

# SMART ENERGY TECHNOLOGIES

ACHIEVE YOUR SUSTAINABILITY GOALS AND ENHANCE RESILIENCE



Manufacturers of energy storage, voltage optimisation and smart transformer technologies

SMART ENERGY SOLUTIONS BY **powerstar**

# A FLEXIBLE POWER FUTURE

Powerstar has helped thousands of businesses around the world optimise their electrical consumption and reduce costs, whilst providing power resilience through the manufacture and delivery of its award-winning technologies.

Due to multiple factors, including the continuous rise of non-commodity costs as part of the electricity bill, the constant push from Government to decarbonise, and the need to reduce reliance on fossil fuel sources, securing a flexible power future has never been more important.

Powerstar is dedicated to helping customers achieve their energy efficiency objectives and aspirations based on each site's specific requirements and by considering the site-wide perspective.

**This enables businesses to implement a comprehensive smart grid solution to meet their energy targets, including:**

- Enhancing power **resilience** by delivering Uninterruptible Power Supply (UPS) capabilities to a full or partial load
- Maximising or implementing renewable generation sources to enable **flexibility** by minimising imported energy reducing reliance on the National Grid
- Reducing on-site consumption and enhancing the performance of assets to maximise energy **efficiency**
- Optimising all generation sources and controlling the exported energy to support energy **flexibility** efficiently
- Improving **flexibility** by deploying battery buffered EV charging that is independent of the grid and doesn't require costly grid reinforcement
- Implementing online remote monitoring to new and existing smart energy technologies to provide **insights** into energy use and asset performance
- Upgrading a site's ageing high voltage (HV) infrastructure with smart transformers for improved **efficiency** and real-time **insights**

Based on analysis of your site and goals, Powerstar can model, design, manufacture, and deliver solutions to meet your requirements.

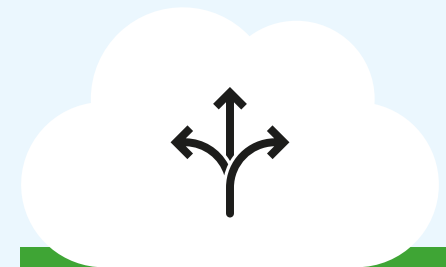
**Contact one of our experts for a no obligation discussion.**

## CREATING A SMART ENERGY SYSTEM



### EFFICIENCY

Improving efficiency will reduce a business' electrical consumption, costs and CO<sub>2</sub> emissions.



### FLEXIBILITY

Controlling energy usage and maximising on-site generation provides greater energy flexibility.



### RESILIENCE

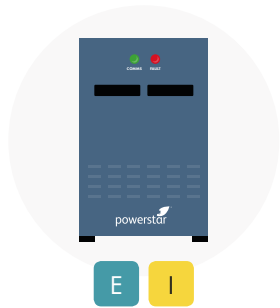
Power resilience delivered by full UPS capabilities will protect against energy-related failures.



### INSIGHTS

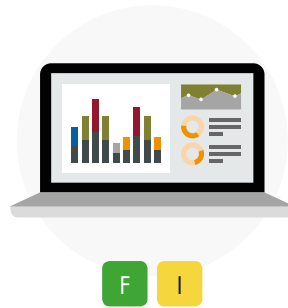
Remote monitoring enables continuous analysis and ongoing insights and improvements.

# UNDERSTANDING THE TECHNOLOGIES



## VOLTAGE OPTIMISATION

Voltage optimisation is a proven technology to reduce electrical consumption and costs, whilst minimising carbon emissions. It works by reducing the incoming supply to a level that is optimal for onsite equipment.



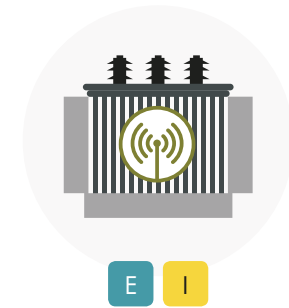
## ENERGY OPTIMISATION SYSTEM (EOS)

An effective EOS allows for a pre-programmed method of asset prioritisation to take place. This optimises system output, managed through a series of complex and real-time algorithms to maximise benefits.



## BATTERY ENERGY STORAGE

Energy storage provides the flexibility required to maximise energy generation and use, giving businesses full control. If required, full Uninterruptible Power Supply (UPS) capabilities will provide power resilience to the full site.



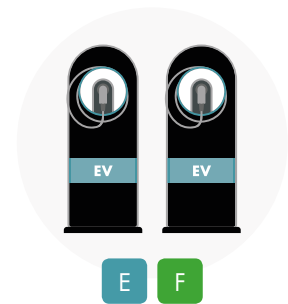
## SMART DISTRIBUTION TRANSFORMERS

Replacing ageing transformers provides energy savings for sites that operate and maintain their own HV infrastructure. Online remote monitoring will enhance performance and maintenance activities by providing 24/7 insights.



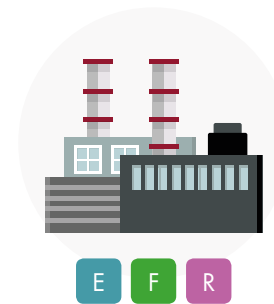
## ONLINE REMOTE MONITORING

Remote monitoring capabilities enable continuous analysis and insights, 24/7, in real time across any connected assets. This enables businesses to identify further areas of improvement whilst offering peace of mind over asset performance.



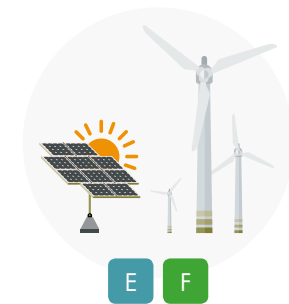
## ELECTRIC VEHICLE (EV) CHARGING

Battery buffered electric vehicle charging enables off-grid fast, and rapid charging through an AC connection. This allows sites with limited grid capacity to charge vehicles without costly infrastructure upgrades.



## SITE LOAD SHEDDING

Deliberately shedding non-critical electrical loads in a planned and controlled manner will reduce electricity consumption and costs. It also provides enhanced management of energy profiles.



## ON-SITE RENEWABLE GENERATION

Renewable generators such as solar (PV), wind and biomass can be implemented or their output maximised through integration with other assets. This provides CO<sub>2</sub> reductions, cost savings and enhanced flexibility for the use of energy.

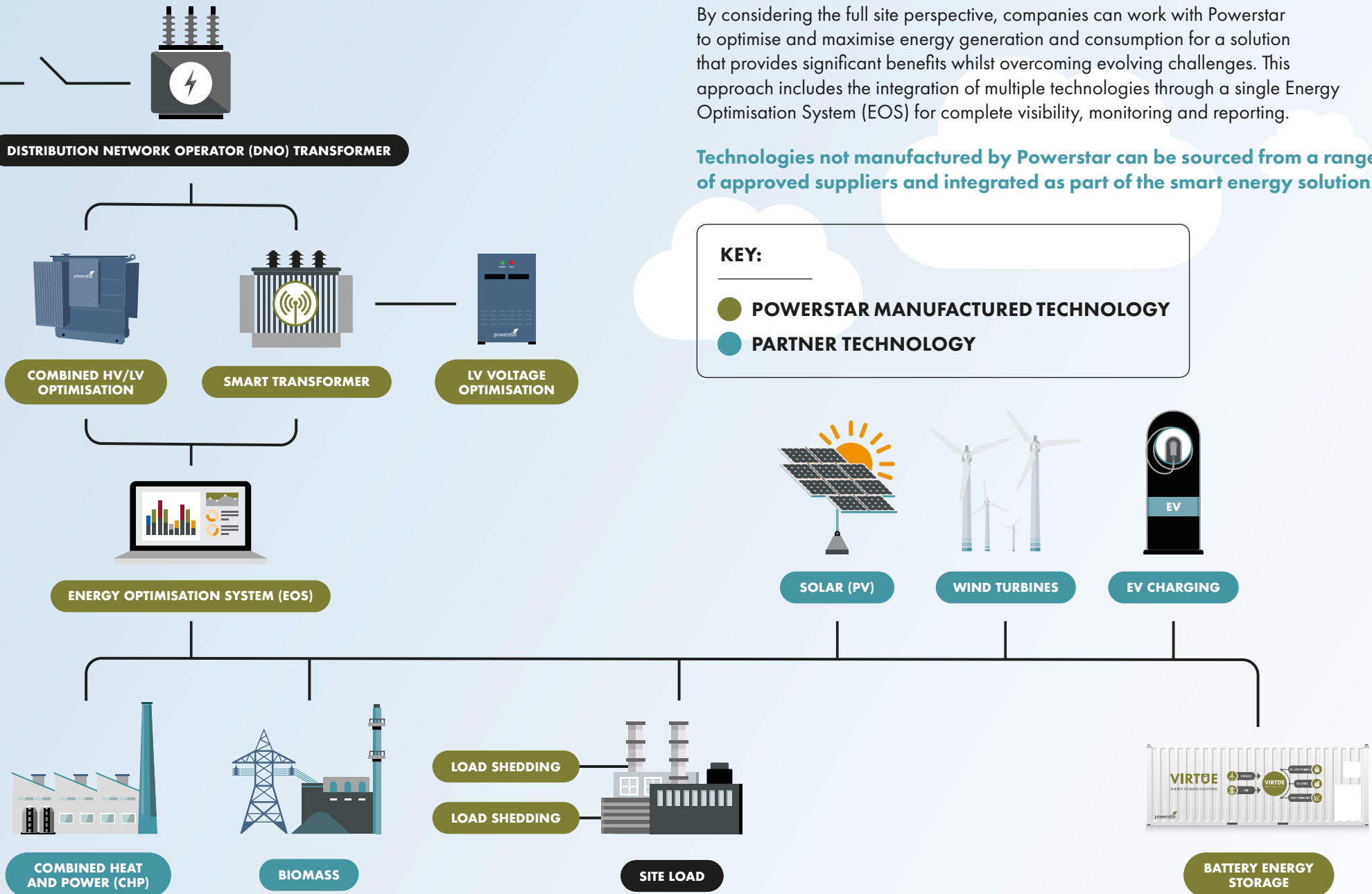
# A COMPREHENSIVE SITE PERSPECTIVE

By considering the full site perspective, companies can work with Powerstar to optimise and maximise energy generation and consumption for a solution that provides significant benefits whilst overcoming evolving challenges. This approach includes the integration of multiple technologies through a single Energy Optimisation System (EOS) for complete visibility, monitoring and reporting.

Technologies not manufactured by Powerstar can be sourced from a range of approved suppliers and integrated as part of the smart energy solution.

## KEY:

- POWERSTAR MANUFACTURED TECHNOLOGY
- PARTNER TECHNOLOGY



# ENERGY OPTIMISATION SYSTEM (EOS)

Powerstar's inhouse developed EOS enables an intelligent and automatic prioritisation of activities to optimise output. It also provides detailed site, grid, and asset information and analytics for customers via a simple online portal.

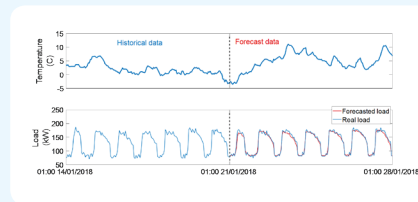
This enables businesses to:

- Optimise energy use through accurate load planning for greater efficiencies
- Maximise onsite generation to reduce reliance from the grid and increase flexibility
- Enhance power resilience with full Uninterruptible Power Supply (UPS) capabilities to protect against power failures
- Access real-time information for ongoing insights and to identify further optimisations

OPTIMISE GENERATION AND CONSUMPTION USE BASED ON SITE PRIORITIES.

## OPTIMISATION ALGORITHMS

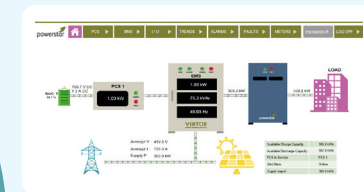
Asset prioritisation is achieved utilising neural network-based AI, which analyses data including load prediction and (where applicable) weather forecasting based on historical data, for strategic load planning.



Load forecast example

## POWERSTAR PORTAL

The EOS outputs all its data on a user friendly, easy to navigate platform that summarises key performance and operational information to enable a comprehensive view of connected asset performance as well as the ability to analyse trends and identify opportunities for further optimisations.



Portal homepage example

## POWERSTAR ENERGY OPTIMISATION SYSTEM (EOS)

## REALTIME ASSET OPERATIONAL DATA

Information from a multitude of assets can be combined into one easy to use platform.

## FLEXIBLE AGGREGATION SERVICES

By appointing an aggregator, some assets can participate in grid-based contracts, such as Demand Side Response (DSR) to generate revenue. The EOS can communicate effectively with these providers.

# YOUR OBJECTIVE: CARBON NEUTRALITY

As Governmental and societal pressures to reduce the rate of climate change continue, one major energy related objective affecting businesses of all sizes is the goal of carbon neutrality.

This refers to achieving net zero carbon dioxide emissions, either through balancing carbon emissions with carbon removal activities, or by eliminating the production of carbon emissions altogether. To achieve carbon neutrality, businesses across all sectors are required to make radical changes in the way they use and manage energy.

For this, opportunities to better utilise existing generation assets and optimise a site's use of electricity must be considered:



**ENHANCING EXISTING GENERATION** by utilising battery energy storage technology to store excess energy for use when desirable generation conditions are no longer present.



**ADDING NEW OR ADDITIONAL GENERATION** to maximise on-site generation including increasing or upscaling existing assets (such as replacing CHP with solar) will enable businesses to achieve a true carbon neutrality. The implementation of renewable generation is vital for true carbon neutrality and the aim should be to replace other generation assets with renewables (such as replacing CHP with solar).



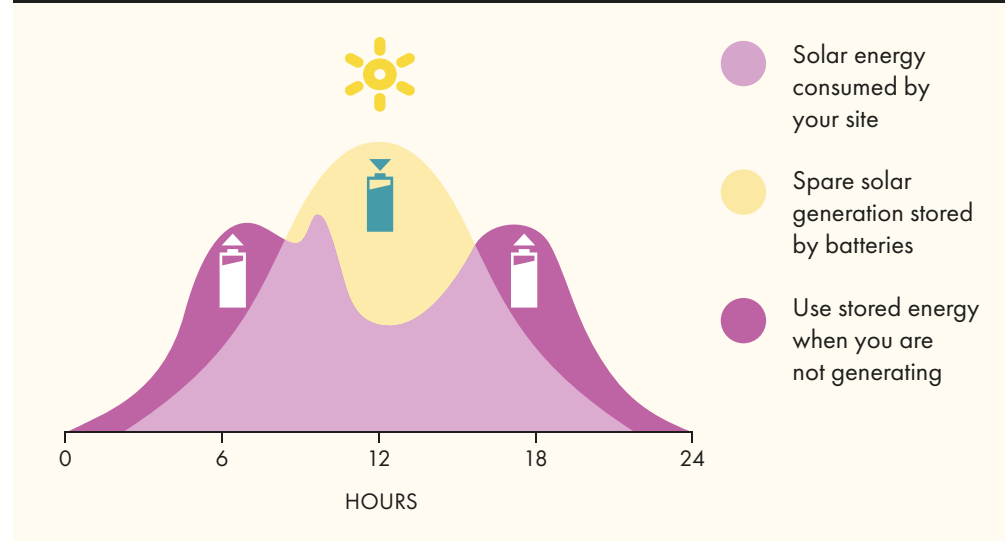
**OPTIMISING EXISTING ELECTRICAL SUPPLIES** by implementing voltage optimisation to reduce electrical consumption, therefore, reducing the reliance on carbon-intensive forms of energy.



**ELECTRIFICATION OF COMPANY VEHICLE FLEET** and utilised logistic methods supported by battery buffered electrical vehicle charging combined with a solar canopy to minimise carbon footprint.

No matter where you are on carbon neutrality journey, Powerstar can help. Submit a consultation request today: [powerstar.com/carbon-consult](https://powerstar.com/carbon-consult)

## REDUCING IMPORTED ENERGY



## ELECTRIFICATION OF FLEET WITHOUT GRID REINFORCEMENT



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

# YOUR OBJECTIVE: POWER 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 business processes in the UK.**

A Centrica Business Solutions survey highlighted this by reporting 81% of participants reported a power failure and that these failures can total up to 17% of a company's annual revenues. At the same time, power resilience and security of supply is now considered to be a top-4 business risk in the UK.

This has led to an increasing amount of organisations seeking to improve their power resilience to protect themselves from the financial, reputational, and operational implications of interruptions to operations.

## POWER RESILIENCE THROUGH SITE-WIDE UPS CAPABILITIES

An effective way of achieving resilience is through Uninterruptible Power Supply (UPS) capabilities. UPS is not a new concept but a new generation of solutions are available that go beyond the system specific benefits that UPS is traditionally known for.

Powerstar VIRTUE provides power resilience to a full site, opposed to providing backup to a particular system such as IT servers. By providing an always-online in-line UPS solution that activates within milliseconds, Powerstar VIRTUE provides power failure protection for critical systems and operations.

In simple terms, in the case of a loss of power, Powerstar VIRTUE will eliminate any disconnection time and ensure your critical systems remain operational, delivering full power resilience to your business. This is also the case when it comes to supporting sensitive assets such as machinery and Combined Heat and Power (CHP).

## ENHANCING POWER RESILIENCE BY SUPPORTING OTHER ASSETS

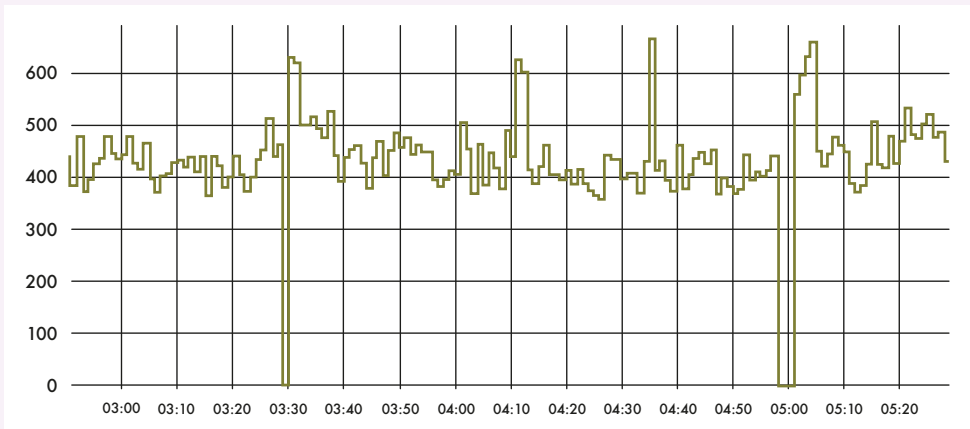
In addition to delivering full UPS capabilities directly to site loads, businesses can enhance resilience by supporting other connected assets, such as CHP, to ensure that costly downtime is avoided. By supporting the effective running of connected assets, businesses can be confident that their operations will continue uninterrupted and running optimally in the case of a power failure.

SOURCE: Centrica, 2017 and 2019

## PROTECTING OPERATIONS WITH UPS CAPABILITIES

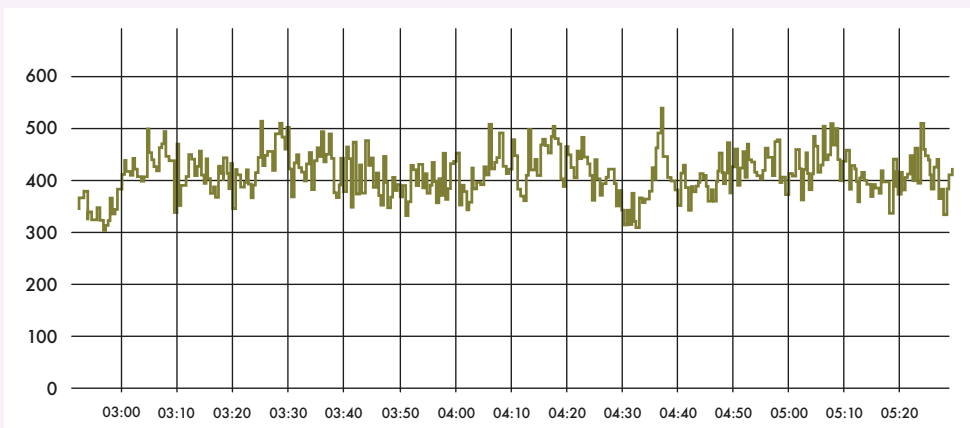
The following graph shows two losses of power were experienced by the supply.

### SUPPLY ACTIVE POWER



The following graph shows that despite this, no interruption was experienced by the load so the site continued to operate without interruption.

### LOAD ACTIVE POWER



# YOUR OBJECTIVE: ENERGY OPTIMISATION

**As the costs of electricity continue to increase, it is vital for businesses to actively manage their energy profile to be as efficient as possible and enable them to reinvest savings made in activities which can improve the business as a whole.**

Inefficiencies can be present in the electricity profile without detection. Many buildings are supplied with electricity at a higher voltage level than needed, resulting in wasted energy, increased levels of carbon emissions, higher than necessary electricity bills, and unnecessary wear and tear to on-site electrical equipment, causing premature failure.

By optimising the business' voltage supply and effectively managing its voltage profile, Powerstar can provide a bespoke solution, as part of a comprehensive smart energy strategy, to minimise wasted electricity and reduce electricity costs.

At the same time, by implementing new or supporting existing on-site generation with battery energy storage technology, businesses can ensure they are minimising their reliance on the grid by maximising locally generated energy and managing it all automatically and intelligently through Powerstar's EOS for an optimisation and efficient use of energy.

## **Your business can optimise its energy through:**

- Reduced electricity consumption and costs through Powerstar's patented voltage optimisation technology
- Stabilised voltage profile to protect against voltage spikes and dips that can damage equipment and cause sensitive systems to trip
- Improved HV infrastructure with Powerstar SO-LO to optimise the energy at source
- Enhanced analysis through remote monitoring capabilities across multiple technologies enables proactive management of the energy profile.
- Reduced reliance on the grid for the supply of energy by supporting on site generation with battery energy storage

## BENEFITS OF ENERGY OPTIMISATION

**By optimising the use of energy, businesses can achieve significant benefits including:**



### SAVING

Money on electricity costs



### PROTECTING

Corporate Social Responsibility (CSR) and company reputation



### REDUCING

Wasted energy by optimising supply and use



### CUTTING

Carbon footprint and CO<sub>2</sub> emissions



### MAXIMISING

Locally generated energy effectively

### UNSURE WHERE TO START?

Arrange a no obligation phone consultation with one of our experts today.



# YOUR OBJECTIVE: FLEXIBLE USE OF ENERGY

**The transition towards a decentralised energy network that focuses on local smart grids brings an opportunity for businesses to be more flexible with their use of energy.**

By being flexible with how, where, and when energy is generated, businesses can ensure their priorities and targets are met, contributing to a more efficient and cost-effective network.

Ofgem defines energy flexibility as: 'modifying generation and/or consumption patterns in reaction to an external signal to provide a service within the energy system'. This often involves participating in grid contracts, such as demand side response (DSR) which can be achieved with battery energy storage systems.

Businesses can benefit from adopting a smart grid strategy that uses low carbon, locally generated energy, such as solar (PV), as well as reducing the costs associated with energy transportation and reliance on the National Grid.

## ACHIEVING FLEXIBILITY

**A combination of technologies can enable businesses to operate a smart grid in which they have control of their energy, such as:**

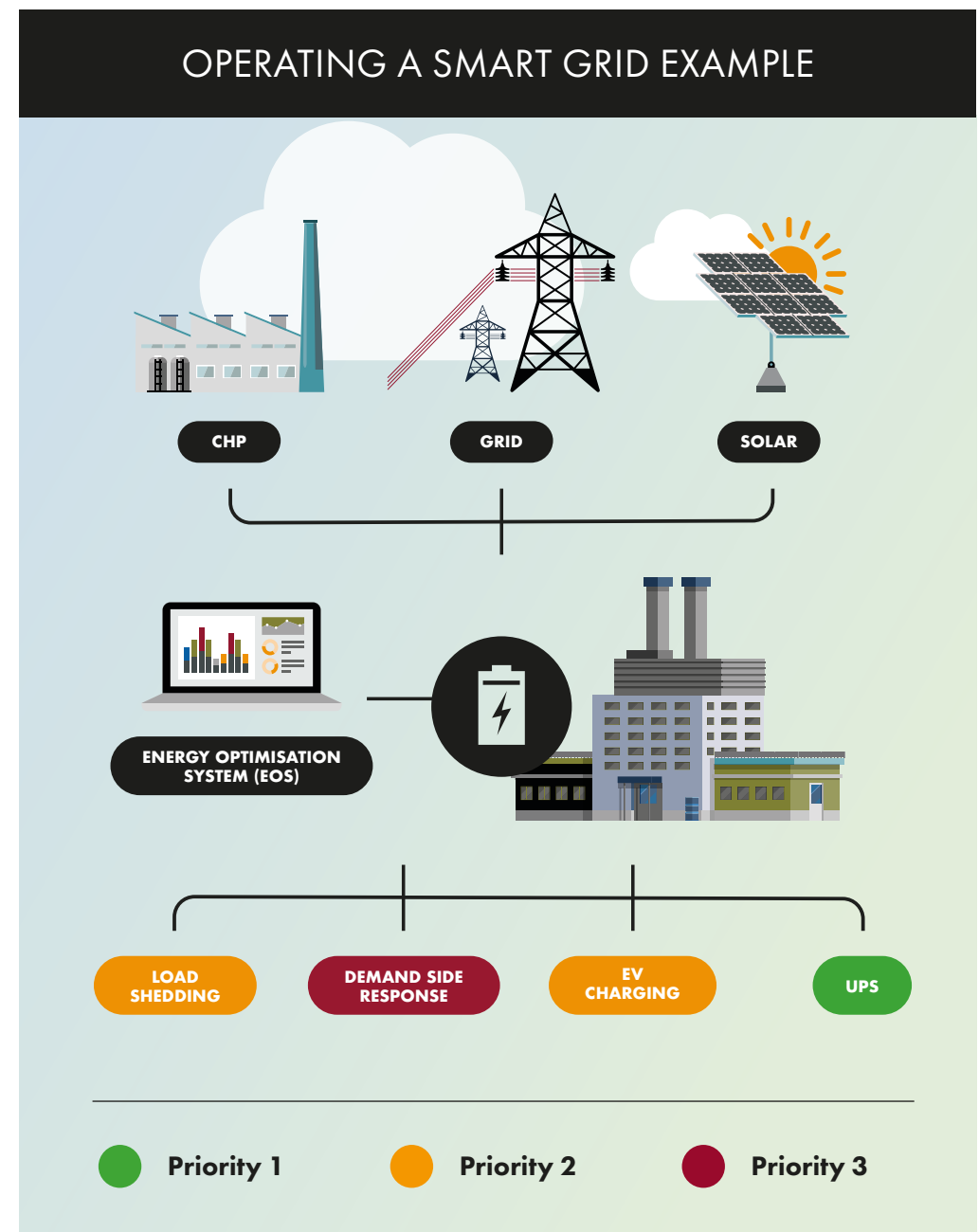
- Utilising stored energy to avoid using grid energy at peak times
- Using onsite generation combined with battery storage to come off-grid
- Participating in grid contracts to generate revenues whilst responding to network needs
- Protecting a site from unexpected power failures by responding rapidly to grid failures

### A FLEXIBLE POWER FUTURE

By considering the generation sources available and consumption patterns, Powerstar can enable businesses to deploy a comprehensive smart energy strategy to achieve savings through the intelligent and flexible use of energy based on the sites' priorities and capabilities.

**Learn how in our latest webinar: [Powerstar.com/energy-flexibility-webinar](https://www.powerstar.com/energy-flexibility-webinar)**

SOURCE: OfGem, 2019



# THE CASE FOR A COMPLETE SOLUTION

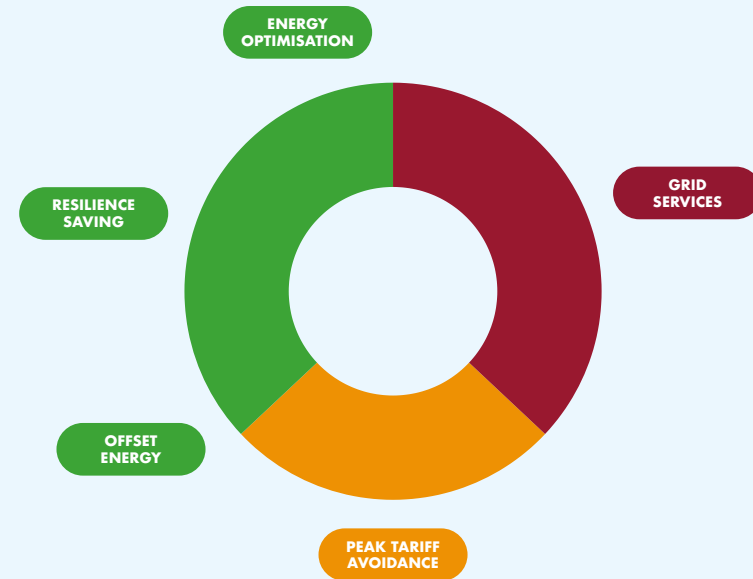
To illustrate the savings and benefits that a complete smart energy solution can provide, the following example of savings and revenues opportunities achievable through the integration of multiple technologies has been created.

This example business case includes:

- Powerstar Voltage Optimisation
- Powerstar Distribution Transformer
- Powerstar VIRTUE Energy Storage Solution
- Fast/Rapid Electric Vehicle Charging Station
- On-site generation

- Expected Savings**  
Operational Savings
- Additional Savings**  
Subject to legislation changes  
– occasional fluctuation
- Projected Revenue**  
Tender based services  
– regular fluctuation

## REVENUE AND SAVINGS BREAKDOWN



### BACKED BY EXPERIENCE - SINCE 2001:



Thousands of installations worldwide



Extensive warranties across manufactured technologies



Industry leading certifications and accreditations



Trusted and tested technologies

TYPICAL PAYBACK

**4-6 YRS**

AVERAGE ROI

**UP TO 25%**

CASE STUDIES AVAILABLE  
ONLINE AT **POWERSTAR.COM**

# PROJECT IMPLEMENTATION

Powerstar delivers a full concept to completion service, utilising the vast experience of its workforce to understand the unique requirements of each client to ensure all projects are implemented within required parameters, delivering results without a negative impact on business operations.

## CONCEPT TO COMPLETION

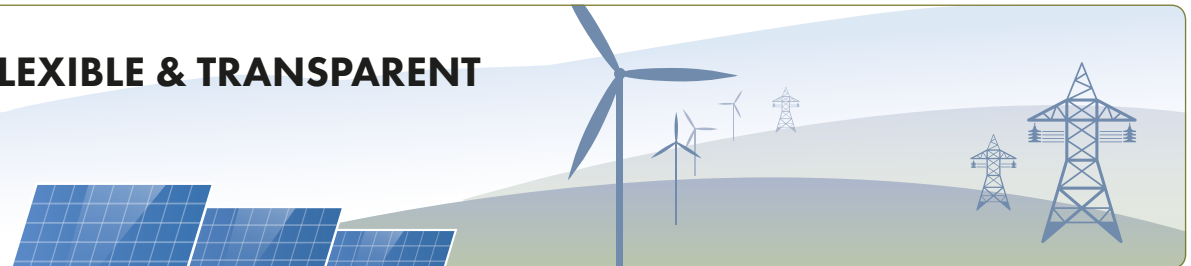


Powerstar operates in a transparent manner and its team of experts are on hand throughout the entire project to ensure a fully supported solution is delivered. The below flowchart shows the step by step process taken to ensure a fit for purpose solution is designed, delivered, and verified.



## FLEXIBLE FINANCE AVAILABLE: TAILORED, FLEXIBLE & TRANSPARENT

Powerstar can provide you with funding examples modelled to your requirements and can scale the financial solutions to suit you. All finance options are subject to eligibility.



# CONTACT A POWERSTAR EXPERT FOR MORE INFORMATION



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