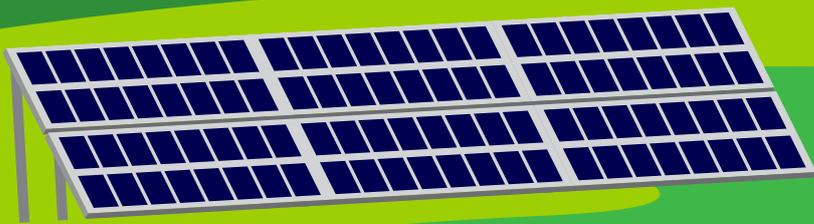


Case Study Milnathort



Summary

- **Location:** Milnathort, Kinross, Scotland
- **Capacity:** 34.4 kWh
- **Type:** Solar PV system
- **Developer:** AES Solar
- **Owner:** Domestic Customer
- **Panel type:** Q Cell 405W Solar PV Modules
- **Completion date:** October 2024



Founded in 1979 in Moray, AES Solar quickly established itself within the growing solar power market. Today it is one of the oldest manufacturers of solar thermal collectors in Western Europe. With over four decades of industry experience, it now offers Solar PV and battery storage solutions alongside its solar thermal panel, the AES Luminary. The company's dedication to excellence and environmental stewardship has earned it national recognition, including The Queen's Awards for Enterprise in Sustainable Development.

Overview

This project features a powerful 34.43 kWp Solar PV system, designed to provide reliable and sustainable energy for a new build residential property in Milnathort. With access to six acres of land on the site of their new property, the homeowner was keen to utilise the large space available and maximise the solar generation opportunities of the system. The main driving force behind this substantial system was to enhance the sustainability of the new build and the overall goal of achieving energy independence. Backup power was also important to our client to ensure an uninterrupted power supply in the event of a grid outage.

The solar PV system is comprised of 84 ground-mounted Solar PV modules installed on a custom-designed Sunfixings Framework, optimised to deliver clean energy and long-term cost savings. To complement the solar array, a battery storage system has been installed consisting of nine SolarEdge Home Battery 400V 10kWh units, providing a total storage capacity of 90 kWh significantly contributing to the client's desired energy independence. Additionally, a SolarEdge Backup Interface was integrated to enable seamless backup power, further reinforcing the homeowner's energy security.

The system is powered by three high-efficiency inverters, two SolarEdge 6kW Home Hub Solar PV Inverters, and one SolarEdge 5kW Home Hub Solar PV Inverter. These inverters maximise the solar harnessed by the solar panels and stored in the battery units while optimising the overall system performance. These inverters were housed in a purpose-built log cabin, approximately 200 metres from the main property, constructed in advance by the homeowner



Project Summary

The customer approached AES Solar looking to explore solar and storage solutions for their new-build property, listing high energy consumption and sustainability as the main drivers for pursuing this option.

The customer had a solid understanding of solar and storage technology and as a result, had a general idea of the system size and the technology options available. Keen to maximise their generation opportunities as much as possible, they came to us aware their roof would be too small and actively seeking out a ground mount option. This decision was made particularly easy thanks to ample land available on their property.

Additionally, a large battery storage system was requested alongside the Solar PV system. This was to make the most of the free, renewable energy generated for self-reliability and energy independence purposes, as well as to minimise energy consumption from the grid. Self-reliability was a key priority, making it essential that the system provided backup power in the event of a grid outage.

The customer also valued the ability to actively monitor system performance and gain real-time insights into their solar generation, battery usage, and overall energy consumption which made the SolarEdge system an obvious choice.



Meeting the customer's requirement for a backup interface (BUI) did not come without its challenges. SolarEdge recommends a maximum distance of 100m for the communication connection between the inverter and the BUI. However, as the system's internal components were to be housed in a log cabin located 200m from the main property and its grid supply, this would double the maximum recommended distance. As a result, SolarEdge initially deemed a BUI unfeasible due to potential communication and power supply limitations over that extended range.

The system design also posed its own challenges, particularly due to the large-scale Sunfixings Frame required to position and fix the solar PV array to the ground. The quality of ground at the chosen site was considered poor quality and there were concerns over how to secure the Sunfixings Frame without relying on an excessive amount of concrete. The challenge was to find a solution that ensured stability while keeping concrete down to ensure the design remained efficient, cost-effective, and environmentally responsible.

Outcomes

Throughout the installation of the ground mount solar PV system, battery storage and associated backup interface (BUI) there were several challenges that required careful planning, research, and collaboration to ensure project success. The team had to find solutions that balanced efficiency, cost, and reliability whilst keeping environmental impact to a minimum.

One setback was the poor ground quality at the proposed site for the ground mount solar PV system which meant that securing the Sunfixings Frame without using too much concrete was a challenge. Too much concrete would increase costs as well as the project's carbon footprint. To address this, a reinforced concrete slab was chosen instead of multiple small bases. The slab was reinforced with rebar to increase its strength and improve the stability of the structure. This required precise adjustments to the original design, ensuring space for the base supports of the Sunfixings Frame whilst accommodating the rebar.

These design modifications were achieved through close collaboration between AES Solar, Sunfixings, and the customer. The customer took responsibility for arranging the groundwork, ensuring that preparations were completed in advance. This proactive approach helped streamline the installation process, reducing costs and maintaining structural integrity whilst keeping environmental impact to a minimum.

Multiple solutions were considered to combat the challenge we faced with the placement of the backup interface (BUI). One option was to move an inverter, along with its batteries and Solar PV panels, to the main building, placing the BUI nearby to serve as the primary inverter. However, this was deemed unfeasible by the client. Other alternatives, such as extending the Ethernet connection using Fibre, DSL, a POE Switch, or a dedicated Gigabit Ethernet link, were also proposed. However, SolarEdge advised against these options, as they would not support the necessary 12VDC power supply for the BUI.

Following ongoing conversations and recommendations from SolarEdge, our technical design team determined that the best solution was to use a Belden RS485 cable. This choice was driven by the cable's superior efficiency in transmitting data over distances beyond 100m.

Designed with high-quality materials and strict manufacturing standards, Belden cables ensure signal integrity over long runs thanks to enhanced insulation, thicker conductors, and superior shielding against interference. This cable allowed for both reliable communication and the required 12VDC power transmission over an extended distance. By implementing this solution, the system's reliability and functionality were secured.

The success of the project was due to the strong collaboration between all parties involved, as well as continuous monitoring and adaptability. The customer played a crucial role in ensuring that the groundwork and cabling were prepared in advance, which streamlined the installation process. Any additional challenges that arose were effectively managed through ongoing assessments and adjustments. By maintaining a proactive approach, the project was completed successfully, ensuring a robust and efficient solar power system that met all functional and environmental requirements.

Local Benefits

An installation on a private residential property might not initially be seen as one that can bring direct benefits to a local community at first glance. However, AES Solar have been contacted by several neighbours and local community members who, after seeing the system for themselves and hearing about its success, are now interested in exploring solar and storage solutions for their own homes.

Community Benefits

The system has ignited interest and curiosity within the local community, raising awareness of solar energy and energy independence. It has encouraged others to consider how solar and storage solutions could benefit their own lives while also making a positive impact on the environment. This effect is especially noticeable in smaller towns and villages across Scotland, such as Milnathort, where a strong sense of community fosters conversation and connection.

This "word-of-mouth" effect is a great example of how one successful installation can inspire others, promoting wider adoption of sustainable energy solutions and contributing to a more environmentally conscious community.



Learn more about what's happening at AES Solar at www.aessolar.co.uk



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