



Microgrid Solutions

OFF-GRID ENERGY SUPPLY WITH MICROGRIDS

The main driver for microgrids in remote areas is the access to a reliable and affordable power supply. Different customer groups have different priorities, whether they are trying to meet growing energy demand, reduce their costs, improve the reliability of their supply or reduce their environmental impact.

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Customers located in remote locations, such as islands or sparsely populated regions, often do not have access to a suitable grid connection for energy supply. This affects a wide range of applications from remote towns and villages, through island holiday resorts to remote mines.

Remote Communities

Millions of villages in remote areas have no access to electricity and are unlikely to be connected to the public grid in the near future due to the infeasible costs of grid extension. Growing electricity demand and rising diesel costs are putting increasing pressure on current off-grid solutions and power outages are becoming more frequent. Microgrid solutions - including solar energy, battery energy storage systems (BESS) and gas or diesel gensets - are the solution to provide reliable electricity for households and commercial applications in remote communities, additionally supporting the reduction of carbon emissions and reducing the need for transport and storage of fuel. At the same time, local economic development is supported through energy cost savings and the access to a secure power supply.



Microgrid on a Nicaraguan island

Remote Hospitals

Off-grid solutions can bring energy to almost any corner of the world, avoiding huge investments in infrastructure, and enabling healthcare institutions to take better care of their patients. For hospitals and clinics, electricity is indispensable, with a secure and stable power supply essential to ensure good care for patients, especially for sensitive equipment and medical procedures. In remote areas, where a grid connection is not available, the dependency on diesel means high energy costs and sometimes an unreliable supply, for example if transport of fuel is interrupted.



Albert Schweitzer Hospital

Renewable Energy Integration in Nicaragua

As an example, on this Nicaraguan island, the increasing electricity demand caused existing diesel generators to no longer be sufficient to provide energy for the 8,500 inhabitants, who were suffering regular power outages. With the installation of a solar power plant and a BESS, the increased load is now provided reliably, with blackouts prevented and grid stability improved.

The installation consisted of 6,372 photovoltaic modules and a mtu EnergyPack providing an energy storage capacity of 22.2MWh. This integrated, all-in-one solution is perfectly suited for difficult climates and geographical conditions and saves the local community 95,000 litres of diesel per month.

Reliable and Affordable Power Supply for a Hospital in Haiti

The Albert Schweitzer Hospital in Haiti is the only 24/7 hospital with full service in the region and serves a population of around 350,000 people. The electricity supply of the hospital is generated by diesel generators, at a cost of over US\$ 400,000 a year. The installation of a roof-mounted solar system and two mtu EnergyPacks (506kWh/332kVA) helped to reduce these costs by more than 50%

The battery energy storage system takes over the 'grid-forming' function of the diesel generator, thereby sometimes allowing the genset to be switched off entirely. Surplus electricity is stored and saved for later use. At the same time, the microgrid controller regulates the hybrid network, thereby assuring stable and secure operation, with maximum energy generated from the solar system. The microgrid is able to reduce CO2 emissions by approximately 200 tons per year.

Remote Hotels and Resorts

Hotels and resorts in remote locations promise scenic views and an excellent opportunity for relaxation, but customers expect the guarantee of a steady power supply and ideally at the same time a low carbon footprint. These exclusive resorts often do not have access to a local power grid and must rely on expensive diesel, with high generator maintenance requirements and sometimes with unreliable

fuel delivery. Another challenge for resorts and hotels reliant on 24/7 running diesel generators is that the noise can also disturb customers. Solar power can provide significant fuel savings, but only during the day, and generators are still required to balance the system or to provide energy overnight. To provide an eco-friendlier energy supply, solar power can be combined with a battery energy storage system. In this case, the battery supplies energy to smooth the profile of energy generation required from the diesel generators, enabling them to operate more efficiently, and making additional fuel savings. Where excess solar power is generated during the day, this can be stored in the battery potentially even allowing the generators to be switched off completely.

Hotel in Chile switches to eco-friendly energy

The Tierra Atacama Hotel is located in the Atacama Desert in the North of Chile. It has 32 rooms, a Spa and many other amenities. The hotel installed 156 kW of solar power together with a 180 kW mtu EnergyPack QS battery energy storage system that also facilitates efficient communication between the solar power and diesel generators. The hotel now saves more than 100,000 litres of diesel each year (a saving of 60%).

The generators are shut down for 8.5 hours on average each day. The Tierra Hotel provides a unique relaxation experience and thanks to the eco-friendly energy system, the generators are switched off during the day, and guests can enjoy even more peace and quiet.

Remote Mine

Electricity accounts for a large share of a mine's annual operating costs and as resources become scarcer, mining companies are

increasingly being forced to operate far off the beaten track, where a grid connection is not available. Operations such as crushing, milling, conveying and pumping, as well as transport and staff accommodation, create continuous high energy loads and costs that can negatively influence a site's profitability. However, even more important than the cost of generating electricity, is the reliability of supply. If any of the processes are interrupted by a power failure, the whole mine operation may come to a halt, and there can be significant cost and safety implications.

Most mines have huge potential for generating renewable energy, for example using their often abundant additional space for installation of solar panels. This not only saves on fuel costs and avoids logistical challenges with fuel transport and storage, but also helps to reduce carbon emissions. The carbon footprint of mines and other industrial applications is increasingly being scrutinised by local governments and authorities and in some cases a reduction in emissions is even necessary to fulfil legal requirements or access government incentives or tax cuts.

When it comes to microgrid solutions for mining facilities, the mtu EnergyPack is a key component for improving reliability and profitability. It stores electricity from any source – diesel or gas-powered generators, wind turbines or solar panels – and delivers it right when it's needed. Designed as a scalable, all-in-one solution, the mtu EnergyPack is able to stabilise the power supply and with its embedded control functionality, can automate and optimize the operation of the complete energy system. This gives the mine owner piece of mind that their energy supply is reliable, cost-optimised and as eco-friendly as possible.



Tierra Atacama Hotel, Chile

Rolls-Royce provides world-class power solutions and complete lifecycle support under our product and solution brand mtu. Through digitalization and electrification, we strive to develop drive and power generation solutions that are even cleaner and smarter and thus provide answers to the challenges posed by the rapidly growing societal demands for energy and mobility.

We deliver and service comprehensive, powerful and reliable systems, based on both gas and diesel engines, as well as electrified hybrid systems. These clean and technologically advanced solutions serve our customers in the marine and infrastructure sectors worldwide.