How we turned solar rays into sustainable off-grid power

Delivering a bespoke solution that provides 22+ hours of off-grid sustainable power per day to a remote site security station.

- Demonstrating a more sustainable method of energy production
- Reducing generator run time by 703 hours per month
- Deferring 2,379L of diesel consumption per month
- Eliminating 6,497kg of carbon emissions per month

In the Scottish Highlands, Balfour Beatty are delivering improvement works as the principal contractor working on the Skye 132kV Reinforcement Project.

The aim of the project is to provide residents and businesses in the most remote areas of Scotland with reliable energy for the future by improving existing transmission infrastructure.

To carry out the works, Balfour Beatty has constructed a team of 300 personnel, however due to the isolated nature of their works, daily commuting won't be possible. So, they have built the first of many accommodation villages to house their team during work periods.

Our equipment and services supplied at a glance

- 30kVA Solar Pod
  - 1x integrated generator
  - 1x integrated 36kWh lithium energy storage capacity
  - 12x integrated solar panels
- 2.5kW Bespoke Solar Extender Solution
  - 6x 415W solar panels
  - Featuring bespoke DC connections into the solar pod
- Full solution installation and commissioning
  - Including equipment transportation, delivery and associated lift plans

Challenges

In a newly established village like this it can take between 2-5 years to attain a grid supply of energy, so temporary power is required in the meantime. One vital area of this site is a guard's post. This is used to screen those entering site, control access accordingly and stop any possible intruders to ensure the complete safety of those living on this remote site. The guard's post is made up of a standalone cabin which includes a toilet, kitchenette and security apparatus, all of which needs to draw power to function.

As keen advocates of sustainability, Balfour Beatty initially challenged us with supplying 17 hours of sustainable power daily to the guard's post. Once this had been achieved, we were certain that we could enhance the sustainability achievements even further - aiming to increase it to 20 hours per day. So, we pitched the idea and formed a closely aligned sustainability workstream, challenging both of our organisations to bring together expertise in the space and push the bar higher than ever before with a new solution. Ultimately this would reduce generator run time, drive down fuel consumption and minimise associated emissions.

Considering the small designated footprint at the guard's post, the design needed to be compact, efficient and simple to erect.

Solution

In phase 1 of the guard's post delivery, implemented from August 2025, we were able to achieve 17 hours of sustainable daily power by implementing a 30kVA solar pod solution – a smart hybrid solution that features a generator, battery storage unit (BSU) and integrated solar panels all working in tandem. When demand is high the generator runs and charges the battery simultaneously, when demand is lowered the battery takes over entirely to deliver the truly sustainable power, all of which is supported by the integrated solar panels to drive down fuel burn further. Once we'd met the 17 hours requirement we knew we could push the bar higher up to 20 hours of sustainable power.

Building on the 24kW output capacity of the solar pod, our experts began phase 2 by designing a solar frame set to house 6x solar panels. This bespoke solution would add a further 2.5kW of solar capacity.

By working in a truly collaborative fashion with the frame fabricators, we developed a foldable solution for ease of transport, situated at 40-degrees for maximum sunlight exposure with bespoke DC connections delivering the power injection directly into the solar pod.

Creating something like this from scratch based on specific criteria required us to curate a truly collaborative approach, leveraging varying expertise from across teams to draw out different viewpoints and enabling us to arrive at the most appropriate, effective solution.

Result

The results of the solution are staggering. This solution shows just how effective a solar setup can be, even in the Scottish Highlands – an area far from notorious for extremely sunny spells. We were able to overdeliver on the promise of 20 hours, instead achieving 22+ hours of instant, sustainable power - all provided to the guard's post, supporting all activities in the area.

The solar pod itself reduced the integrated generator run time from November 2025 to December 2025 by 377 hours, deferring 1319L of diesel burn at a cost of £2,177 at £1.66 per litre, ultimately eliminating 3,484kg of carbon emissions. These figures reflect a 51% efficiency rating, and with the integration of the solar frame we were able to reach 95% efficiency. In its first month, from June 1st 2026 to July 1st 2026, the bolstered solution cut generator run time by 703 hours, deferred 2,379L of diesel burn at a cost of £4,060 at £1.66 per litre, therefore eliminating 6,497kg of carbon emissions. During this first month of operation, the solution managed to run purely on solar and battery power for 6 consecutive days at a time, demonstrating the extent of its capabilities.

These savings represent the capability to deliver sustainable results, off grid in the most remote of locations, to a truly vital element of a high-profile site. It also represents a new way of working in the energy industry, showcasing the possibilities of sustainability.

Bespoke sustainable solutions

Delivering measurable results

Supporting vital areas of site

Leave the how to us.

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