

Electric Vehicles

5th June 2019

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As part of Drax Group, we're going to be a key player within the UK's future energy system – a future that's focused on renewable, low carbon and flexible technologies and, crucially, that also needs other low cost, low carbon resources to provide baseline power to the UK when the sun's not shining and wind not blowing.

The IPCC says 85% of power will come from renewables by 2050. The other 15% will therefore come from flexible, reliable technologies, like biomass, hydro, pumped storage and gas.

Drax Power Station is the UK's largest decarbonisation project, having transformed 4 of its 6 generation units from coal to biomass in recent years. On 7th February, the plant announced that its Bioenergy Carbon Capture and Storage (BECCS) pilot had started to capture a tonne of carbon dioxide each day. **(Drax CCUS = Carbon Capture, Usage and Storage.)**

This is the first time, anywhere in the world, that CO₂ has been captured from the combustion of a 100% biomass feedstock. The aim is to scale up this success to deliver negative emissions – to get there, we need to identify how we can store or use the CO₂ we capture, and we're working with the government and other businesses on that.

In addition, the Group's transformed the business from being a single site generator to now having a portfolio of generating projects and assets in locations across Scotland, England and Wales.

Context: There's an electric revolution happening



Shift towards **energy decarbonisation, decentralisation and digitisation**



The coming energy revolution creates **great challenges** but also **great opportunity**

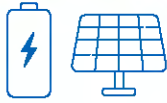


In a changing world people want **leadership and partnership**

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Ways your business can change



Battery storage and renewable generation



Demand Side Response revenue



Power Purchase Agreement revenue



Electric Vehicles (EVs)



Smart meters and UK Smart Grid

Self generation and battery storage

It's possible to boost your sustainability, savings and income by self-generating using solar and wind. Installing a battery helps to mitigate the intermittent nature of these resources and to reduce costs.

You can draw upon your stored power when electricity from the grid is priced higher, and recharge your battery from onsite sources, or via the grid when power is cheaper. Self-gen and storage reduce your reliance upon the grid's electricity, minimising the risk of power failures affecting you.

EVs are coming down in price; charging infrastructure across the country is growing

The Green Alliance charity/think tank estimates that there are 25,000 central govt fleet vehicles in UK and a further 50,000 managed by local councils - scope to adopt EVs and reduce emissions.

Smart meters

The latest smart meters – known as SMETS2 – can save you time and money, and help you reduce your emissions. They automatically record (and securely send) your electricity usage data, in near real time, to your supplier – who can then generate bills that are more accurate than estimated ones – so you only pay for what you use. A smart meter also means not having to note down/send your own meter reads – or wait for an agent. The data from the smart meter should help you identify usage

patterns and map these against costs, to show how much you could save by shifting your consumption.

DSR – creating new revenue streams

As the UK diversifies its energy mix, energy prices are becoming more volatile. Intermittent sources of energy such as solar and wind can make it difficult for National Grid to balance supply and demand.

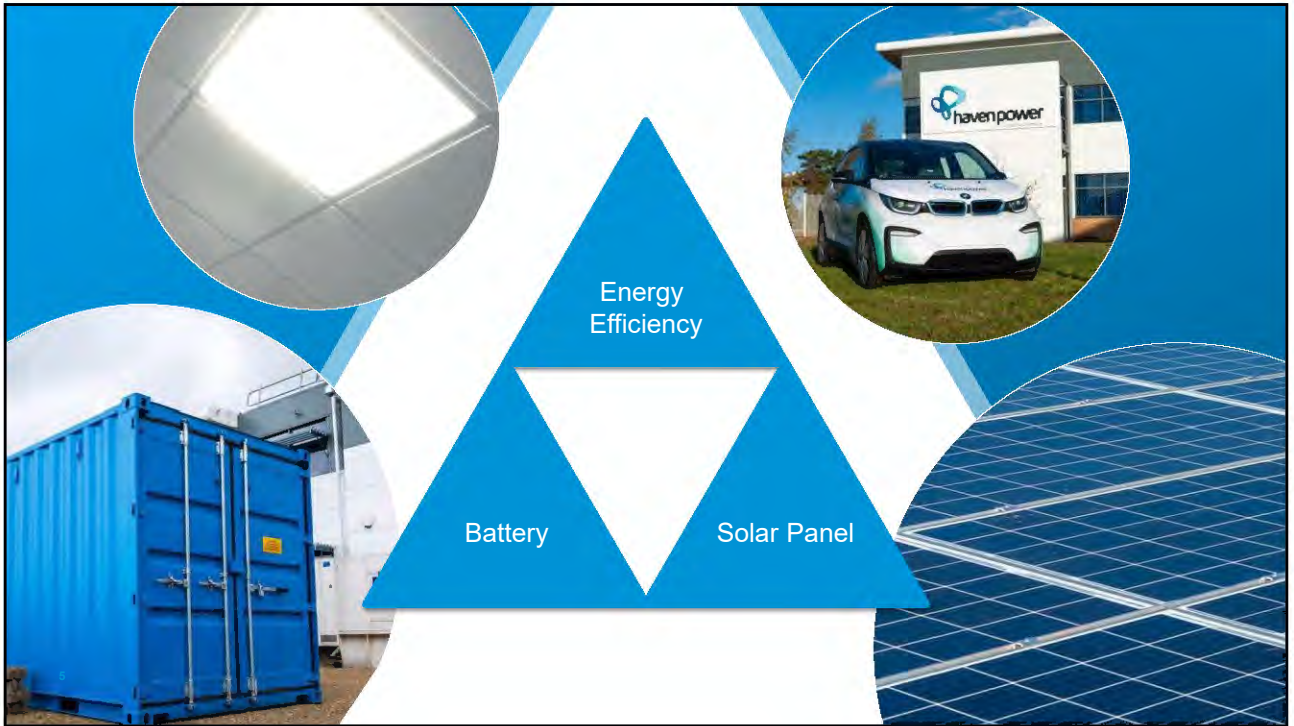
DSR can help to manage these fluctuations – and is good for DSR participants too. You are financially rewarded for temporarily switching to local (non-grid) sources of energy or stored energy, or for reducing consumption.

There are different ways to take advantage of DSR, depending on your organisation's consumption flexibility, generation assets and energy storage capability. Participation results in payments and can protect you from peak energy costs and power cuts. Mitigating 3rd party charges is also a consideration.

Power Purchase Agreement (PPA)

A contract with a supplier at either an agreed or variable rate per unit. This option can offer you, as a generator, a variety of savings related to Use of System charges including Balancing Services (BSUoS). You can decide not to export at a certain time, but retain the option to do so on demand. This is viable if you can balance your costs against the income from supplying back-up energy to National Grid, via DSR.

Working with Haven Power as your energy partner could give you access to all of these technologies and schemes – and more.



We are a business doing this, we're a customer like you:

Solar Panels

- 550 square meters
- Anticipated savings of 15% (energy) **with an expected payback of 5 years.**
- Liaised with Local Planning Authority for permission to install solar – then...
- Installed 280 solar panels on our south-facing roof, with a capacity of 79.8kW – anticipated saving of 15% each month
- Worked with our local Distribution Network Operator (DNO) to set up an export limitation scheme on the solar
- Registered our solar into Ofgem's ROO-FiT scheme

EV Chargers

EV Pool Car

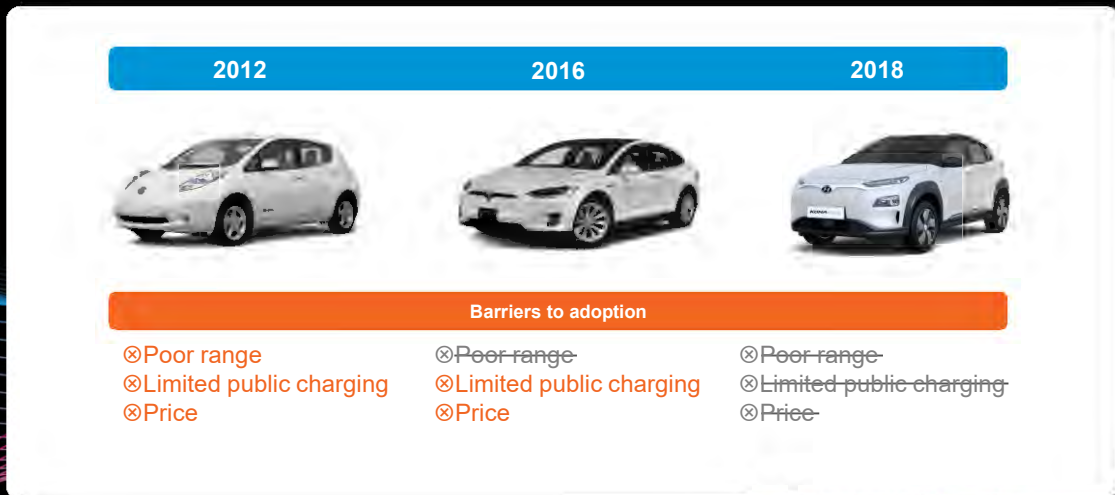
Led Lighting

- 15% energy saving immediately
- Lights only come on when people are in the area (with controls in place)

Battery

- It is an 80/40kW battery
- We are looking to utilise the battery to store our excess solar, which over the bank holiday would have allowed for us to store our generation
- We have the export limitation so our generation shuts off when we are importing less than we are generating to prevent us exporting to the grid. With the battery this, excess generation, can instead be diverted to the battery meaning we can continue to generate when it is sunny and we are not using the power on site.
- We are also investigating supporting grid schemes with our battery once it is up and running.
- We will also be able to discharge the battery at 4pm-7pm so avoid importing in the DUoS red band when demand is higher on the grid.

Electric vehicle adoption is accelerating...



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.....As electric vehicle technology and public charging infrastructure improves and vehicle costs reduce

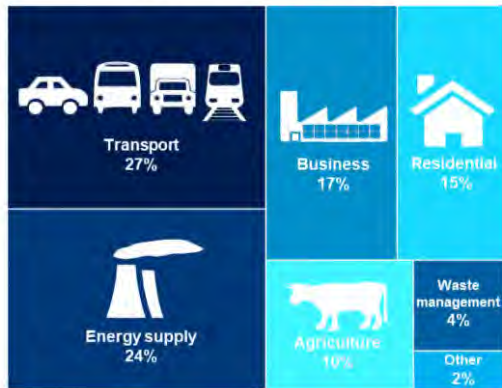
2012 - The Nissan Leaf (the UK's first mass-market EV) released: 75 miles range

2016 - Tesla releases the model X with a 350-mile range: prices from £80,000

2018 - Hyundai releases the Kona Electric with a 300-mile range for under £30,000

...because of transport's role in decarbonisation

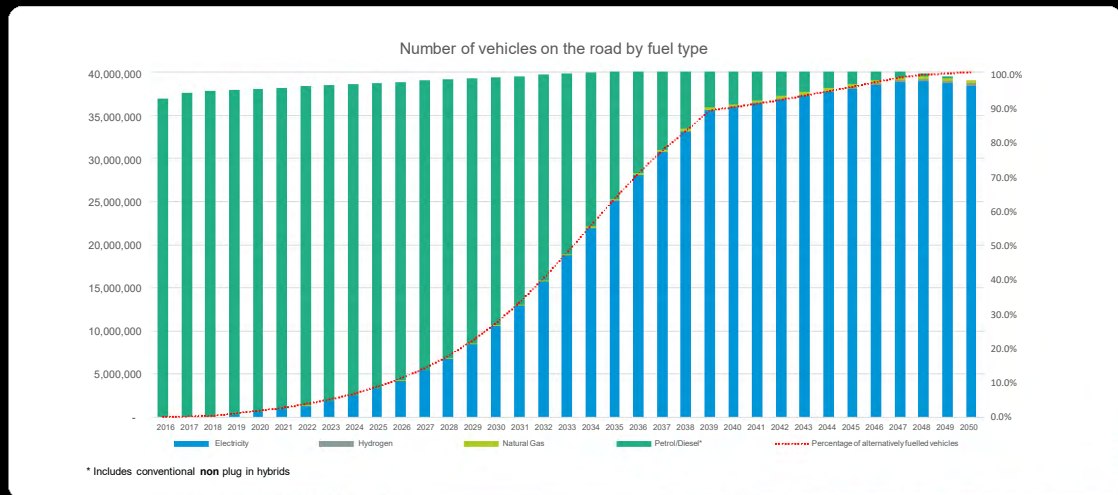
Transport was the largest emitting sector of UK greenhouse gas emissions in 2017



Energy supply and the residential sector delivered the largest reductions in emissions from 2016 to 2017

	2016-2017 % change	1990-2017 % change
Transport	↔ 0%	↓ 2%
Energy supply	↓ 8%	↓ 60%
Business	↓ 2%	↓ 30%
Residential	↓ 4%	↓ 16%
Agriculture	↓ 1%	↓ 16%
Waste management	↓ 1%	↓ 69%
Other	↓ 2%	↓ 88%

And we're moving to a mass market



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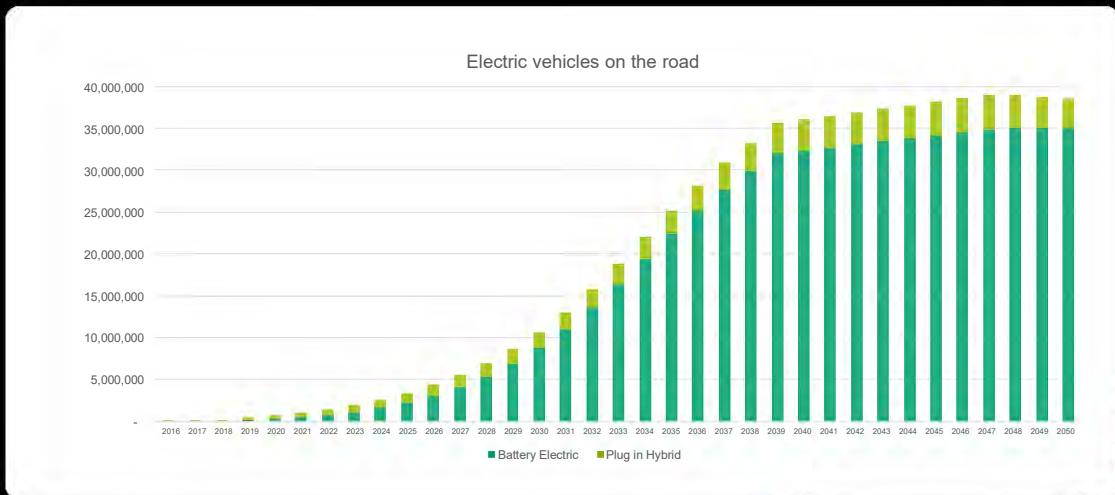
New sales of petrol and diesel vehicles will cease by 2040 – and almost every car and van on the road will have zero emission capability by 2050

National Grid - Future Energy Scenarios

Under the 'Community Renewables' scenario

- By 2030, 10.7m vehicles (27%) on the road will be powered by alternative fuel rising to 36.4m vehicles (90%) in 2040

EVs to 2050



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Vehicles fuelled by electricity amount to some 99% of all alternative fuel vehicles on the road and are essential to meeting Government targets

- Additional annual electricity demand for transport forecast at 22TWh in 2030 rising to 60TWh in 2040.
- Essential that peak demand from electric vehicles is managed through smart charging supported by Vehicle to Grid technology

Make the EV transition today



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So the key question you're probably asking is "Why should any business make the transition to EVs today?"

The three simple answers are (1) To realise value (2) To improve Corporate Social Responsibility (CSR) (3) To learn

Let's look in more detail at each one in turn...

1. To realise value

- The potential savings on fuel and maintenance can make the total cost of ownership comparable to a diesel alternative
- Ultra Low Emission Zones are becoming commonplace and these may restrict or penalise certain vehicles from entering

2. To improve Corporate Social Responsibility

- Some consumers feel personally accountable for addressing social and environmental issues – they look to companies as partners for progress (e.g. Cone Communications / Ebiquity Global CSR Study)
- Using electric vehicles in your fleet can help your organisation boost

your Corporate Social Responsibility (CSR) credentials by reducing your carbon emissions and improving air quality

3. To learn

- The adoption of electric vehicles is a learning curve
- Adopting today gives you the opportunity to learn before policy dictates

Now we know why businesses should transition to EVs, let's look at how they can do it...

What do you need to think about?



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It's not just as simple as buying an electric vehicle...

Fleet review

Which vehicles are candidates for electrification?

- Is the vehicle near to the end of its useful economic life / lease?
- Is the daily mileage achievable?
- Does the average idle time enable within-day charging?
- Does the vehicle have any special needs e.g. refrigeration?

Infrastructure review

What charging infrastructure is required for your vehicles?

- What charge point connections are required (defined by which electric vehicles are proposed)?
- What charging speed is needed (dependent on idle time)?
- Will the infrastructure also be used for employee/public charging?

Electrical site visit

What civil work is required for the charging infrastructure?

- What options are there for infrastructure location?
- What network reinforcements are required?
- Should a new Distribution Network Operator connection be requested?

That's a lot to consider – covering areas that a business may not feel it has expertise. In such cases, there's help on hand...



SES Water

SES Water **will rely on their own charge point infrastructure** – there will be no public access to these!

No business should rely on public networks alone just yet. As time progresses, companies like GridServe will likely change this issue as they build dedicated 'destination' (Shopping Malls/Eateries) with charge points offering fast charge.

Public network issues include:

- Units being unexpectedly offline
- No queueing functionality (e.g. I want to charge up at 1pm) – it's first come first serve!
- Lack of charge points at key sites
- No interoperability – different apps for different charge points

SES Water fleet – learnt our own lessons, sold our first EV fleet to SES Water:

- Drax's first EV customer
- 16 new charging points
- Initially replacing 10 of its 120 strong fleet of diesel vans with electric vehicles
- The switch will result in a carbon saving of 43 tonnes of CO₂ per year

- A significant step forward in SES Water's environmental commitments which last year saw the company switch to 100 per cent renewable electricity.

Data Visualization

Haven Power developing a bespoke visualisation tool that will give electricity consumers a visual representation of their consumption and performance, comparing this data to their goals or industry benchmarks.

Gathering information from a number of potential sources - including HH data, sub-metering and Internet of Things devices. The software will show consumption in unit and financial terms in order to provide understandable insight that will enable informed business decisions.

- Dashboard – portfolio view of consumption, commodity and TPCs, generation, SToD level view
- Site consumption & cost – SToD Level view – daily, weekly
- Energy trend data – Daily, monthly yearly
- Asset level capability
- Site vs Site comparison
- Asset vs Asset comparison
- Forecast of Cost/Consumption
- Weather data – alerts on adverse weather conditions
- Exception reporting – Anomalies in consumption pattern or % deviation from expected cost
- KPI data – Bespoke, user defined measures

Opus Energy PPA details:

In 2018 we bought over 1TWh of local, renewable power from over 2,100 generators:

- Around 1,100 solar sites (around 320 MW)
- Nearly 900 wind sites (around 225 MW)
- The rest a mix of anaerobic digestion, CHP, hydro and landfill gas power

For context, 1TWh is roughly 25% of the energy that Opus Energy supplied to customers last year – over 340,000 meters.

Thank you

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