WILSON POWER SOLUTIONS
Responsible Power Engineering

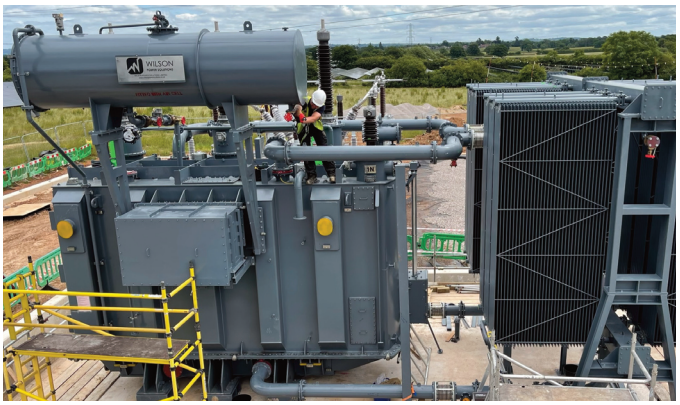
BATTERY ENERGY STORAGE SYSTEMS

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, and electricity demand growth as a result of the increased electrification in transport and heating.

Depending on the configuration, BESS often consist of battery containers with lithium-ion batteries being the most prevalent and mature connected to bi-directional inverters to convert the power from AC to DC to charge the battery from the electricity grid or from DC to AC to discharge the batteries and export AC power to the grid, and transformers to transform the voltage up and down depending on the direction of power flow. Wilson Power Solutions design, manufacture and supply the full scope of transformers needed in BESS projects (distribution transformers, power transformers and auxiliary transformers). We have worked with key industry developers to supply transformers that enable delivering landmark projects in the UK and Europe.

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.

BESS UTILISING WPS SOLUTIONS



Acton Green 49.9MW Solar & 49.5MW BESS Bristol

The UK's first solar farm to connect to a transmission network instead of a distribution network has been developed by Enso Energy & Cero Generation. The 49.9MWp Solar Photovoltaics (152,400 solar modules) farm co-located with a 45.5MW/99MWh Battery Energy Storage System was connected to the grid using a 140MVA Wilson Power Transformer.

We supplied a Continuous Maximum Rating 140/110MVA 132/33-33kV power transformer that weighs nearly 150 tonnes. In addition, a 300kVA 33kV/415V auxiliary transformer was installed on site. Our site team consisting of electrical engineers & fitters installed the transformer, fitted the cooling bank, fans, conservator and bushings, filled the transformer with the coolant and undertook marshalling, cabling and testing over a few weeks.

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.

50MW / 75MWh Osbaldwick – York

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 provide power supply to 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 has 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.

49.5MW / 99MWh Chapel Farm – Luton

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 couple of 100kV 33kV/433V Auxiliary Transformers.

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.

34MW / 68MWh Contego – West Sussex

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 supplied the site with fourteen 2.8MVA Wilson T2 Ecotrans Transformers with a voltage ratio of 33kV/505V. The project was 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. It 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.

11MW / 22MWh Broadditch – Kent

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 Limited and the construction of the project was managed by Tesla.

We supplied three 4200kVA Wilson T2 Large Distribution Transformers and one 100kVA Auxiliary Transformer. The project was successfully energised and is operational through Autobidder, Tesla's algorithmic trading platform.

20MW / 40MWh Hawkers Hill – Dorset

Built in less than five months, Hawkers 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 Transformers in bunds.

The two-hour front-of-meter BESS utilises Telsa'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.

35MW / 70MWh Rusholme – North Yorkshire

Covering the full scope of this BESS project in Selby, North Yorkshire, we supplied the full range of transformers to this site. Ten 4200kVA 33kV/480V-480V Wilson T2 Large Distribution Transformers, a 24/36MVA 66kV/33kV Power Transformer and a 100kVA 33kV/415V Auxiliary 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.

49.5MW/ 99MWh Little Raith - Fife

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-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.

10MW / 10MWh Doncaster Power South Yorkshire

The site utilises three liquid cooling Battery Energy Storage System units based on Lithium Iron Phosphate (LFP) from 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 supplied the site with 500kVA 33kV/400V Wilson T2 Ecotrans Auxiliary Transformer with an oil temperature indicator, winding temperature indicator, pressure relief device, and a magnetic oil gauge, connected to a marshalling box.

99MW / 198 MWh Bumpers Farm Buckinghamshire

Located in Princes Risborough, Bumpers Farm consists of fifty-six Tesla two-hour duration Megapacks connected to twenty-eight 4200kVA 33kV/480V-480V Wilson T2 Ecotrans Large Distribution Transformers and two 150kVA 33kV/415V Wilson Auxiliary Transformers.

Surrounded by a 17.5MW Solar Photovoltaics Farm, the BESS site features white Tesla Megapacks alongside our moss-green transformers. Tesla managed the construction of the project which was developed by Harmony Energy for Harmony Energy Income Trust Plc.

99MW / 198 MWh Clay Tye – Essex

Developed by Fotowatio Renewable Ventures (FRV), part of Abdul Latif Jameel Energy and Harmony Energy, Clay Tye uses fifty-two Tesla Megapack lithium-ion batteries and will have a capacity of 99MW/198MWh. Located in Essex, Clay Tye will become one of the largest Battery Energy Storage Systems in Europe upon energisation in 2023.

The site will be connected to the UK Power Networks distribution network utilising twenty-four 4.2MVA Wilson T2 distribution transformers with a voltage ratio of 33kV/480V-480V and two 150kVA 33kV/415V Auxiliary Transformers.

50MW / 100MWh Camilla - Fife

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 4350kVA 33kV/400V Wilson T2 Ecotrans transformers were supplied to the site. The hermetically sealed transformers are connected to BYD batteries. Located in Scotland and will have multiple revenue streams through the capacity market and local flexibility and ancillary services including dynamic containment.

32MW Hallen – Bristol

The 32MW Battery Energy Storage System utilises sixteen stacked BYD lithium-ion batteries to optimise the surface used. We supplied the project with a 1500kVA 11kV/433V Auxiliary Transformer and multiple 33kV/400V-400V Wilson T2 Ecotrans Distribution Transformers; four 3200kVA and four 4800kVA.

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 at the right time to provide flexibility to the grid and a revenue stream to the customers.

20MW / 40MWh Farnham – Surrey

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 Limited, 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 has been energised in June 2023.

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CASE STUDY

Largest BESS in Europe
98MW/196MWh Pillswood – East Yorkshire

The utilisation of seventy-eight Tesla two-hour Megapack batteries made Pillswood Europe's biggest Battery Energy Storage System upon energisation in November 2022. The site can store up to 196 MWh (megawatt hours) of electricity in a single cycle. This is enough to power around 300,000 UK homes for two hours.

Wilson Power Solutions supplied the site with Forty Tier 2 compliant 2.8MVA 33kV/480V Wilson T2 Ecotrans Distribution Transformers®. And to blend in with the white Tesla Megapacks, Wilson Power Solutions coated the transformers in the trademark Tesla colour. The megapacks and the transformers were installed on raised platforms for being located in a flood sacrifice zone which allowed for the ducting & cables to be fitted below the platforms.

Developed by Harmony Energy, Pillswood's location in Cottingham has a strategic significance. The site is adjacent to the National Grid's Creyke Beck substation, the same connection point proposed for phases "A" and "B" of the world's largest offshore wind farm, Dogger Bank.

Tesla managed the construction of Pillswood which is also operated by Tesla Autobidder, a real-time trading and control platform providing asset management and portfolio optimisation based on value. This allows Pillswood to provide balancing services to the GB electricity grid while maximising revenues.

The National Grid Energy System Operator has asked wind farms to switch off in the past in the occurrence of consumption/generation imbalance occasions. Battery Energy Storage Systems like Pillswood prove necessary to allow the NG to maximise the utilisation of the energy generated by wind farms.

98MW/196MWh

78x 1.3MW
TESLA MEGAPACKS

40x 2.8MVA
WILSON T2 TRANSFORMERS

Get in touch and find out how Wilson Power Solutions can help with your BESS project:

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