

# Pandemic- resilient communities powered by DRE



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ARE is the global association for the decentralised renewable energy (DRE) industry, catalysing private sector-driven markets for sustainable electricity services, creating jobs and powering equitable green economies in emerging economies. With more than 15 years of experience and 200 members, ARE enables improved energy access through business development, policy and visibility support for its Membership along the whole value chain of DRE technologies.

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GET.invest is a European programme which supports investments in renewable energy. The programme targets private sector business and project developers, financiers and regulators to build sustainable energy markets in partner countries. Services include market information, a funding database, matchmaking events and access-to-finance advisory. Since 2022, GET.invest powers the Team Europe One Stop Shop for Green Energy Investments, an access point for information about and facilitated access to European support and financing instruments for energy projects and companies in Africa. The programme is supported by the European Union, Germany, Sweden, the Netherlands, and Austria, and works closely with initiatives and business associations in the energy sector. Find out more at [www.get-invest.eu](http://www.get-invest.eu).

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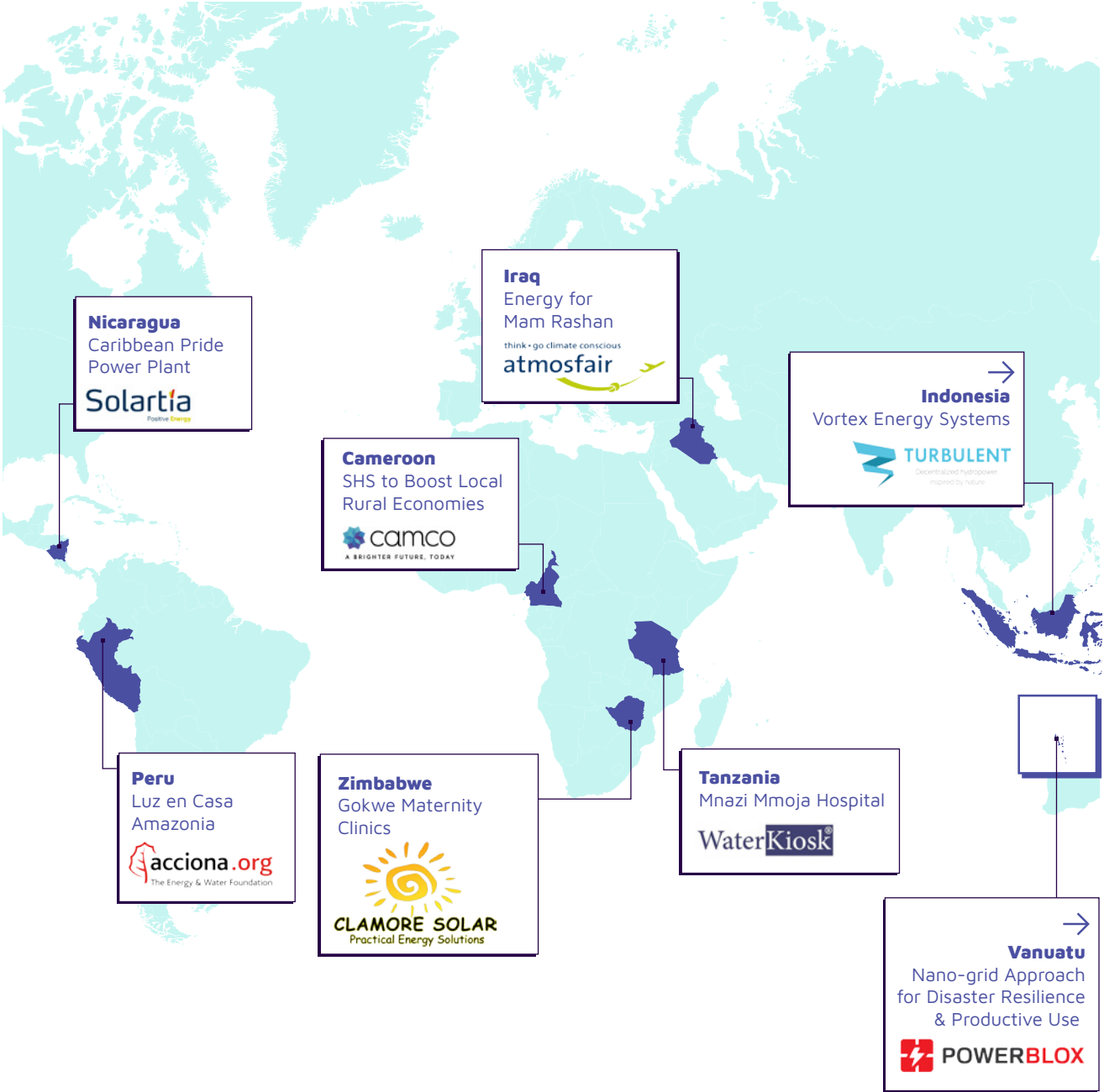


# Portfolio of case studies

The portfolio of case studies showcases innovative solutions and best practices from successful projects supporting rural communities recover better and faster from the pandemic, with a particular focus on climate change mitigation, adaptation and resilience.

Organisation	Project & Country	Challenge	DRE solution	COVID-resilience
<b>acciona.org</b>	Luz en Casa Amazonia - Microgrid Pilot Project in Copal Urco   Peru	3 hours of electricity a day + expensive diesel	Solar PV	More financial resources available
<b>Atmosfair</b>	Energy for Mam Rashan   Iraq	Unreliable grid connection + limited financial resources	Solar PV	Relieving economic stress
<b>Camco Clean Energy</b>	SHS to Boost Local Rural Economies   Cameroon	No grid connectivity	Solar Home System (SHS)	Stable energy for health centres + remote working and education possible
<b>Clamore Solar</b>	Gokwe Maternity Clinics   Zimbabwe	Limited power for clinics	Solar PV + borehole	Improved COVID-19 response
<b>Power-Blox</b>	Nano-grid Approach for Disaster Resilience & Productive Use   Vanuatu	Reliable and disaster-proof energy supply needed + difficult access to financial resources	Solar PV nano-grid	Economic growth leading to overall community resilience
<b>Solartia</b>	Caribbean Pride Power Plant   Nicaragua	Outdated diesel generators, high energy cost, recurrent blackouts + vulnerable to natural disasters	Solar PV mini-grid energy storage system	Hurricane-resistant energy supply to health centre and PUs
<b>Turbulent Hydro</b>	Vortex Energy Systems   Indonesia	Unreliable and unsustainable grid connectivity	Hydropower	Reliable electricity for schools and community
<b>WaterKiosk</b>	Mnazi Mmoja Hospital   Tanzania	Limited access to stable supply of clean and hygienic water in rural health care facilities	Solar-powered desalination plants	Increased COVID-19 response capacity and more financial resources available

# Map of Case Studies





# Luz en Casa Amazonia

## Microgrid Pilot Project in Copal Urco

### Location

Department of Loreto, Peru

### Total project budget

EUR 185,000

### Company name

acciona.org Foundation  
(project developer)

### Partners

- acciona.org Peru (project development & implementation, project financing)
- The Napo council (beneficiaries)
- The community's Microgrid Electrification Committee (beneficiaries)

### Project period

June 2020 – ongoing

## The challenge

In the four years prior to the project, the rural community of Copal Urco only had access to three hours of electricity per day, through a 45 kW microgrid fed by diesel.

Luz en Casa has been providing Solar Home Systems (SHS)-based electricity to the most isolated households in Copal Urco for three years, reaching about 2,200 households across the Loreto region.

The current phase of the programme aims to extend off-grid electrification through a solar PV microgrid to increase the availability of electricity and avoid fossil fuel use in the unique environment of the Amazonian rainforest.

In the context of COVID-19 and the consequential financial impact, the availability of affordable electricity for the community ensures its resilience and capability to cope with rising costs in other domains.

## DRE solution

The chosen solution was a 33.5-kWp solar PV station with a 95-kWh lithium battery-based electricity storage system (a diesel generator remained as a back-up system), combined with electricity meters including a prepayment software.

The solution is based on a tailored pay-for-service and service management model, whereby:

- acciona.org has projected an affordable cost per kWh for users to buy the electricity.
- Electricity users will purchase a certain amount of kWh at the Luz en Casa Centre.
- Preventive maintenance of the new systems remains responsibility of the users through a trained community group of operators.
- The corrective maintenance, annual revision of the systems and replacing of equipment due to end of lifetime are the responsibility of acciona.org, without extra cost for the community.

## Project outcomes

- The solution installed provides at least six hours of electricity per day to 60 households (5:30 to 6:30 and 18:00 to 23:00), 24 hours to three schools, one health centre and one community centre and three hours of street lighting at night.
- The project contributes to increased gender equality and to bridge gaps between urban and rural areas, as the improvement of the electric system and the facilitation of daily activities allow for more time for productive, domestic, educational, health or entertainment activities. Such as favouring the local



commerce in the communities thanks to cooling systems for small grocery shops.

- During the COVID-19 pandemic, the electricity provided by Luz en Casa connected the community and classes were delivered online.
- In addition, the project creates green jobs. For example, a new job was created for the maintenance of the PV station installed. The operator, a member of the committee, is paid (the rest of the responsibilities of the committee are assumed voluntarily without any remuneration).
- Finally, the project contributes to mitigate climate change by avoiding 50 tonnes of CO<sub>2</sub> per year and other environmental risks, such as fuel leaks into the Napo River, in the heart of the Peruvian Amazonia.

### Key recommendations for international funding partners & regulators

The support of national bodies to develop such programmes is essential. The provision of a sustainable supply of electricity in such isolated contexts requires subsidies to make the payment affordable for users and economically viable for the service suppliers. Tailored regulations, community involvement and local expertise are critical factors to ensure the success of the project.

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# Energy for Mam Rashan

## Location

Kurdistan, Iraq

## Total project budget

EUR 1,500,000

## Company name

atmosfair GmbH (project development & implementation)

## Partners

- Federal state Baden-Württemberg (Stiftung Entwicklungs-Zusammenarbeit Baden-Württemberg (SEZ)) (project finance)

- Several equipment and service donors (project finance)
- Elk-Erneuerbar (engineering); Martany (civil works) Autarsys (battery); ZnShine, REC, Luxor, NSP, AEG (PV modules); Kaco. Refusol (inverter); Zimmermann PV-Stahlbau (mounting structure: manufacturing)
- Greentech (O&M supervision)
- Nawar Aeena (O&M provider & local partner)

## Project period

May 2017 – ongoing

## The challenge

The camp Mam Rashan was built in 2015 in response to the thousands of IDPs (Internally Displaced Person) caused by the ISIS. The camp is currently home to ~10,000 people who cannot go back to their destroyed or unsecure villages. Mam Rashan is one of 22 IDP camps in the region of Dohuk, Iraq and it is designed to be one of the permanent camps. The camp is connected to the national grid but suffers from recurrent electricity shortages in the whole region, mainly during the night. As a result, IDPs cannot cool their containers during the day (reaching 40°C outside) or use electrical equipment, such as fridges.

Some IDPs that can afford it, are connected to a diesel generator run by a private operator. However, for the most vulnerable IDPs, free electricity is their only solution, a situation intensified due to the economic impact of COVID-19.

## DRE solution

As the region has a high solar irradiation and electricity is mostly required during the day, the most suitable solution was to build a PV

plant (980 kWp) with a battery storage (800 kWh), together with a low voltage grid in parallel to the national grid. The installation of the plant was done by IDPs supervised by atmosfair and a local site manager. The site manager and some of the IDPs are now the O&M team of the plant, supervised by Greentech.

The plant was installed in two phases. As the first installation was not enough to cover the electricity demand of the camp during the day, it required an energy management system, which allowed to supply the load groups in a rotating system. A plant extension combined with a limitation on the connected load per household have made it possible to cover the demand of all households at the same time.

## Project outcomes

- Especially during the COVID-19 pandemic households benefited from the project which provides electricity to 1,840 households free of charge and covers some shops and workshops during the summer.
- Through the installation and O&M works, the project created 40 short term and 10 long term jobs within the camp for the IDPs.



- Where the users used diesel generators beforehand, the solution has helped to avoid CO<sub>2e</sub> emissions, about 1,000 tonnes of CO<sub>2</sub> per year.

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## Key recommendations for international funding partners & regulators

- Consider DRE at the camp implementation phase and combine it with the national grid if possible, to avoid a costly and complicated system.
- Offer a tariff system that is affordable to all, e.g., a basic amount of electricity for free and a fee for any extra demand.
- International funding (grants and low-interest loans) is required to cover the high initial costs.



# Solar Home Systems

## to Boost Local Rural Economies

### Location

Various sites, Cameroon

### Total project budget

EUR 9,700,000

### Company name

Camco Clean Energy, as the investment manager of the Renewable Energy Performance Platform (REPP) (project financing).

### Partners

- Agence de la Transition Ecologique (ADEME); BPI France; COLAM
- Impact; EDFI ElectriFI; Energise Africa; Gaia Impact Fund; Lendahand; LITA; Power Africa; INCO, ANAXAGO; Persistent; Camco-managed (REPP) (project financing)
- upOwa (project development & implementation)

### Project period

September 2019 – ongoing

## The challenge

Around 40% of Cameroon's population currently lives without access to electricity. In rural areas, comprising 42% of the country's population, only one in five households has access to the national electricity grid, despite the high penetration of mobile technologies that are dependent on electricity.

With extension of the national grid being both costly and time-consuming to large parts of the population, access to power remains a major hurdle for households, businesses and essential services, which affects socio-economic development in the country and the achievement of national sustainable development goals.

## DRE solution

upOwa provides reliable and cost-effective electricity through SHS. SHS allow end users to utilise DRE for essential services, such as lighting, cell phone charging, access to media (radio, TV, internet), healthcare and education, as well as for extending operating business hours in rural areas. By employing a service-based pay-as-you-go model, customers are not burdened by the relatively high upfront cost of the

systems, and are able to pay over time.

In addition, with REPP's assistance, upOwa has established a [Gender Action Plan](#) to mainstream gender into their operations and increase the number of female customers.

## Project outcomes

- 4,269 tonnes of CO<sub>2e</sub> avoided, contributing to the implementation of target of reducing GHG emissions by 35.5% (of which 11.2% is expected to come from the energy sector).
- To date, 24,715 SHS installed across two central regions in Cameroon, providing 117,455 people with first-time access to electricity with an expected 900,000 to be connected by 2023.
- 758 micro businesses and 211 essential services including schools, and water-pumping stations connected, strengthening the resilience of low-income populations.
- Reliable electricity provided to health care facilities was essential to face COVID-19. The increased electric capacity allowed vaccines to be stored and supported medical machines essential to treat patients in respiratory dis-

tress due to the virus.

- Reliable electricity was key to education during COVID-19 lockdown allowing students and teachers to stay connected.
- The DRE solution supported the economy by allowing remote work.
- Reduced electricity costs allowed people to invest their money elsewhere.



## Key recommendations for international funding partners & regulators

### Financiers:

- Provide flexible investment and patient capital for innovative business models.
- Provide technical assistance and capacity building for investees to identify and manage environmental and social risks, further business development and scale up their operations.

### Governments and development partners:

- Design tailored subsidy programmes to improve affordability of low-income populations and ensure equitable coverage, taking into account the logistical costs in the hard-to-reach areas.
- Incentivise gender equality and diversity through results-based finance.
- Ensure that DRE is part of national electrification policies and strategies, thus sending a clear signal to the private sector.
- Facilitate transparent, efficient and predictable customs and tax application processes, tailored to the DRE sector.

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# Gokwe Maternity Clinics

## Location

Midlands Province, Zimbabwe

## Total project budget

EUR 318,129

## Company name

Clamore Solar (system installation)

## Partners

- UNICEF (project financing)
- EnviroEarth (lead EPC)

## Project period

March 2021 – ongoing

## The challenge

In Gokwe, local health care facilities used to operate with limited power and constant power cuts, in turn affecting the delivery of care services and making the storage of vaccines an issue.

During the implementation, the project team engaged local young people as part-time contract workers for the trenching, loading and offloading equipment from trucks.

As a result, both the power systems and delivery of services in the health care facilities significantly improved, and there was a notable increase in the number of people who received vaccines, improved maternal health, and decreased child mortality.

## DRE solution

The DRE solution was chosen as a sustainable solution to the problem, and it also gave the centres a comparative advantage by allowing them to monitor and control their power usage.

The solutions include a solar borehole that enables patients to access clean and safe water. The maternal ward and the health care facilities as well as staff quarters are fully operating on the solar station that was installed.

A total of six health care facilities had solar systems installed and each system comprised of:

- 4 x Axitec Axistorage II 10S (40kWh);
- 2 x Victron SmartSolar MPPT 250/100 VE;
- 1 x 5 kVa Victron Quattro 48/5000/70-100;
- 22 x 375-W (8kWp) Solar array on a ground mount carport structure.

## Project outcomes

- One cold storage of COVID-19 vaccines with a reliable source of power.
- Borehole, solar geyser, solar lights and household use for each health care facility and 2-3 staff houses per health care facility.
- Some of the material used was purchased from local businesses. The project team comprised of eight people. During installations, the team also employed 20 youths within the community.
- Improved access to clean and safe water through the solar powered borehole. Enhanced maternal health services by providing sustainable power to the maternal ward.
- The betterment of the plight of women by reducing childbirth complications. The financially disadvantaged can now access health services from their local health care facilities.



## Key recommendations for international funding partners & regulators

- Funding partners and service providers should conduct a detailed site assessment to estimate project costs, to avoid under- or over-quoting.
- Funding partners are encouraged to develop a quality and standard document that will guide the implementing partners on the funder's expectations.
- There should be a clear indication of the nature of infrastructure and roads by the implementing partners that the service providers will be using during the project.

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# Caribbean Hybrid Power Plant

## Location

Corn Island, Nicaragua

## Total project budget

EUR 4,000,000

## Company name

Solartia (prime contractor, EPC, training)

## Partners

- ENATREL - the National Energy Transmission Company (executing agency)
- IDB (project financing & technical advisor)

## Project period

May 2018 – ongoing

## The challenge

As Corn Island is isolated from the Nicaraguan mainland, it suffered from high energy costs, constant blackouts and brownouts, and plodding technical support, besides being completely vulnerable to natural disasters.

The island is traditionally powered by five 900 kVA outdated power generators that ran on diesel, yet people did not have power 24/7; appliances and electronic devices were constantly damaged by peak surges. As a result, there was no improvement in education, nutrition, economic growth and sustainability.

COVID-19 added further stress to an already difficult situation, deepening the isolation of the island because of restrictive measures and emphasising the need for reliable energy supply for its health centre.

## DRE solution

Solartia was chosen to build a mini-grid that integrated 2.1 MWp solar PV + 2.1 MWh lithium-ion energy storage system + 900 kVa diesel generator.

The solution was to develop a self-sustaining power source with the ability to integrate different sources of energy (renewable or non-renewable) to provide access to cost-effective and reliable electricity such as a mini-grid.

## Project outcomes

- This project allowed the local health facility to face the pandemic by providing stable energy supply needed for the treatment of COVID-19 patients. Furthermore, it provided essential services to 8,000 people in the island (nearly 3,500 households) as well as productive use activities, such as better conditions for the fishery industry, local shops, and tourism.<sup>1</sup>
- Four direct jobs were created for maintenance, and 60 indirect jobs in food services such as stores and small restaurants.
- 381 tonnes of CO<sub>2</sub> emissions were avoided as the reliance of fuel was reduced by 60% on the island.
- The project increased the resilience of the island to natural disasters and the awareness of climate change adaptations in the community. During the 2021 hurricane season and the COVID-19 crises, logistics were strongly affected. The mini-grid allowed the island's community to have access to electricity despite the harsh meteorological conditions. The system installed endured two Category 5 hurricanes without interruptions.
- Access to electricity allowed women to spend less time on household chores and gave them more time to pursue other activities.

<sup>1</sup> Tier 4 electricity



## Key recommendations for international funding partners & regulators

- Allocate more funds for DRE in order to accelerate energy independence, grid parity, and climate change resiliency.
- Develop DRE roadmaps for Central America and the Caribbean.
- Build DRE partnerships with international, experienced companies that know the region.
- Guarantee transparency in contract awarding.
- Guarantee that qualified companies execute DRE projects to avoid early failures or decommissioning.
- Invest in capacity building for installations more than for design.

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# Nano-grid Approach

## for Disaster Resilience & Productive Use

### Location

Lelepa Island, Vanuatu

### Total project budget

EUR 200,000

### Company name

Power-Blox AG (project development & implementation)

### Partners

- UNDP (project financing)
- PCS Ltd (project development & implementation)

### Project period

June 2020 – ongoing

## The challenge

Vanuatu has not yet found a comprehensive electrification solution for the approximately 60 inhabited islands, despite many efforts and support from various donors. Despite the implementation of some mini-grid projects, they have been so expensive that no scalable business model could be found. The remaining households had to rely on pico-solar systems, if there was any electricity at all. The country has good potential for productive uses in various areas – e.g., fishing or tourism –, which the solutions implemented so far have not been able to power.

In addition, Vanuatu is repeatedly hit by terrible storms that have destroyed part of the country's infrastructure. This situation is particularly problematic for remote islands without fast access to specialised professionals. It also makes access to investments more difficult, as investors fear total infrastructure failure as severe storms increase due to climate change.

The existing difficulties were amplified by the severity of the COVID-19 pandemic that further isolated the island.

## DRE solution

Power-Blox coordinated with UNDP to provide islanders with access to sustainable, affordable and 'disaster-proof' solar-based electricity that

was reliable to supply energy needs for households and productive uses such as the health care facility. Furthermore, it supplies electricity to small businesses, schools and churches.

Power-Blox's nano-grid approach met increasing energy needs thanks to its modular scalability and allows the locals to operate and maintain the solar battery cubes independently to ensure the long-term sustainability of the system. Electricity is sold to the connected households by local sales agents. Similar to prepaid mobile tariffs, the local households can choose among four prepaid electricity packages. After the purchase of a package, the local sales agent charges the customer's credit by activating the package on the customer's smart meter.

## Project outcomes

- 140 households and around 500 people, a health care facility, school, shop and two churches were electrified in the pilot project on Lelepa. The number is projected to raise to 90,000 people, including 44,237 women, with a total of 17,785 households in the next project phases.
- Two direct jobs created, and more indirect jobs expected, linked to productive use applications, that will be provided to produce souvenirs and food refrigeration. Indirect jobs derived from the entire project are expected



to increase in fishing, poultry farming, fruit processing and tourism, accounting for 250 new jobs and USD 2.68 million per year in income.

- An annual reduction of around 25,000 metric tonnes of CO<sub>2e</sub> equivalent is expected once the project has been fully rolled out to all 60 islands.
- The project has enabled the economic development of the islands, specifically in fishing, post-harvest processing, food conservation, tourism, souvenir manufacturing and access to critical services such as water and communications. It has also strengthened disaster resilience and food security of the rural households.
- Women are the main operators of the energy infrastructure and electricity trading in the business model.

### Key recommendations for international funding partners & regulators

- Providing tiered, blended finance models to implement a project of this scale is essential. For instance, risk minimisation in the form of a first loss guarantee helps to attract international investors.
- It is essential to provide a guarantee with concessions or concession-like contracts to protect the investment and to regulate the potential integration into the national power grid in the contracts.

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# Vortex Energy Systems

## for an Ecological School

### Location

Bali, Indonesia

### Total project budget

EUR 50,000

### Company name

Turbulent (project development  
& technology provider)

### Partners

The Green School: ecological educators

### Project period

2017 – ongoing

## The challenge

For years, the Green School in Bali has been looking for a replacement for the unreliable and unsustainable electricity of the national grid. The network is very unstable and at the same time they wanted to have an energy source that is coherent with their philosophy. The goal was to produce clean energy from the river.

The COVID-19 pandemic was an additional challenge for the school that had to adapt to remote classes, which needs reliable electricity for the whole community.

## DRE solution

Hydropower vortex energy systems are characterised by the relatively low complexity of the civil works, installation, and maintenance. By using low head hydropower rivers and canals, the end-customers/users get access to constant and reliable electricity.

Turbulent Vortex Turbines are developed with the help of local contractors.

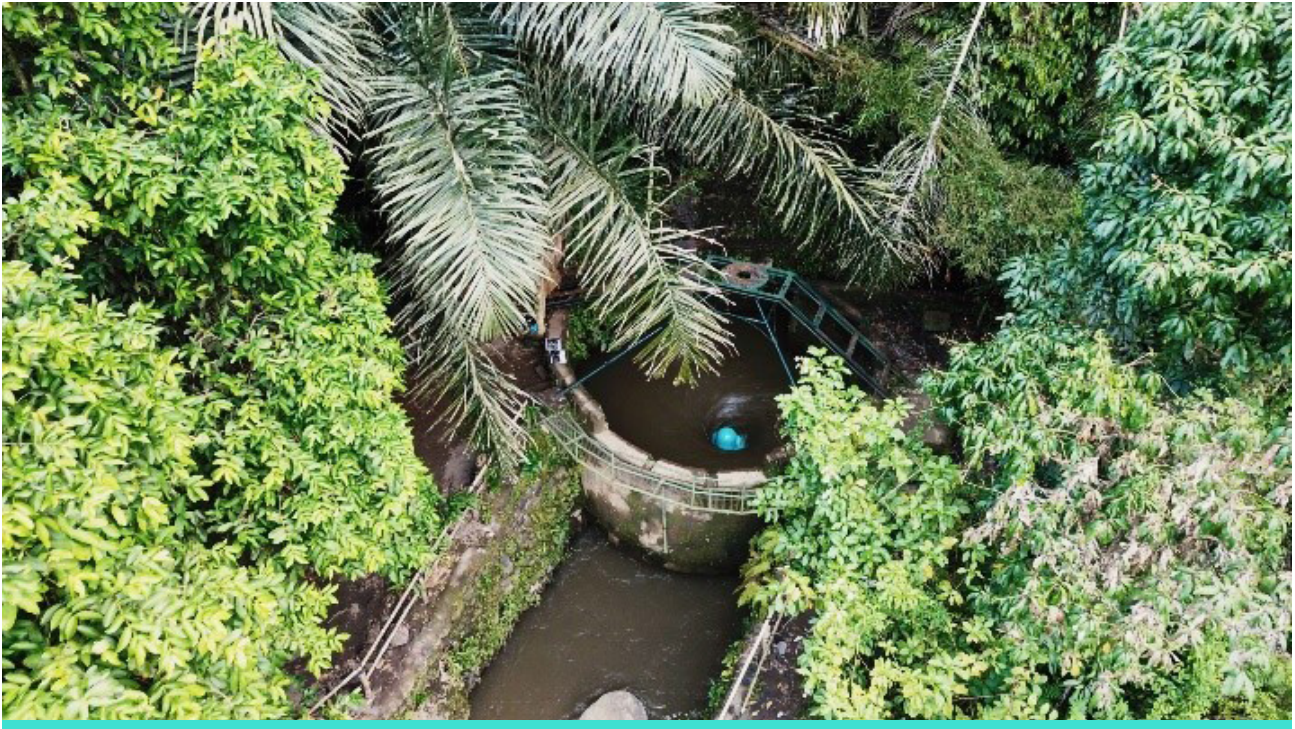
Turbulent is evaluating the possibility of manufacturing and assembling its systems locally in several emerging countries. In doing so, Turbulent provides efficient energy solutions that have a strong performance at a very low cost, without the need for backup diesel or

storage. The solutions installed included a 15 kWp system in Bali.

The turbine is used for autonomous electricity consumption, as well as for educational purposes.

## Project outcomes

- By installing a vortex hydropower system, it is now possible to produce more electricity than the school is using, which they can share with the surrounding community, allowing students and teachers to be in constant contact and continue classes during lockdown.
- A school with 500 students and four houses connected to green and reliable electricity.
- Training of local technical team for maintenance.
- A contractor and technical maintenance jobs created.
- 62 tonnes of CO<sub>2e</sub> emissions avoided.
- 60-80% reduction of electricity costs. The reduction of costs was achieved through the improvement of the grid quality and reliability.



## Key recommendations for international funding partners & regulators

Portfolio investment funds should be available to streamline access to finance for smaller projects.

Currently, development funds only look at projects with a cost of millions, which then they evolve towards large scale, non-sustainable, non-socially responsible megaprojects.

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# Solar Energy

## for COVID-19 Response to Mnazi Mmoja Hospital

### Location

Stone Town, Zanzibar, Tanzania

### Total project budget

EUR 250,000

### Company name

WaterKiosk Ltd (system installation & operation)

### Partners

- Boreal Light GmbH (manufacturer and project financing)
- KfW DEG (project financing)
- Lady Fatemah Charitable Trust (funding)

### Project period

November 2021 – ongoing

## The challenge

Many health care facilities in rural areas need a stable supply of clean and hygienic water, especially in water-scarce areas, and where levels of salinity are too high for drinking purposes. With the COVID-19 pandemic, health care facilities capacities and their access to clean water have been pushed to the limit due to the increased number of patients and COVID-19 guidelines (i.e., frequent hand washing, disinfecting facilities, etc.) and drove the water needs of Mnazi Mmoja health care facility higher than ever before.

## DRE solution

To help improve the situation in Tanzania and especially Zanzibar, Boreal Light GmbH and the German government founded a project that was installed and operated by WaterKiosk Ltd., with the objective to provide 100 m<sup>3</sup> of clean water per day to Mnazi Mmoja health care facility. To do so, saline polluted water is treated in the decentralised desalination plant, entirely powered by solar energy.

A solar array was installed at the facility site to feed a well water pump and a desalination system, 60 kWp in total. The capacity of the installed desalination system amounts to 10,000 l/h. The system is equipped with pre-filters, UV disinfection lamps, a reverse osmosis module and different pumps. The solar-powered wa-

ter desalination solution is eliminating the lack of or insufficient electricity. This solution also solves the problem of costly fuel, especially during covid times, and high carbon emissions.

## Project outcomes

- Since February 2022, solar panels with a total installed capacity of 60 kWp ensure reliable, independent access to clean drinking and sanitation water to the Mnazi Mmoja hospital health care facilities with 776 beds.
- Diesel engines have been eliminated from the operational site, as well as water hauling.
- 300 tonnes of CO<sub>2</sub> emissions are avoided per year.
- The excess of solar electricity supports the internal electricity load of the health care facility.
- Three new direct jobs have been created by employing operational staff. The jobs created during the projects remain as long as the plant is operated.
- Employees of any gender and age can operate and maintain the plant, fostering women inclusion in the project, with four female operators today.
- Timely implementation to respond to limited access to clean water as well as respond to financial constraints due to COVID-19.





## Key recommendations for international funding partners & regulators

When it comes to health care facilities, water is not just water, it is medicine. Renewable energy that provides electricity and clean water can play an important role in reducing electricity and water bills for patients and monthly expenses for health care facilities. The offset generated can be invested in improving other areas of the health care facilities thereby improving the quality of health care.

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