



# BATTERY ENERGY STORAGE SYSTEMS



Pillswood, Cottingham 98MW/196MWh

As leaders in the transformer industry, we understand the critical role transformers play in connecting Battery Energy Storage Systems (BESS) to the grid. **Whether you are a developer, EPC contractor, investor, or project manager, we will be able to support your project with our diverse product ranges of transformers.**

Depending on the configuration, BESS often consist of battery containers connected to bi-directional inverters and transformers. While the inverter converts power from AC to DC in order to charge the battery from the electricity grid or from DC to AC to discharge the batteries, transformers play a pivotal role in stepping the voltage up or down depending on the direction of power flow.

Utility-scale BESS play a bigger role than dispatching renewable energy. Their rapid response times make them great to provide other essential dynamic containment services to balance the grid such as voltage regulation, frequency response, demand flexibility, reserve services, etc.

The United Kingdom made a landmark commitment to decarbonise electricity systems by 2035, ahead of achieving Net Zero by 2050. Battery Energy Storage Systems (BESS) play a pivotal role in advancing these decarbonisation plans underpinned by two key trends,

- Renewable energy expansion to accelerate phasing out fossil fuels with the government targeting up to 240GW of renewable capacity by 2050.
- Electricity demand growth as a result of the increased electrification in transport and heating,

We at Wilson Power Solutions design, manufacture and supply the full scope of transformers needed in BESS projects:

- [MV Transformers](#)
- [Power Transformers](#)
- [Auxiliary Transformers](#)
- [Earthing Transformers](#)

We have been working with key industry developers to supply transformers that enable delivering landmark projects in the UK and Europe.



## WILSON POWER SOLUTIONS BESS TRANSFORMERS A BRIEF PORTFOLIO:

'Wilson Power Solutions' transformers have contributed a total capacity of over 5.8GW/10.6GWh to BESS projects. We have sold nearly 400 transformers of various types across more than 84 BESS projects (as of Q2 2024).

We have worked with the most prominent investors, EPC contractors, HV contractors, battery manufacturers and other stakeholders in this sector. This demonstrates our ability to deliver quality transformers to diverse projects.

At Wilson Power Solutions, we provide state-of-the-art products for Battery Energy Storage projects as it is crucial to customise transformer specifications to match the battery or power conversion system requirements. Whether it is one battery, a bank of two, or more, each of our offerings in the BESS portfolio reflects our commitment to innovation, bespoke design, and high quality. This includes the full suite of EHV or HV Power Transformers, MV Distribution Transformers and any other Auxiliary or Earthing arrangement.



### POWER TRANSFORMERS

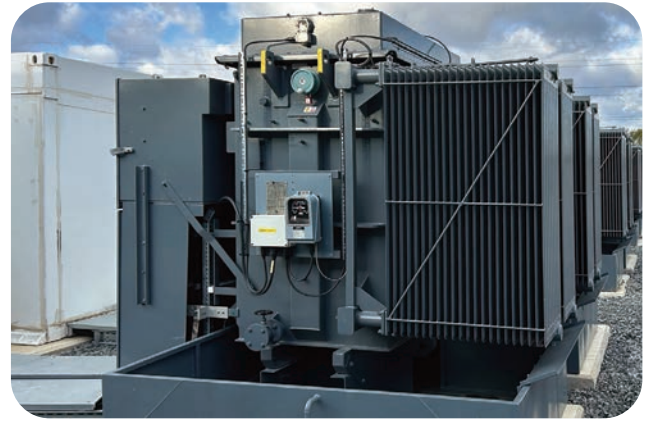
Up to 300MVA

Our Power Transformers allow voltage step-up or step-down, voltage regulation (with On-Load Tap Changers), power quality enhancement and efficient energy transfer. This enables the maximisation of renewable generation through the storage of excess energy during periods of low demand and discharge of that stored energy during peak demands.

Our Power Transformers facilitate seamless integration of BESS with both Distribution Network Operators (DNO) and the national grid, ensuring energy transfer and grid stability.

#### Product Specification:

- Primary Voltage Levels: bespoke up to 400kV such as 33kV, 66kV, 132kV, 275kV, 400kV.
- Secondary Voltage Levels: bespoke such as 3.3kV, 6.6kV, 11kV, 33kV, 66kV, 132kV or custom specification (option of dual LV winding is available).
- Vector Groups: YNd1, YNd11, YNd5, YNd1d1, YNd11d11 or YNd5d5 or any other vector group as per IEC 60076.



### MV TRANSFORMERS

Up to 5000kVA

Our Large Distribution Transformers are primarily used for medium to low voltage applications. They facilitate the integration of renewable energy resources, grid stabilisation and efficient energy transfer. They step-up LV to MV and provide protection to the Power Transformers. They also provide localised isolation to the entire site in case of single or multiple battery pack failure, delivering enhanced power quality and fault protection. Our design allows configuration with systems that have integrated Power Conversion Systems (PCS) where design optimisation can be performed e.g. the connection of two battery packs to one transformer. This not only makes our system robust, but also efficient.

#### Product Specification:

- Primary Voltage Levels: 11kV, 33kV or bespoke
- Secondary Voltage Levels: single & dual low voltage between 400-800V (e.g. 400-400V, 600-600V, 800-800V, etc.)
- Vector Groups: Dyn11 or Dyn1, Dyn11yn11 (3 winding), Dyn5Dyn11 (3 winding) or any other vector group as per IEC 60076.



## AUXILIARY TRANSFORMERS

Up to 4500kVA

Our Auxiliary Transformers play a crucial role in battery energy storage systems by facilitating the substation through stepping up or stepping down voltage levels to match the auxiliary requirements on site, such as lighting, CCTV, fire systems etc.

### Product Specification:

- Primary Voltage Levels: 6.6kV, 11kV, 11-6.6kV or 33kV
- Secondary Voltage Levels: 415V or 433kV
- Vector Groups: Dyn11 or Dyn1 or any other vector groups as per IEC 60076



## EARTHING TRANSFORMERS

33kV

Voltage fluctuations and transients caused by lightning strikes, switching operations and electrical disturbances can be hazardous to the project equipment and personnel. To help protect against these, our Earthing Transformers are designed to provide low impedance path to the ground for fault currents.

### Product Specification:

- Short Time Current Rating and Duration:
  - Maximum Current: 1500 amps
  - Duration: 10 seconds
- Vector Group: ZN or any other vector group as per IEC 60076



## EARTHING & AUXILIARY TRANSFORMERS

Up to 500kVA

Our combined Earthing and Auxiliary Transformers are designed to integrate the functions of both Earthing and Auxiliary Transformers into a single unit. This provides the system with safety, stability and efficiency, establishing a ground reference for the electrical system while facilitating the connection between site equipment (lighting, CCTV, etc.) and the electrical grid. This also streamlines the installation process whilst minimising space.

### Product Specification:

- Primary Voltage Levels: 33kV or bespoke
- Secondary Voltage Levels: 415V or 433V
- Short Time Current Rating and Duration:
  - Maximum Current: 1500 amps
  - Duration: 10 seconds
- Vector Group: ZNyn1 or ZNyn11 or any other vector group as per IEC 60076



## BESS PROJECTS UTILISING OUR TRANSFORMERS

### LARK'S GREEN, BRISTOL

49.9MW Solar & 49.5MW BESS

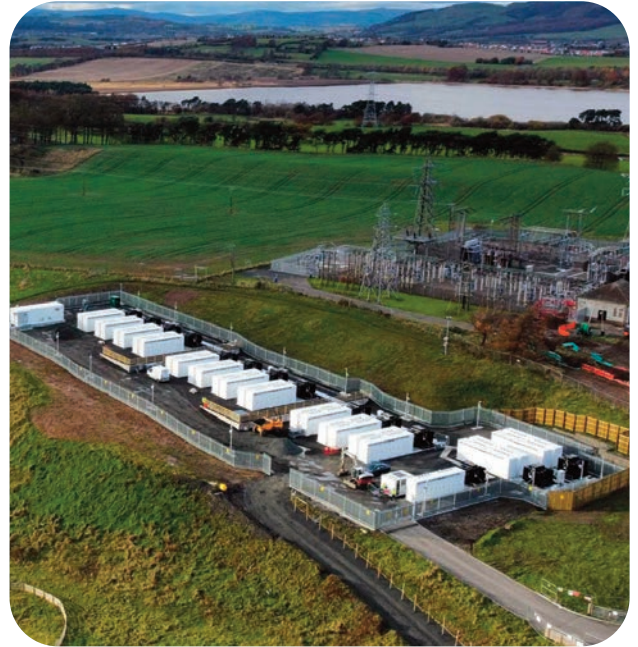
The UK's first solar farm to connect to a transmission network instead of a distribution network has been developed by Enso Energy and Cero Generation. The 49.9MWp Solar Photovoltaics farm, co-located with a 45.5MW/99MWh Battery Energy Storage System, is connected to the grid using a 140MVA Wilson Power Transformer.

The 110/140MVA 132/33kV Power Transformer weighs nearly 150 tonnes. In addition, we have also provided a 300kVA 33kV/415V Auxiliary Transformer on site.



Our site team of electrical engineers and fitters installed the transformer. They fitted the cooling bank, fans, conservator and bushings. The transformer was filled with the coolant after which procedural marshaling, cabling and testing were carried out.

The project is expected to generate over 73GWh annually through a connection to Iron Acton substation near Bristol. The power generated from the farm is enough to power over 17,000 family homes annually with electricity. The site's 106 hectares of land will achieve a biodiversity net gain of 25% through the strengthening of 9.9km of hedgerow and 9 hectares of new wildflower planting.



### LITTLE RAITH, FIFE

49.5MW / 99MWh

Located in Fife, Scotland, the Battery Energy Storage System features what could be a first in the UK, black glossy Distribution Transformers. Fourteen 4.2MVA 33kV/480V-480V Wilson T2 Ecotrans® Large Distribution Transformers were supplied hermetically sealed and KNAN (FR3-filled).

The two-hour duration BESS is developed by Harmony Energy and is situated within close proximity of Little Raith Wind Farm, 45.75MW. The site utilises twenty-seven XL Tesla Megapacks and Tesla Autobidder software; a real-time trading and control platform that provides value-based asset management and portfolio optimisation to maximise revenue.



### HAWKERS HILL, DORSET

34MW / 68MWh

Built in less than five months, Hawk's Hill near Shaftesbury in Dorset, was developed by TagEnergy using sixteen Tesla Megapack lithium-ion batteries. We supplied the project with eight 2.8MVA 33kV/480V hermetically sealed Wilson T2 Ecotrans® Distribution Transformers in bunds and a 100kVA Auxiliary Transformer.

The two-hour front-of-meter BESS utilises Tesla's Autobidder AI software for real-time trading and control. The project will enable greater penetration of renewable energy to respond to electrification and the increased demand, both domestically and commercially.

## OSBALDWICK, YORK

50MW / 75MWh

Owned by Gresham House and developed by Metka EG, this project in York showcases twenty-five one-and-half-hour batteries by Contemporary Amperex Technology Co., Limited (CATL). This Battery Energy Storage site can power as many as 100,000 homes for up to an hour at certain times of the day.

We supplied a 60MVA 132kV/33kV Power Transformer to the 50MW project connecting it to the local Distribution Network Operator, Northern Power Grid. Our team attended the site to help with the offloading and assembly of the transformer. Enclosed by two blast walls, a jacking and skidding method was used to position the transformer on the plinth.

This project had several challenges to overcome in terms of proximity to trees, requirements for additional drainage work and the potential for ecological risks. An ecological assessment was undertaken and mitigation measures were put in place to protect wildlife to comply with local and national planning policies.



## CONTEGO, WEST SUSSEX

34MW / 68MWh

Located near Burgess Hill in West Sussex, Contego has twenty-eight Tesla Megapack lithium-ion batteries making up 34MW of battery energy storage capacity. We have supplied the site with fourteen 2.8MVA Wilson T2 Ecotrans® Distribution Transformers with a voltage ratio of 33kV/505V. The project has been developed by Harmony Energy and Fotowatio Renewable Ventures (FRV).

The site is managed through Tesla's Autobidder AI software for real-time trading and control and is connected to UK Power Network's (UKPN) distribution network. Contego BESS is providing the capability to store energy from renewable sources to be used during peak hours. This also increases the flexibility of the UK National Grid, while playing a part in the country's mission to move away from fossil fuels.

## BROADDITCH, KENT

11MW / 22MWh

This two-hour duration 11MW Battery Energy Storage System features the first energised Tesla Megapack 2XL outside North America. Located near Kent, the project was developed by Harmony Energy and the construction of the project was managed by Tesla.

We supplied three 4.2MVA Wilson T2 Ecotrans® Large Distribution Transformers and one 100kVA Auxiliary Transformer. The project was successfully energised and is operational through the Autobidder, Tesla's algorithmic trading platform.





## RUSHOLME, NORTH YORKSHIRE

35MW / 70MWh

Covering the full scope of this BESS project in Selby, we supplied the full range of transformers to this site; Ten 4.2MVA 33kV/480V-480V Wilson T2 Ecotrans® Distribution Transformers, a 24/36MVA 66kV/33kV Power Transformer and a 150kVA 33kV/415V Auxiliary Earthing Transformer.

This 35MW/70MWh Battery Energy Storage System is developed by Harmony Energy and constructed by Tesla. It's situated close to Rusholme wind farm which consists of 12 turbines and a 24MW capacity, and Drax Biomass Power Plant. Its location plays a vital role in providing dynamic containment and renewable smoothing services to the grid.



## JAMESFIELD, SCOTLAND

49MW / 98MWh

Located near Abernathy, Scotland, Jamesfield BESS utilises two-hour duration Tesla Megapacks and Tesla AI Autobidder software alongside thirteen of our hermetically sealed 4.2MVA 33kV/480V-480V Wilson T2 Ecotrans® Distribution Transformers. We also provided two of our Wilson Auxiliary Transformers with a rating of 100kVA 33kV/433V. The project has been developed by TagEnergy and Harmony Energy with financial funding from Santander UK.



## CAMILLA, FIFE

50MW / 100MWh

Securing a capacity market contract for initially a one-hour duration of 50MWh going up to 100MWh in due course, this standalone Battery Energy Storage System is a joint venture between NextEnergy and EelPower.

Fourteen 4.35MVA 33kV/400V Wilson T2 Ecotrans® Distribution Transformers were supplied to the site. The hermetically-sealed transformers are connected to BYD batteries. This project is located in Scotland and has multiple revenue streams through the capacity market and local flexibility and ancillary services including dynamic containment.



## DONCASTER POWER, SOUTH YORKSHIRE

10MW / 10MWh

The site utilises three liquid-cooled Battery Energy Storage System units based on Lithium Iron Phosphate (LFP) manufactured by Contemporary Amperex Technology Co. Limited (CATL) and skid-mounted SMA inverters. Developed by ForePower and constructed by Edina, the one-hour duration site has a capacity of 10MW and is expected to provide balancing services to the grid to accelerate the renewables transition and provide system flexibility.

We have supplied the site with 500kVA 33kV/400V Auxiliary Transformer with an oil temperature indicator, winding temperature indicator, pressure relief device, and a magnetic oil gauge, connected to a marshalling box.

## CHAPEL FARM, LUTON

49.5MW / 99MWh

Energised in May 2023, the 99MWh Battery Energy Storage System near Luton is a joint venture between TagEnergy and Harmony Energy. We supplied the project with thirteen 4.2MVA Wilson T2 Ecotrans® Large Distribution Transformers with 33kV HV and 480V dual LV windings and a 100kV 33kV/433V Auxiliary Transformer.

The twenty-six Tesla Megapack lithium-ion batteries are supported by Tesla's Autobidder AI software for real-time trading and control with the operations overseen by a prominent asset management company, RES. The project plays a major role in contributing to the Net Zero transition by unlocking the full potential of renewable energy without relying on taxpayer subsidies.



## HAWTHORN PIT, DURHAM

49.9MW / 99.8MWh

Developed by Harmony Energy, this site has 60MVA 66kV/33kV Wilson Power Transformer installed to support the grid connectivity. Planned to be energised in 2024, this site consists of lithium-ion batteries supplied by Envision.

Envision batteries modular design are easily expandable and are powered by AI and IoT operating system which allows the integration with smart grids.

The Hawthorn Pit project is aimed to help the grid manage greater fluctuations using energy captured from renewable sources.

## HALLEN, BRISTOL

32MW / 32MWh

The 32MW Battery Energy Storage System utilises sixteen stacked BYD lithium-ion batteries to optimise the area used. We supplied the project with a 1.5MVA 11kV/433V Auxiliary Transformer and multiple 33kV/400V-400V Wilson T2 Ecotrans® Distribution Transformers; four 3.2MVA and four 4.8MVA.

The Battery Energy Storage System is a collaboration between Limejump and Voltalia. The project is optimised to trade in the National Grid's ancillary service markets and the wholesale power market to provide flexibility to the grid and a revenue stream to the customers.



## FARNHAM, SURREY

20MW / 40MWh

Farnham features six 4.2MVA 33kV/480V-480V Wilson T2 Ecotrans® Large Distribution Transformers and one 100kVA 33kV/433V Auxiliary Transformer. The 20MW Battery Energy Storage System has eleven Tesla Megapack lithium-ion batteries and is operated via Autobidder, Tesla's AI algorithm trading platform.

The project was developed by Harmony Energy, and the construction was managed by Tesla with oversight from the Harmony Energy project team. The asset is now owned by Harmony Energy Income Trust and was energised in June 2023.



## CASE STUDIES : THREE LARGEST BESS IN EUROPE

Wilson Power Solutions transformers have been instrumental in driving the success of the three largest BESS projects in Europe by MWh, setting new standards for performance and efficiency.



### CLAY TYE | 99MW/198MWh

- Twenty-four of 4.2MVA 33kV/480V-480V Wilson T2 Ecotrans® Transformers
- Two 150kVA 33kV/415V Wilson Auxiliary Transformers
- Provide energy to more than 300,000 homes
- Connected to UK Power Networks



52  
BATTERIES



26  
TRANSFORMERS



99/198  
MW/MWh



### BUMPERS | 99MW/198MWh

- Twenty-eight of 4.2MVA 33kV/480V-480V Wilson T2 Ecotrans® Transformers
- Two 150kVA 33kV/415V Wilson Auxiliary Transformers
- Fifty-six Tesla 2XL Megapack
- Close proximity to a solar farm
- Tesla AI Autobidder technology



56  
BATTERIES



30  
TRANSFORMERS



99/198  
MW/MWh



### PILLSWOOD | 98MW/196MWh

- Forty-two of 2.8MVA 33kV/480V Wilson T2 Ecotrans® Transformers
- Seventy-eight Tesla Megapack batteries
- Size of three football pitches!
- Tesla AI Autobidder
- Lifted platforms for flood mitigation
- Connected to the world's largest offshore wind farm, Dogger Bank.



78  
BATTERIES



42  
TRANSFORMERS



98/196  
MW/MWh

