

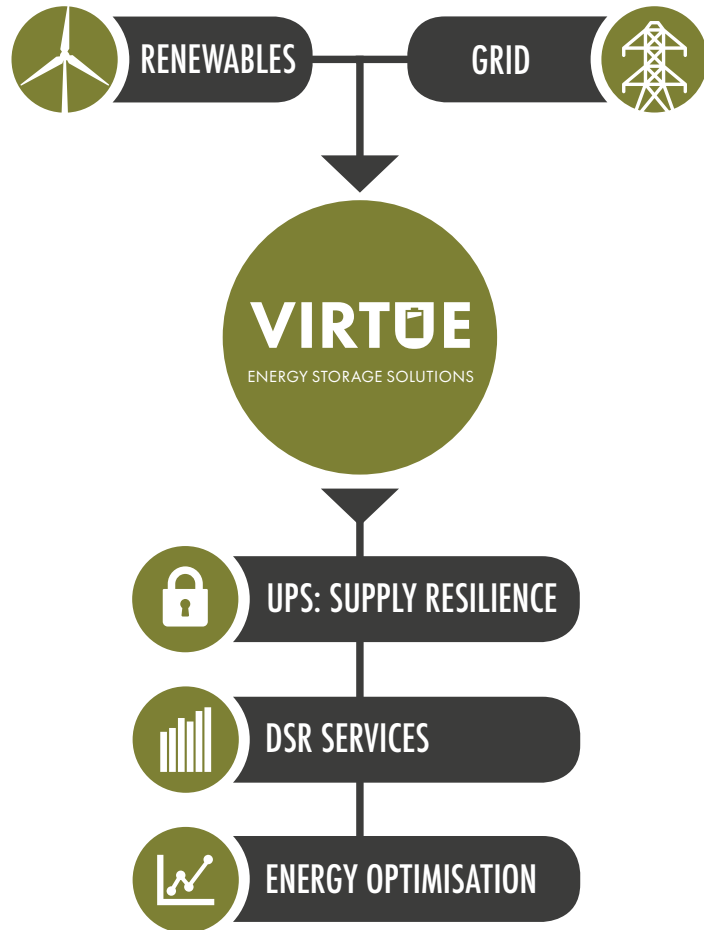
VIRTUE

ENERGY STORAGE SOLUTIONS

A COMPLETE ENERGY
STORAGE SOLUTION
FOR BEHIND-THE-METER
APPLICATIONS



ENERGY STORAGE SOLUTIONS



Powerstar VIRTUE is a complete integrated energy storage and microgrid solution with smart grid control for behind-the-meter (BtM) applications.

It is forming an integral part in the future development of smart cities, enabling energy generated from sources such as wind and solar to be stored locally and ultimately utilised more efficiently.

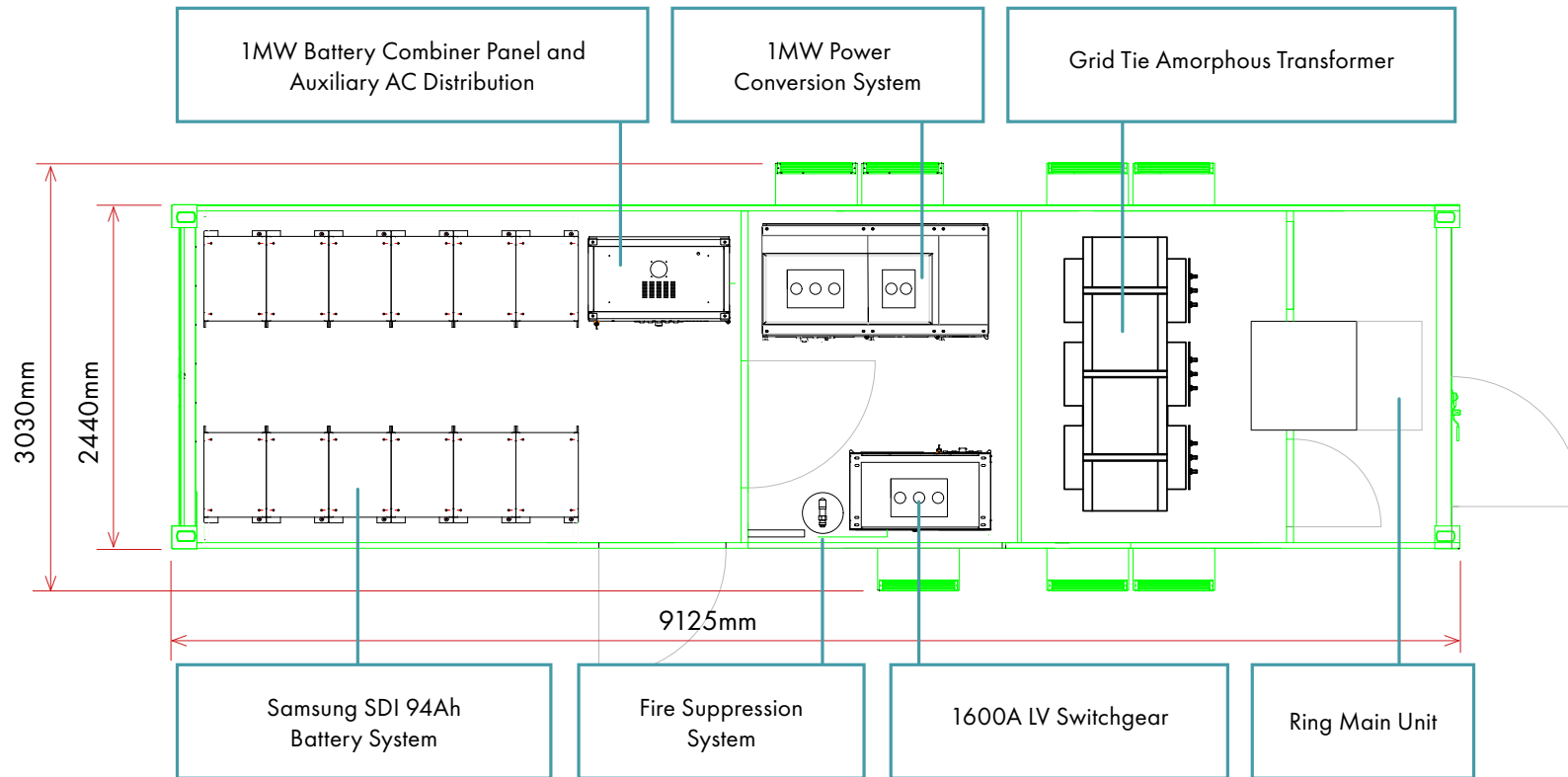
Powerstar VIRTUE has full UPS capabilities for supply resilience and can be integrated with existing energy efficiency assets, such as solar (PV), CHP, wind, biomass and voltage regulation to provide enhanced benefits including reduced energy consumption, costs, and CO₂ emissions.

As the UK transitions towards a truly carbon neutral landscape, the requirement for solutions that can not only maximise existing assets but also reduce reliance on the grid, and provide tangible benefits such as site-wide protection from supply issues is growing significantly. As a bespoke solution, Powerstar VIRTUE can provide exactly that.

HELPING BUSINESSES ON THEIR JOURNEY TO CARBON NEUTRALITY

VIRTUE SYSTEM TYPES

VIRTUE is a scalable solution that can be installed inside or outside, depending on the site characteristics and needs. Every solution is manufactured bespoke to meet the unique requirements of the client. Below shows a blueprint of a 1MW/1.1MWh solution built for an outdoor, containerised application. This solution was delivered to provide full UPS capabilities utilising Samsung SDI 94Ah battery cells. It includes G59/3 protection panel and a super low loss amorphous core transformer.



EXAMPLE CONTAINERISED SOLUTION

POWERSTAR VIRTUE ENABLES THE SMART USE OF ENERGY IN A COMBINED, FUTURE-PROOF SOLUTION

VIRTUE APPLICATIONS AND TECHNOLOGY PREVIEW

VIRTUE energy storage solutions are built bespoke to each customer's requirements. Systems can be connected in parallel to provide output up to 10MVA and storage up to 50MWh storage. VIRTUE can be combined with new or existing systems such as CHP, biomass, wind and solar (PV) to cover a variety of applications.

TECHNOLOGY APPLICATIONS

Behind-the-Meter

- Battery energy storage
- Site wide UPS
- Voltage regulation



Maximise renewables

- Battery energy storage
- Renewable generation



Battery buffered EV charging

- Battery energy storage
- Electric vehicle charging
- Solar PV



Maximise existing cogen

- Battery energy storage
- CHP



3D MODEL EXAMPLE OF A 1 MW POWERSTAR VIRTUE SOLUTION



1 MW SOLUTION INSTALLED AT A CRITICAL COMPONENTS MANUFACTURER

POWERSTAR VIRTUE IS A BESPOKE SOLUTION DESIGNED TO THE SPECIFIC REQUIREMENTS OF A SITE

HOW POWERSTAR VIRTUE BENEFITS YOU

Powerstar VIRTUE is an energy storage solution that enables a more intelligent approach to the use of electricity, from peak shaving to maximising existing generation, and providing an opportunity for new sources of revenue through demand side response. As each system is built upon the unique requirements of the customer, it has the ability to provide multiple benefits including:



OPERATIONAL BENEFITS

- Power resilience through full Uninterruptible Power Supply (UPS) capabilities
- Ability to maximise existing assets such as renewable generation and CHP
- Energy optimisation through voltage regulation
- Harmonics reduction and power quality improvements
- Remote monitoring capabilities for enhanced visibility of asset performance and optimisation
- Intelligent and optimised use of energy offers increased flexibility



COST SAVING BENEFITS

- Minimise transmission (Triads) and distribution costs (red DUoS)
- Capacity Market (CM) levy avoidance
- Average reduction of 25% off your electricity bill



REVENUE OPPORTUNITIES

- Balancing services: frequency response
- Balancing services: energy arbitrage
- Capacity Market (CM)
- Renewable portfolio balancing



MAXIMISE

Get the most out of your existing assets by integrating them with VIRTUE



SAVE

Switch to stored energy when required to maximise revenues and save energy



ELIMINATE

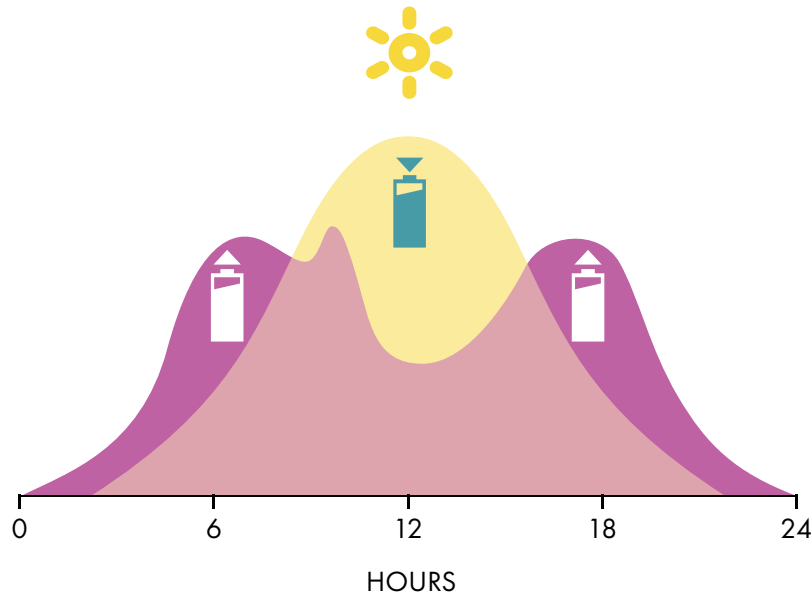
Eliminate operational risk through the full load UPS capabilities of VIRTUE

AS A BESPOKE SOLUTION, VIRTUE ENABLES CUSTOMERS TO ACHIEVE THE BENEFITS THEY REQUIRE

INTEGRATED SOLUTIONS FOR **MAXIMUM** BENEFITS

INTEGRATING WITH EXISTING ASSETS

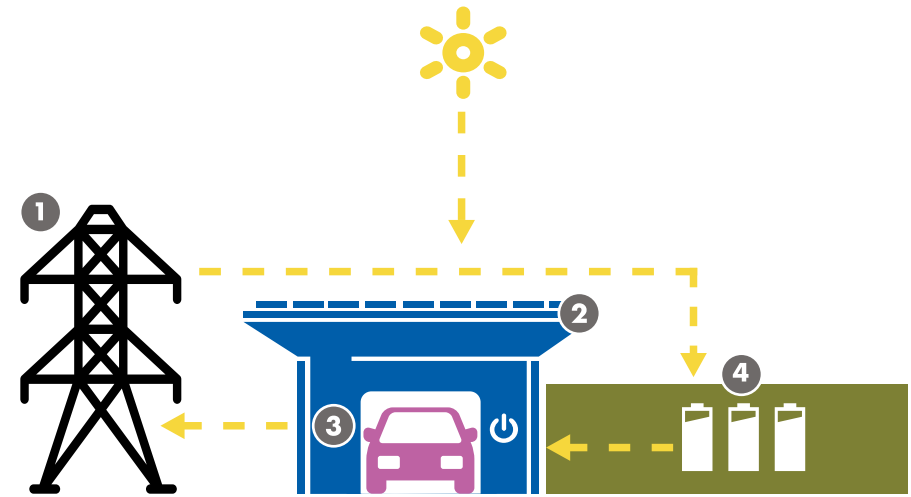
VIRTUE energy storage solutions can optimise solar (PV) arrays by storing energy at peak generation times for use at peak consumption times. By integrating solar and storage systems, VIRTUE is able to better monetise the solar (PV) array.



- Solar energy consumed by your site
- Spare solar energy can be stored by VIRTUE
- Use your stored energy from VIRTUE when you are not generating

INTEGRATING WITH ELECTRIC VEHICLE CHARGING

VIRTUE EV is a combined DC rapid/fast charger and energy storage system with integrated energy storage and solar (PV) canopies. It provides storage with bi-directional grid-tied inverters allowing systems to provide both off-grid rapid charging and fast AC charging allowing a site with limited grid capacity to charge vehicles without upgrading infrastructure.



- 1 Grid supply
- 3 EV charging facility
- 2 Solar canopy
- 4 Battery energy storage

VIRTUE CAN INTEGRATE WITH EXISTING ASSETS TO MAXIMISE CARBON NEUTRALITY EFFORTS

PROTECTING YOUR SITE WITH SUPPLY RESILIENCE

THE GROWING REQUIREMENT FOR SUPPLY RESILIENCE

Although the National Grid system in the UK is extremely reliable, supply issues, such as brownouts or blackouts, are increasingly causing problems to many continuous processes in the UK.

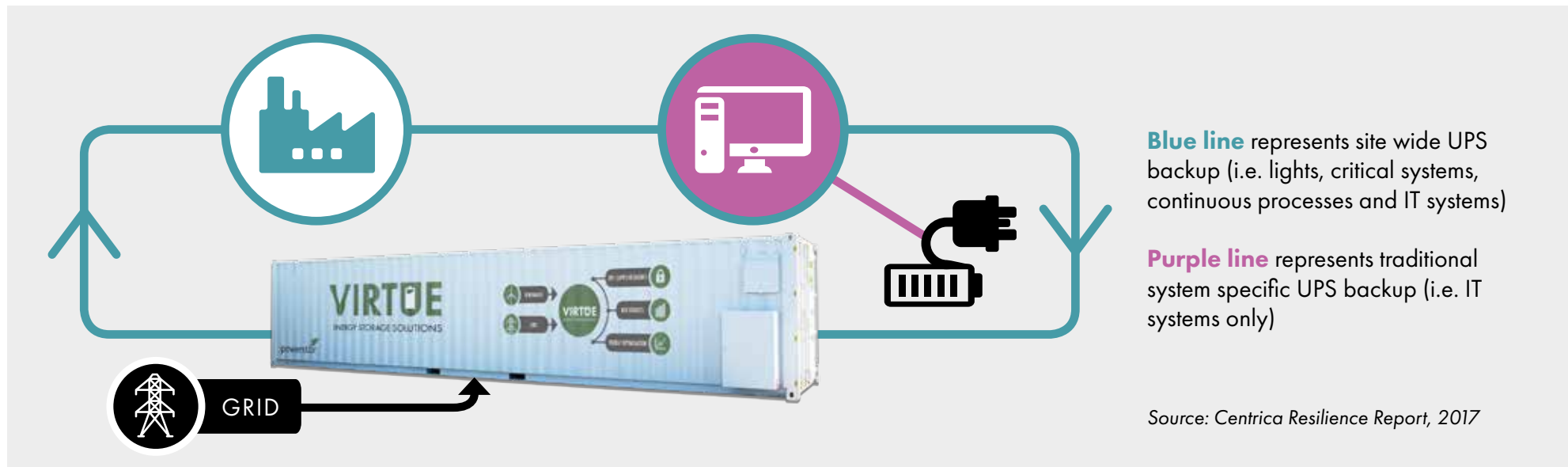
Supply issues are anticipated to increase in the future as more renewable sources are integrated on the National Grid, so having energy storage with full UPS capabilities is of growing importance for behind-the-meter applications.

A Centrica Business Solutions survey in Autumn 2017 highlighted this by reporting that 81% of participants reported an energy failure and that these failures can total up to 17% of a company's annual revenues.

THE ADVANTAGES OF SITE-WIDE UPS

Powerstar VIRTUE can provide supply resilience at a site-wide level, opposed to system specific UPS which is often used to backup IT systems. As an always online in-line UPS system with less than 1ms activation, it affords seamless brownout and blackout protection for IT systems and site-wide critical systems.

In simple terms, in the case of an energy related failure, no matter the cause, Powerstar VIRTUE eliminates any disconnection time and ensures your critical systems remain operational, delivering supply resilience throughout your business.



POWERSTAR VIRTUE HAS FULL UPS CAPABILITIES FOR THE CONNECTED LOAD

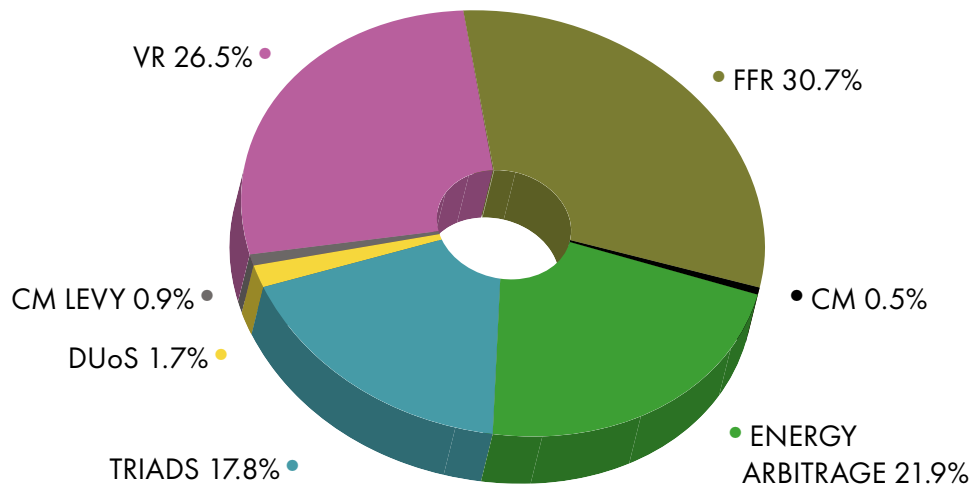
THE BUSINESS CASE FOR VIRTUE ENERGY STORAGE

To illustrate the enhanced savings that Powerstar VIRTUE can provide as a complete solution, this page shows examples of the cost savings and revenue opportunities available, in addition to how the business case adjusts depending on the technology that is integrated into the system, such as Uninterruptible Power Supply capabilities (UPS) or voltage regulation (VR). The examples below show the revenues and savings breakdown based on a medium scenario, 1MW deployment with and without UPS across a 15 year timeframe.

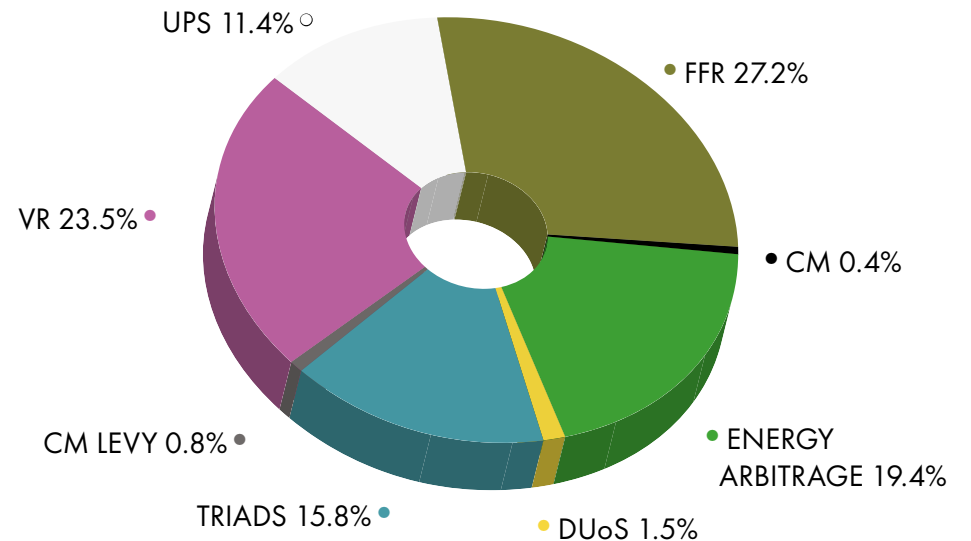
Example 1 reflects the traditional energy storage benefits achieved through grid balancing mechanisms such as Firm Frequency Response (FFR) and energy arbitrage to achieve revenues while savings occur due to minimising Distribution Use of System (DUoS) and transmission (Triads) charges as well as from the patented integrated voltage regulation technology of Powerstar VIRTUE.

Example 2 illustrates how the introduction of UPS can add an additional financial benefit which increases the return on investment (ROI) and could provide more than 10% of the financial benefit of the solution over a 15 year period whilst still generating the revenues and cost savings identified in example 1.

1. Revenue and savings breakdown (15 year) without UPS



2. Revenue and savings breakdown (15 year) with UPS



MAKE SAVINGS AND GENERATE REVENUE WITH VIRTUE TO COMPLEMENT YOUR BUSINESS OPERATIONS

CONCEPT TO COMPLETION

We deliver a full concept to completion service utilising the vast experience that our workforce possesses to understand the unique requirements of our clients and ensure all projects are implemented within required parameters, delivering tangible results without any negative impact on business operations.

The below flowchart shows the step by step process taken to ensure a fit for purpose solution is designed, delivered and verified.



* Warranties apply to systems installed within the UK and are subject to storage technology used. Exact warranties for each system will be clearly communicated as part of the proposal. Warranty will be voided if yearly maintenance performance inspections are not undertaken.

BESPOKE SMART ENERGY SOLUTIONS FROM CONCEPT TO COMPLETION

VIRTUE IN REAL LIFE - CASE STUDIES

Application: Maximising renewables utilising renewable firming, voltage regulation, supply resilience, peak shaving and grid contracts.

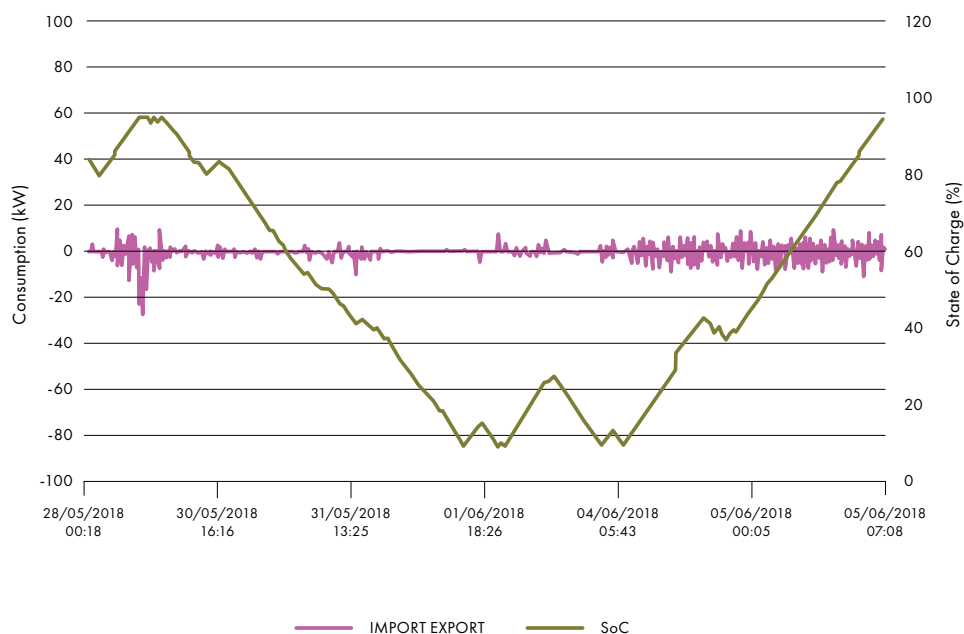
Client: Holiday accommodation provider **Location:** Norfolk, UK
Technology: 100kW BESS, solar (PV) & wind **Project date:** 2017

The results: Following installation, the site used the Powerstar VIRTUE's charging and discharging profile to minimise grid import and export. This contributed towards a 57.5% reduction in the energy consumption of the site.

Application: Enhanced supply resilience utilising voltage regulation, supply resilience, peak shaving and grid contracts.

Client: Supermarket chain **Location:** Cornwall, UK
Technology: BESS & UPS **Project date:** 2015

The results: Following installation, significant energy consumption and cost savings were achieved and the site was able to avoid costly power failures due to the full UPS capabilities.



Full case studies available online at Powerstar.com



- Daily average profile 12 months before installation
- Daily average profile 24 months after installation
- A** Reduction in consumption due to Powerstar MAX
- B** Charging overnight
- C** Discharging during red DUOS/Triads

SECURE YOUR BUSINESS OPERATIONS WITH ENHANCED ENERGY RESILIENCE FROM VIRTUE

FLEXIBLE FUNDING OPTIONS

Whether a multi-national or single site company, businesses require options when it comes to undertaking new projects. That's why we've developed a range of flexible finance options so that you can choose the option that best suits your requirements. From capital expenditure to revenue expenditure and even revenue sharing agreements, our team of experts can provide you with a proposal to best suit your needs.

REVENUE SHARING AGREEMENT

Acquiring VIRTUE via a revenue sharing agreement (RSA) model allows organisations to claim a share of all the benefits associated with improved energy efficiency and energy storage without any capital outlay.

Through the RSA model, all up-front investment for a VIRTUE project is provided by a funder, with the investment recouped over an agreed payback period through the savings and revenues generated.

In this model the risk is absorbed by the funder in return for the revenues, ensuring the customer remains protected.

RSA options are available up to a 15 year term.

RENTAL (or Storage as a Service)

Acquiring VIRTUE via a rental or STaaS™ model is designed to give customers a fixed payment service for the delivery of the energy storage solution.

This provides customer's with the ability to match use with benefits resulting in a cash positive position whilst de-risking the investment with Powerstar's performance guarantee and warranty.

Powerstar provides a service based solution that delivers benefits over time and allows customers to pay for the service provision without any capital outlay.

Rental options are available up to a 10 year term.



TAILORED



FLEXIBLE



TRANSPARENT

As part of our preliminary proposal process, we can provide you with examples modelled to your requirements and can scale our financial solutions to suit you. All packages are subject to eligibility.

ACQUIRE POWERSTAR VIRTUE WITH ZERO CAPITAL OUTLAY THROUGH FLEXIBLE FINANCE OPTIONS

VIRTUE

ENERGY STORAGE SOLUTIONS



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