

WHAT ACHIEVEING NET ZERO MEANS FOR YOUR MANUFACTURING SITE

Alastair Morris Chief Commercial Officer Powerstar



- The Energy Transition to Net Zero
- A Practical path to Net Zero for a Manufacturer

Battery Energy Storage System

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RESILIEN CE 🕣

ENERGY LANDSCAPE



Electricity supply is about to change for the first time in 100 years.

We cannot continue to ignore the cable coming into the wall.

We will need to invest in and manage this critical asset.

Energy Landscape

20th Century

A stable network to transmit electricity around the UK

A NATIONAL GRID

- Centralised power stations
- National Grid
- Distribution Network Operators
- Users

Energy Landscape

21st Century

Complete change in supply and demand relationship

"DISTRIBUTED", INTERMITTENT ENERGY

- Many more generation sites
- Local, even on-site generation
- Weather dependant generation
- Seasonal generation
- e.g. Agile Octopus variable tariff

An Infrastructure Problem

Aging UK network will need significant upgrades

TIME AND MONEY NEEDED TO CHANGE

Grid scale battery storage

Sub-stations

Cabling

In the meantime Behind-the-Meter solutions are needed to provide business resilience.

£48bn

TO REWIRE THE UK*

*https://www.scottishpower.com/news/pages/uks_net_zero_pathway_revealed.aspx

Power Distribution Risk

Increased risk of disruption

99.7% risk of localised black-outs*

A PERFECT STORM

Greater impact of disruptions:

- Hospitals
- High volume manufacturing
- High value manufacturing
- Distribution Centres
- Defence

* https://www.spglobal.com/platts/en/market-insights/latest-news/electric-power/102220-uk-at-much-greater-risk-of-winterblackouts-than-indicated-trader-hartree

80%

UK ORGANISATIONS EXPERIENCING AT LEAST 1 POWER DISRUPTION IN 2017**

** https://theenergyst.com/manage-risk-business-energy-disruption/

Power Resilience

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Power disruptions are not just power cuts. Critical equipment is reset or damaged by unreliable voltage supplies.

- 🕀 Black-out / Brown-out
- Spikes / Sags
- Undervoltage / Overvoltage
- Fluctuations
- Frequency variations

Power Resilience

The ability to continue your core activities without impact from disruption to your power supply.

INCREASING VULNERABILITY

- Electrification and automation of all activities creating greater dependency on a stable power supply
- Increasing renewable generation on the National Grid is causing greater risk of disruptions

Power disruptions are not just power cuts. Short term voltage drops or spikes, power fluctuations and

inconsistencies can reset equipment, interrupt activities, and shorten

the life of critical electrical equipment.

Powerstar technology provides power resilience to a whole site through any combination of three core technologies:

- Uninterruptible Power Supply (UPS)
- Voltage Regulation
- Reliable, low-loss transformers

A PATH TO NET ZERO

A Practical Path toward Net Zero for Commercial and Industrial Sites in the UK

Largest and first to tackle are typically emissions from:
Scope 1: what is actually emitted on your site / by your property – typically gas, diesel and petrol for heating, generators and vehicles.

Scope 2: emissions from your electricity supply.

To tackle these and move toward net zero overall emissions or absolute zero scope 1 and scope 2 emissions:

- 1. Reduce energy use
- 2. Electrify scope 1 energy sources
- 3. Generate renewable electricity

1. Reduce Energy Use

The transition to renewable energy has created a lot of volatility in the power market, with large jumps in electricity prices increasingly common.

HOW TECHNOLOGY CAN LOWER COSTS

- Voltage regulation to reduce electricity consumption
- \oplus On-site generation to reduce reliance on energy from the grid
- Battery energy storage to further maximise the return from onsite generation technologies, or to partake in load shifting activities
- Microgrid control systems to intelligently manage power flows for cheapest energy possible

250% INCREASE IN WHOLESALE ENERGY PRICES SINCE JANUARY 2021

2. Electrify

Organisations considering electrifying their vehicle fleet or gas heating have several barriers to overcome. One of the most significant is the limits of the grid supply.

BATTERY STORAGE WITH CHARGING

- Implementing the large electrical power demands of electric heating or multiple EV chargers may not be possible without paying for an additional or upgraded grid connection – your substation simply may not be large enough,
- Battery Energy Storage can be used to prevent this and manage the power demands – slowly charging the battery over time then rapidly using the power for your times of peak use.

250kW

RAPID CHARGER DEMAND

3. On-Site Generation

Generating your own electricity on-site is a powerful way to create independence from the National Grid, dramatically reduce energy costs, and work towards net zero carbon emissions.

SUPPORTING WITH BATTERY STORAGE

Battery energy storage allows excess energy generated on-site to be stored for later use, or to be sold back to the National Grid at peak pricing.

As well as renewable energy, battery energy storage can also support other generation assets, such as Combined Heat and Power (CHP) systems. **43%** OF UK ELECTRICITY IS RENEWABLE SOURCES

Smart Microgrids

The "National Grid" generates and distributes electricity around the country. It is a complex network and the infrastructure to balance supply and demand, ensuring constant supply is large.

A commercial / industrial site can now replicate this by themselves with use of a control system to manage:

- On-site, variable renewable generation
- Storage of green and/or cheap electricity for use at other times
- Large new, variable power demands like EVs and heat pumps
- AI powered software can learn to predict generation and load demands

Firming Renewables

Renewable energy, such as solar or wind, are green sources and preferable to the traditionally used alternatives such as fossil fuels.

- Renewable sources can be less reliable due to their naturally intermittent nature.
- Energy storage solutions have the ability to store the excess generation and time-shift it for use at a later date

Renewables accounted for

43%

of domestic power generation in 2020

Load Shifting

As our energy mix undergoes a rapid transformation, it will shift from a central dispatch method to a broad mix of renewable generation methods.

 Ability to offload excess power back to the grid, forcing network operators to balance not just outgoing power but also incoming, small-scale generation.

8/10 Businesses suffer at least one power disruption annually

Grid Service Contracts

As the UK's energy mix becomes more diverse and the share of renewable energy increases, the need for National Grid to use Balancing Services to prevent disruption similarly grows.

- Frequency Services
- Dynamic Containment
- Dynamic Moderation
- Dynamic Regulation
- Firm Frequency Response (FFR)
- Short Term Operating Reserve (STOR)

The Energy Trilemma

Outlines the challenges faced by individual businesses and organisations in the face of a volatile, complex and rapidly changing energy market.

- Affordable Cost-effective energy procurement.
- Sustainable Net zero targets aren't going anywhere, and progressing towards them is a vital part of maintaining relations with consumers, partners and investors.
- **Reliable** Bolstering the energy resilience of your business sites can be one of the more challenging aspects of the trilemma to address without compromising the other two.

Affordability

The Energy Trilemma

Sustainability

Reliability

ANY QUESTIONS?

Alastair Morris Chief Commercial Officer Powerstar