

POWERING REMOTE ISLANDS

THE HYBRIDISATION OF EXISTING DIESEL-POWERED GENERATION WITH WIND TURBINES, SOLAR PHOTOVOLTAICS AND BATTERY ENERGY STORAGE SYSTEMS OFFER SMALL REMOTE ISLANDS A MORE RELIABLE, COST EFFECTIVE AND CLEANER SOURCE OF POWER.



Estimates suggest that some 700 million people live on islands, with many countries in regions such as Asia and the Pacific being considered island nations. The Philippines and Indonesia are great examples, between them the two countries have around 25,000 islands, of which almost 17,000 have permanent habitants. Like other island-rich territories they face challenges with the process of generating power consistently and economically for populations which are often sparse and widely distributed. Fraser Galbraith, Engineering Adjuster with Integra Technical Services, explains “usually it is not economically viable to justify connecting a small island to the main grid via submarine or overhead cables. Most small islands are served by micro-grids powered by imported diesel and bunker (freighter) oil generators”.

That approach comes at a financial and environmental cost, not least that imported fuel is expensive. Islands often suffer from rolling blackouts and unplanned power outages with, in many cases, weak daytime demand not justifying a 24/7 service. A typical island will have only 4-5 hours of electricity a day: not ideal



PV GENERATORS



WIND TURBINES



CONVENTIONAL GENERATORS



STORAGE



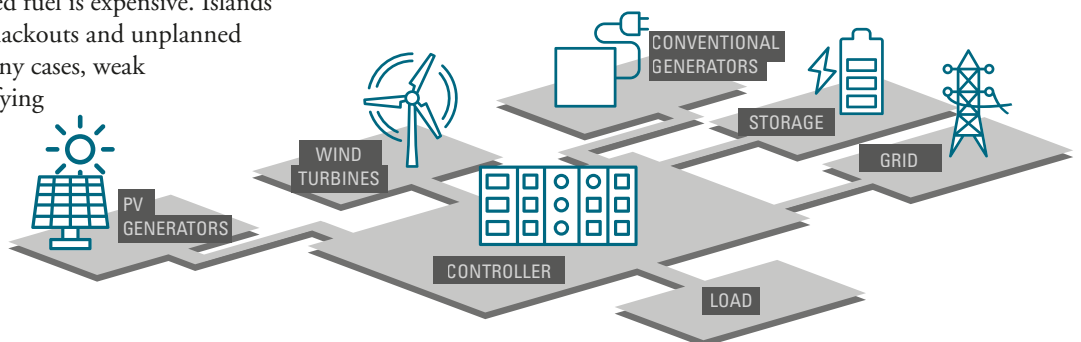
GRID



CONTROLLER

LOAD

Example Hybrid Plant



when services like refrigeration, internet and mobile phone use depend on 24-hour power. In many village locations, electricity is critical to the production of clean water.

Unsurprisingly, renewable energy is a huge part of the solution: solar, onshore wind and combined hybrid solutions. Offshore wind is not generally part of this picture, even though (i) there’s plenty of it and (ii) it’s popular in other Asian countries such as China and Taiwan.

The micro-nature of energy provision that we are talking about – small, isolated communities generating power locally – means that only smaller-scale modular solutions are feasible. Small solar panels and onshore wind turbines with diesel generators continuing to make a contribution – but in a more limited and less economically demanding way. Fraser suggests “the ideal world sees solar being used during the day; with support from wind to meet heavier demand with diesel generators and battery storage used to top up and stabilise the micro-grid”.

According to Phil Durrant, Managing Director Europe, Middle East & Africa at Integra Technical Services “hybrid solutions are now being introduced into many islands. As well as the usual risks relating to solar, renewables and diesel generation, developers and operators will need to consider additional risks associated with transport, labour, geographical and social risk”.

TRANSPORT

One of the most significant challenges is transporting the machinery. As Fraser points out “the road infrastructure on many islands is not well developed, and often renewable energy machinery (especially wind) is cumbersome, sensitive and easily damaged”. Transportation to the construction site can be a significant operational headache, given the practical risks posed by the existing infrastructure.

LABOUR

Because the island economies largely focus on traditional sectors such as farming and fishing, hi-tech construction experience associated with a renewable energy plant may not be available in local island labour markets. Even the relatively small turbines and sub-stations used in these island contexts require specialist construction and project management skills. It is usually possible to import specialised labour, but at a cost, which is what the small island co-operatives who are looking to implement the solutions are trying to avoid.

Phil suggests that “solar panels are different: they are easy to install, often plug-and-play. Which of course also makes them easy to steal”. We will touch on this in more detail below.

GEOGRAPHY

Geographical remoteness complicates the insurance requirement and brings loss adjusting challenges in the event of a claim. Assuming Delay in Start-Up (DSU) cover has been purchased, geographical remoteness may be a limiting factor when it comes to mitigating the loss in terms of the impact the insured event has to the critical path.

Manufacture often occurs a long way from an island (e.g. China or Germany) and in a highly scheduled, build-to-order production model. If something gets damaged, then there will be delays while a manufacturing slot can be found for the replacement. It's not economic or practical to rely on storing back-up parts in close proximity to the site/plant. And then there is shipping; although the land-based wind turbines that are suitable for these island installations are not huge (compared to, for example, offshore turbines)

they are still substantial. Shipping is really the only feasible logistical solution, so chartering time and cost also have to be built in.

Fraser suggests “overall there's a good chance if any damage occurs delays will then be long – and thus consequential in insurance terms. Damage to even a small part could result in a delay of 1-3 months, and a full turbine replacement 6-12 months. This is a headache not just for the EPC contractor or operator but for the DSU insurer and the loss adjuster too”.

The geography of the islands also makes them vulnerable to seismic activity and climate effects. Earthquakes, tsunamis and floods are all realistic threats. Both solar panels and wind farms are vulnerable to flooding, unless deliberately sited on higher ground which is by definition even more remote than the coastal regions; and thus comes with both a higher construction cost and risk of damage in transit. Earthquakes and tsunamis, of course, can result in catastrophic damage to the plant in even the best-intentioned location.

SOCIAL FACTORS

Phil points out that “surprisingly insurers are receiving more claims from social factors than from the other risks – wilful damage, vandalism, theft of machinery, even arson”. Wind farms, even small ones, are arguably noisy and ugly. Despite the economic and development benefits they bring, they aren't universally popular with local residents and are prone to being vandalised. And because the particular wind turbines that are economic for island co-operatives are on land, they're easily accessible.

According to Fraser “solar panels can easily be stolen and be operated functionally by the person stealing them. And often are”. This raises a whole set of questions for the loss adjuster in assessing claims – for example whether appropriate security precautions were taken in line with the policy terms and conditions.

According to Technavio, the global hybrid power systems market will experience a compound annual growth rate of over 8% from 2019 to 2023, growing by some USD231 million. Small island grids are likely to become more commonplace bringing economic and environmental benefits, alongside some unique risks.