

# Power to the people

*Peter Kershaw outlines recent proposals addressing energy storage*



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Local authorities, hospitals, universities, charities, large businesses and farms are just some of the organisations placing themselves on immediate standby to feed into emerging development opportunities around energy storage.

The government has recently made a significant announcement for landowners looking to diversify, maximise or rationalise their estates by emphasising its future support towards making it easier for people to generate and store their own energy to sell to the National Grid and by supporting research into energy storage.

This article is aimed at helping landowners to better understand energy storage and the potential development opportunities emerging in relation to placing energy storage facilities on their land.

## **Developments involving energy storage are set to surge**

A 2016 study by the Carbon Trust and Imperial College London concluded that energy storage could result in savings of around £2.4bn per year in 2030 for the UK electricity system.

The need for energy storage on UK land is twofold:

- traditional means of energy distribution from sources like coal-fired power stations are increasingly nearing the end of their operational lives; and
- renewable energy sources often only provide intermittent energy supplies to the National Grid.

The emerging opportunities for landowners and developers to utilise

such technology to diversify the development potential of their land are varied. This is why landowners and developers with land in locations suitable for storing energy to procure to the National Grid are beginning to seek early advice from planning consultants to help ensure that their future planning applications are positively and accurately understood by both local authorities and local communities.

## **Energy storage will be competing against existing balancing services**

Due to the many demands placed upon it, the National Grid currently buys balancing services to help balance electricity demand and electricity supply. These services are provided through a number of existing routes including demand side response, interconnectors, flexible generation and existing pumped hydro energy storage.

While it is true that electricity storage therefore has to compete against a multitude of other existing balancing services, the likely increase in the use of electric heat pumps, electric vehicles and micro-generation in future years will continue to place significant new demands on the UK's ageing electricity transmission and distribution networks. New advanced storage technologies will help to meet these new stresses on the system (and often in a more cost-effective manner).

The 2016 National Infrastructure Commission report on smart power perhaps hit the nail on the head when emphasising the potential for the UK to be 'a world leader' in using some types of energy storage technology. According to the Engineering and Physical Sciences Research Council,

**'Energy storage, especially from new battery storage technology, can potentially provide landowners on constrained sites with a new opportunity to maximise the potential of their land.'**

the UK is already currently world-leading in some niche areas of energy storage, including lithium-ion battery and supercapacitor research.

### Energy storage development opportunities for landowners

Due to the low and expected continued falling costs of battery storage technology, there is a diverse range of potential opportunities emerging for landowners, including:

- energy barns (large storage batteries connected to high-voltage electricity networks, with multiple batteries and associated control systems located near to power lines and electrical substations, and housed in air-conditioned agricultural-type units or in containers on hardstanding);
- retrofitting battery storage alongside existing solar farms;
- retrofitting battery storage alongside existing wind farms;
- providing battery-storage projects in conjunction with solar barn roofs;
- providing battery storage in conjunction with other small-scale renewable projects connected to local distribution networks;
- providing community battery storage projects, alongside photovoltaic technology, to provide neighbourhood/community level energy distribution; and
- providing charging points for electric cars.

The new storage technology could also potentially open up opportunities for landowners in remote areas to now connect new intermittent renewable energy such as solar or wind farms to locally weak electricity networks.

### How stored electricity can be utilised by landowners

Landowners can utilise the energy they store in many ways, including:

- helping to improve the cost efficiency of energy supply by avoiding the need for future network expansion – this can be achieved by storing electricity when demand for the grid is low, in order to help reduce users accessing the grid when demand is high;
- replacing conventional transport fuels with electricity stored in batteries;
- frequency stabilisation, which provides split-second discharging and charging to and from the National Grid to help provide a stable supply when other power stations suffer inertia; and
- providing quick reactive power to help stabilise voltage outputs.

### Types of battery storage

The main types of battery storage technology include:

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- regulating energy flows to maintain reliable flows for household, community and national electricity systems (by ensuring electricity supply matches electricity demand) – this helps make up for intermittent gaps in energy supply when the sun isn't shining at solar farms, or when the wind isn't blowing at wind farms, or when power plants break down, or when flooding causes electricity grid failures;
- enhancing the value of existing onsite energy generation; and
- helping to reduce organisations' electricity operating costs.
- sodium-based batteries (which use sodium, sulphur and ceramic separators);
- redox flow batteries (electrochemical devices which can accumulate energy in charging mode or deliver electricity in discharging mode); and
- lithium-ion-based batteries (recognised for their long lifespan and good power and energy densities).

### Alternative types of energy storage technology which do not involve batteries

Alternative types of energy storage to battery storage include:

- Compressed air storage (this relates to storing air at high pressure and, through a turbine, using it to generate electricity. Geological restrictions often restrict where this type of technology can be utilised.)
  - Hydrogen storage (hydrogen stores energy which can later be released by burning it, or through a chemical reaction).
  - Liquefied air gas storage (this relates to the process of cooling air to below -196 degrees Celsius so that it turns into a liquid and then heating it to expand, turn to gas and turn a turbine to create electricity).
- In addition to storing surplus electricity to release later in the future when required, and in addition to electricity storage playing a role in helping to provide backup power which will not be interrupted, battery storage in particular can also provide 'ancillary services' to both the local distribution network operator and the National Grid. These quick-response means of supplying energy include:
- storing energy for the local grid network ('STOT', ie short-term operating reserve) for when rapid provision of active power is required to help meet surges in demand;

- High-speed flywheels (this relates to accelerating a rotor (flywheel) to a very high speed and maintaining the energy in the system as rotational energy).
- Supercapacitor technologies (this relates to energy stored electrostatically on the surface of materials rather than involving chemical reactions. Supercapacitors can be charged

- biogas or fossil fuels with carbon capture.

**The future of energy storage**

In a sensibly cautious observation from the Houses of Parliament Parliamentary Office of Science and Technology, in Post Note 492 of April 2015 titled ‘Energy Storage’, it concluded that:

The amount of future energy storage deployment is uncertain.

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rapidly, leading to a very high power density, but they have limited storage capacity.)

- Gravity storage (this relates to the kinetic energy from downward forces being utilised to drive a wind turbine to produce electricity. This requires specific and appropriately sited locations to work.)
- Pumped hydro storage reservoirs (this relates to water being pumped up to a reservoir and then being released through turbines whenever electricity is needed. Geological restrictions often limit where this type of technology can be utilised.)
- Pumped heat electricity storage (this relates to generating electricity by pumping heat away from a cold gravel-filled container into a hot one and then reversing the process to drive a pump).

In addition to increases in energy storage, commentators have also pointed to the need for continued advances in other types of low-carbon thermal renewable energy plants to help maintain future flexibility in UK energy provision, including:

- power plants like biomass; and

It is also unknown if one or two technologies will dominate, or whether there will be a mix of technologies for different uses. Most observers agree that storage will become more economically viable as fossil-fuel-based alternatives become less competitive because of policies to reduce greenhouse gas emissions and long-term rising fossil fuel prices. Capital costs of storage technologies may also decrease. Other factors also influence the viability of each storage sector.

Battery storage is often thought to be more expensive than traditional peaking power plants, though it is also often faster, more environmentally sustainable and more efficient for certain applications. If industry predictions come true over the next five years, then energy storage technologies will have an increasingly broad application across the power grid.

Energy managers will however be hard pushed to foresee the shape of the industry in a decade or so and a degree of caution would therefore be sensible among all this enthusiasm.

**Planning ahead**

Energy storage, especially from new battery storage technology,

can potentially provide landowners on constrained sites with a new opportunity to maximise the potential of their land (if their land is appropriately located near to power lines). Battery storage in particular can have the potential to provide a form of development that is relatively unobtrusive compared to other forms of development. This, coupled with the national need for energy storage, could potentially be seen as a favourable form of development by local authorities and local communities.

As with all proposed developments however, landowners need to think very carefully about their planning strategy before putting their proposals to local authorities and local communities to consider.

Planning consultants can assist landowners and developers in assessing the planning constraints of each site and subsequently help to produce planning statements which will intricately, clearly and accurately explain the proposed development in positive terms to local authorities.

They will also be able to assist in advising on and executing an appropriate community consultation plan for engaging with affected neighbours and local communities so that the proposed development is also transparently and positively explained to local stakeholders.

Planning experts will ultimately be able to advise and assist landowners and developers on all planning matters in relation to proposed energy storage schemes (from the outset of initial projects right through to the preparation, submission and management of planning applications).

Planning consultants’ work can involve:

- working with the landowner and architects to design the final scheme to help reduce or avoid any potentially negative planning aspects to the scheme materialising (or to advise on possible mitigation measures);
- advising the landowner’s/ developer’s project team on the plans and documents required by the local authority in order to validate the planning application;

- advising on any additional expert technical reports that might be required to be commissioned to support the planning application (and then arranging quotes from consultants and liaising with them directly to ensure their reports adequately tie into the overall planning submission);
- advising clients on the need for public engagement with the local community from the early stages of the proposed scheme and then subsequently running the public consultation events or letter drops;
- producing clear and accurate planning statements fully outlining the positive benefits of the proposed scheme (and outlining the material planning reasons why the scheme should be approved by the local authority);
- providing support to the client at planning committee (if the scheme is referred by the council to committee);
- liaising with councillors and other stakeholders to respond clearly and positively to any questions that may be raised in relation to the proposed development; and
- providing assistance in clearing planning conditions (if the scheme is approved) or in appealing the council's decision (if the scheme is refused).

If your planning consultants are also based within a law firm, they will be able to seamlessly refer you to relevant legal colleagues who can quote for legal advice should any elements of the project require legal input.

### **Who can benefit from development opportunities around energy storage?**

Organisations who may well be considering future planning applications to utilise energy

storage technologies, to bring down their operating costs or maximise or diversify the potential of their land or estates, include high-energy consumers such as:

- local authorities (to drive down the operating costs of their estates, or to provide community energy initiatives to help drive down electricity costs for their residents and to tackle fuel poverty);
- hospitals (to drive down the operating costs of their estates or to maximise the potential of their car parks or excess or constrained land);
- universities (to drive down their operating costs, or to maximise the potential of their estates);
- charities (to drive down the operating costs of their estates, or to maximise or diversify the potential of pockets of land left to them through legacy donations);
- large businesses (to reduce their operating costs and to show leadership in renewable initiatives for profiling);
- farms and rural landowners (to reduce their operating costs and to maximise or diversify their land – often providing a useful development opportunity on constrained land where other development opportunities are limited or restricted); and
- developers (to maximise the income from their land by providing a long-term income from energy storage and

distribution – alongside other core development projects).

For further information on developments relating to university and local authority property development please see my previous article 'Without a plan(ner)' (*POJ36*, May/June 2017, p22).

## *Planning consultants can advise clients on the need for public engagement with the local community from the early stages of the proposed scheme.*

### **Further news and information**

In other recent news:

- A new cross-government partnership between One Public Estate (OPE) and the Department for Communities and Local Government has been established, which will create a wider support package for partnerships to unlock more surplus public sector land and property.
- 'The Local Authority Land Release Fund', announced in the government's housing white paper earlier in the year, will provide a pot of £45m capital funding for land remediation and infrastructure projects which aim to help deliver land for housing.
- It was also announced on 1 August 2017 that OPE has launched a new funding window giving new areas the opportunity to apply to join the programme, as well as existing OPE partnerships the opportunity to access additional funding to further develop their proposed plans.
- Partnerships will be able to apply for up to £500,000 revenue funding to deliver land and projects in local areas and full details of the announcements can be found at [www.legalease.co.uk/phase-6](http://www.legalease.co.uk/phase-6). ■