
Plot Your Path
to Net Zero
A Focus on Sustainable On-Site Generation
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Business Solutions

What's inside...

Introduction

In 2020, we conducted a major survey of 100 businesses which asked them about the key measures and support they wanted to see from the UK government and other influential stakeholders to help support their decarbonisation plans.

The first report - 'Your Business Blueprint - The Road to Net Zero' - discovered that, while businesses widely supported the net zero ambition, they wanted greater clarity in terms of what their role would be in the low-carbon transition. They also wanted to know the policies that would be put in place to support them, and whether there would be additional incentives to help them make the necessary changes to their operations.

We are now several months on and, since that first report, the government has published its 'Ten Point Plan for a Green Industrial Revolution', its long-awaited Energy White Paper and the Industrial Decarbonisation Strategy.

However, are these enough to give businesses the confidence to make the necessary investments to decarbonise their operations?

Now, in this second report, we take a closer look at sustainable on-site generation and the important role it can play in helping organisations plot their path to net zero, as well as how it can support the UK's wider 2050 ambition.

We have conducted a further consultation with more than 50 organisations to find out whether they are investing, the types of on-site generation they would consider installing and any potential barriers to investment. The message is clear - businesses are already showing ambition in this area, but would welcome further support.

We also explore the benefits of on-site generation - not just in terms of access to 'green' energy, but also better energy security and increased flexibility - and the types of on-site generation that are available to organisations, from solar photovoltaic (PV) through to heat pumps.

For us, considering the installation of on-site generation technology is one of the key actions organisations can take to reduce their emissions and energy consumption. This guide is designed to help you make the most informed decision for your organisation, and our experts are on hand to help you turn that into a reality.

We hope you find it useful.

Anthony Ainsworth

COO, I&C Energy Sales and Solutions, E.ON UK and npower Business Solutions (nBS)

Executive summary

We consulted with more than 50 businesses across areas including manufacturing, transport and the public sector to gauge whether they have invested, or are planning to invest in on-site generation, the potential barriers to investment and also the benefits of generating their own energy supply.

Businesses are investing, and solar PV is the most popular choice

The research showed that, despite a challenging economic environment, many businesses are pressing ahead with their on-site generation plans. Over 50% of our respondents said they had already invested - or were planning to invest - in their own supply.

Solar PV is, by far, the most popular choice, with 77% of respondents saying they had already invested in solar PV for their business. The next most popular option was combined heat and power (CHP), which was chosen by 38% of respondents.

Demonstrating ROI is the key barrier to investment

The businesses and organisations we consulted with also raised some of the issues they face when it comes to building a case for investment for on-site generation. The primary barrier is proving the return on investment (ROI) of an on-site asset, closely followed by access to funding. A quarter questioned whether it would be suitable for their premises.

That said, where on-site generation wasn't possible, a large number of respondents said they already had - or would consider - a Power Purchase Agreement (PPA) to buy renewable energy.

Reducing carbon and costs are the main benefits of on-site generation

When it comes to the key benefits of investing in on-site generation, reducing carbon emissions and energy invoices were at the top. Other benefits businesses cited were increased stability of supply and the ability to integrate it with other low-carbon technologies, such as energy storage or electric vehicles (EVs).

For example, in two recent projects, the results were clear:

- Arena and Convention Centre (ACC) Liverpool Group[1] saved 130 tonnes of harmful carbon gasses each year by installing a solar PV system
- Russell Roof Tiles achieved £72,000 cost savings in the first year following the installation of a CHP system

You can read more examples of 'On-site generation in action' later in this report.

1 NB - ACC Liverpool, Russell Roof Tiles and Audi case studies profiled are E.ON customers. npower Business Solutions (nBS) is now part of the E.ON Group.

01
Section

What are businesses investing in?

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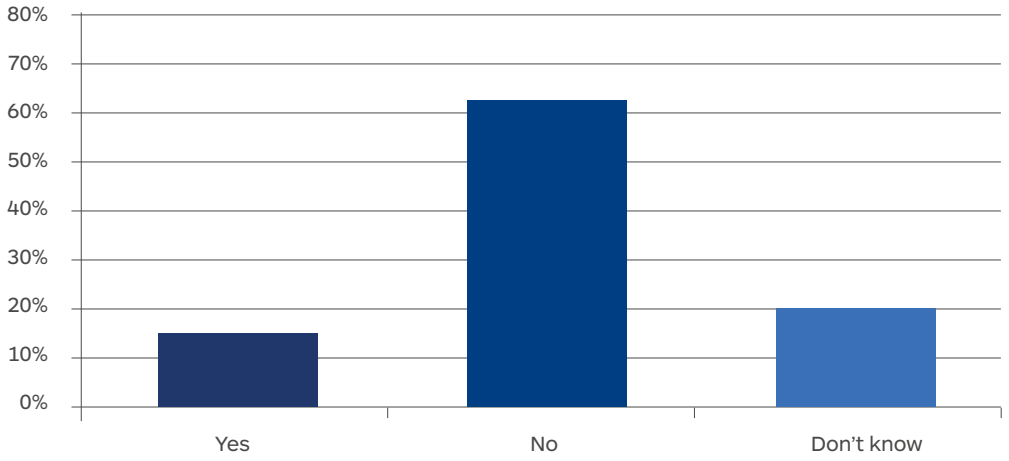
What are businesses investing in?

When it comes to investing in on-site generation, our research shows that it is the top area where businesses would welcome additional government support or incentives to help them with the capital commitment.

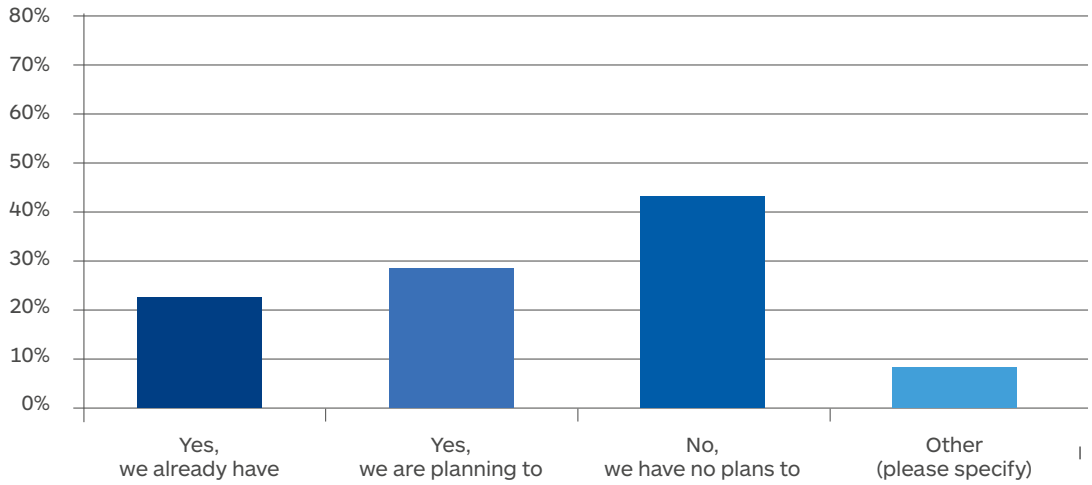
However, two thirds (63%) didn't feel that the latest government announcements and policies gave them the confidence to invest, indicating more needs to be done. (Figure 1.)

Figure 1: Do the latest government announcements and policies give you the confidence to invest in on-site generation?



That said, over 50% of our respondents said they had already invested - or were planning to invest - in an on-site asset. (Figure 2.)

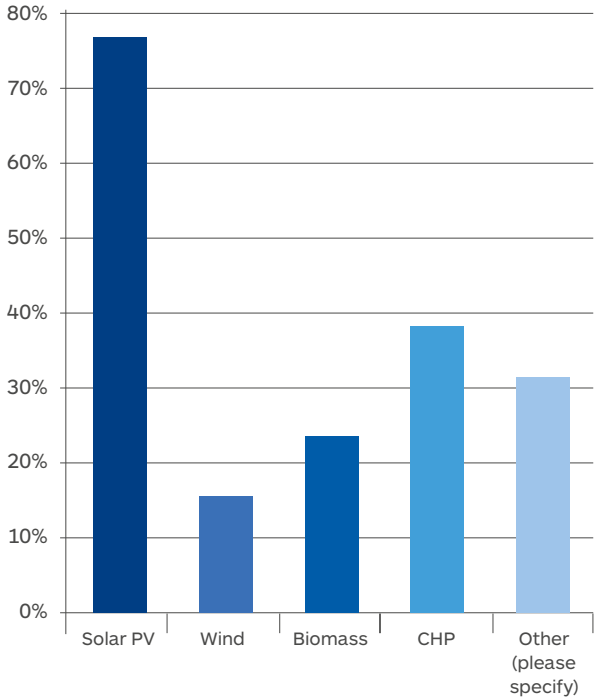
Figure 2: Have you - or are you planning to - invest in some form of on-site generation?



Over 50% of our respondents said they had already invested - or were planning to invest - in an on-site asset.

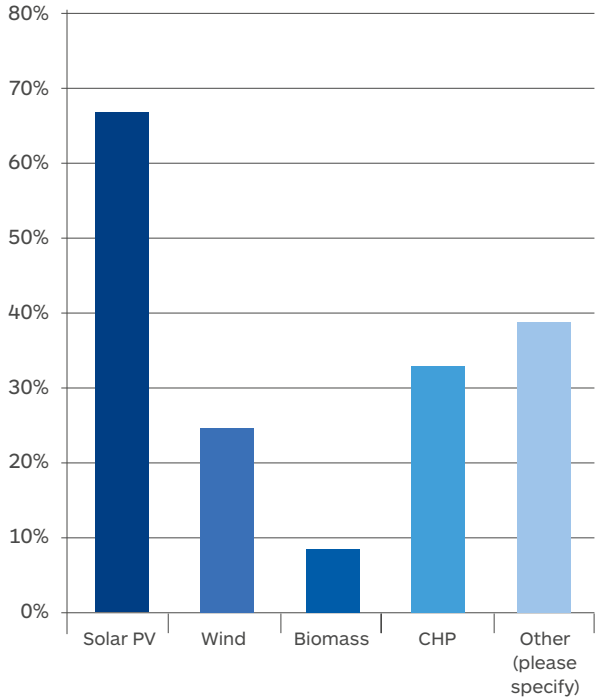
When it comes to the specific technologies organisations invested in, solar PV is proving to be the most popular, with 77% choosing to harness the power of the sun to generate renewable energy. (Figure 3.)

Figure 3: Which areas of on-site generation have you already invested in?



Solar PV is also the most popular choice for businesses that are planning to invest in on-site generation, again followed by CHP. Wind was also a choice for a quarter of respondents. (Figure 4.)

Figure 4: Which areas of on-site generation are you planning to invest in?



One of the main reasons for the growing popularity of solar PV could include the falling costs over recent years, even in a post-subsidy world. It is also widely regarded as one of the more straightforward technologies to install, yielding immediate results.

'Other' answers included batteries and energy storage, as well as ground or air source heat pumps (ASHPs), with several organisations stating plans to combine a renewable energy source such as solar PV or wind with storage to help protect against intermittency and ensure a more stable supply.

Section 02

Barriers to investment

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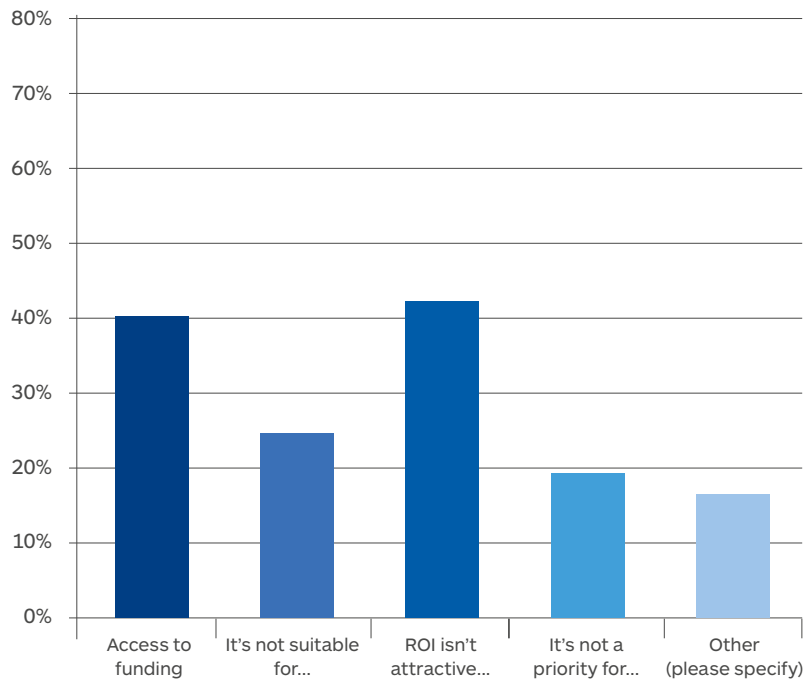
Barriers to investment

Despite the positivity around plans to invest in on-site generation, the businesses we consulted with also raised some of the issues they face when it comes to building a case for the investment. With the majority (65%) saying that they fund any energy efficiency or sustainability initiatives from within the business, the fight for CAPEX can be tough - particularly during a challenging year.

As 'Figure 5' shows, the primary barrier is proving the ROI of an on-site asset (43%), closely followed by access to funding (40%). With some having payback of several years, it can be difficult to justify such a major capital investment at a time when finances are tight.

A quarter (24%) also questioned the suitability of on-site generation for their organisation. There is now a significant choice for commercial installations, so while conducting a thorough site feasibility assessment is important, installing your own asset doesn't necessarily need to be ruled out.

Figure 5: What are the barriers to you investing in on-site generation?

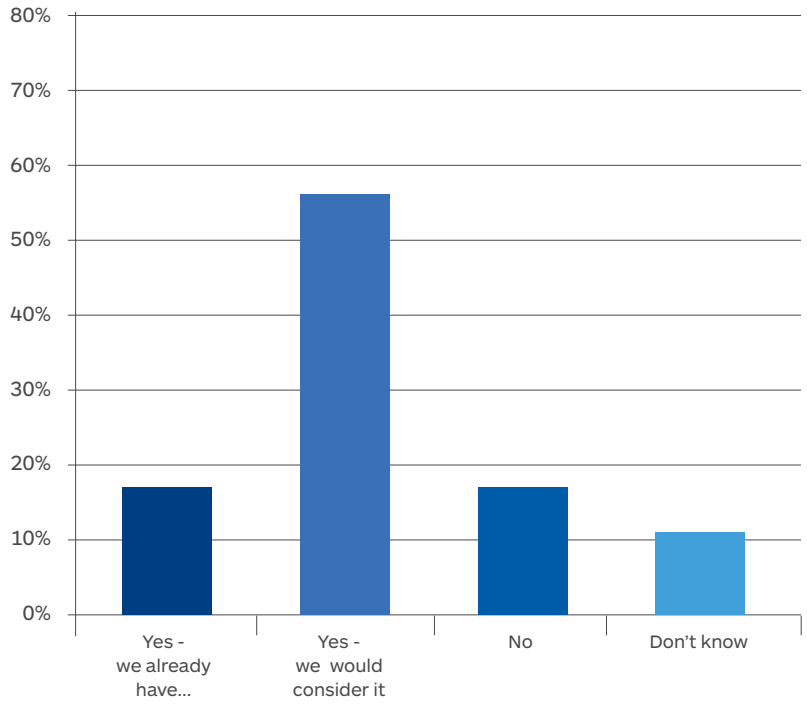


That said, where on-site generation is not an option due to cost barriers, one route to a renewable energy supply from an on-site source is via a PPA. These can be arranged via a third party funder, who can install and manage the on-site asset. The organisation then buys the energy from the funder over the course of a long-term PPA, negating the need for up-front investment.

If suitability for a particular site is also an issue, businesses can still benefit from a PPA to purchase energy from a local renewable energy source.

Encouragingly, this was a route that the majority of our respondents who could not install on-site generation (73%) were either already taking, or were considering. (Figure 6.)

Figure 6: If you cannot install on-site generation, would you consider procuring renewable energy via a PPA?



If suitability for a particular site is also an issue, businesses can still benefit from a PPA to purchase energy from a local renewable energy source.

Section 03

Benefits of on-site generation

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Although businesses highlighted some of the barriers to on-site generation, when it comes to overall decarbonisation targets, the majority (73%) were in agreement that the climate benefits to achieving net zero outweighed the potential cost implications to their business.

This is reflected in what businesses believe are the main benefits of investing in on-site generation. When asked to rank the positive impact of having an on-site source of electricity - with 1 being the most important - the results were as follows:

1. **Reduction of carbon emissions**
2. **Reduction in energy invoices**
3. **Stability in terms of security of supply**
4. **It is future-proof as it has the potential to integrate with other low-carbon technologies, such as EVs**
5. **Potential revenue opportunities i.e. selling surplus energy back to the grid**
6. **Reputational benefits**

You can read more about the benefits of on-site generation in our 'The expert view' section later in this report.

Section 04

What on-site generation is best for your business?

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On-site generation is defined as the 'production of energy at the point of use' i.e. where the energy generated will be primarily utilised. It can also be referred to as 'decentralised energy', as it means an organisation can generate its own electricity at its own site, without relying on buying that energy through the grid.

There are now several different options for organisations, and which is most suitable will depend on the size of their premises, its location and the feasibility of installation.

Here, we look at some of the ways you can generate your own energy from low or zero-carbon sources.

There are now several different options for organisations, and which is most suitable will depend on the size of your premises, its location and the feasibility of installation.

Solar PV

According to Solar Energy UK, solar technologies can be found on one in every 25 buildings in the UK, from 'garden sheds to commercial estates'. It works by capturing the sun with thermal or PV panels to create heat or electricity.

Solar PV systems are experiencing a significant growth in popularity, as it is often seen as one of the simplest and most cost effective ways to generate renewable electricity. It enables businesses to unlock value from existing assets like their roof, parking areas, or ground space and generate their own efficient energy supply.

What makes solar PV an attractive option?

- Even in a post-subsidy world, the falling cost of components has made it affordable
- Technology has evolved which means it can produce effective yields even on a cloudy day
- It can be easily integrated with storage technologies to provide 24/7 electricity, as well as other low-carbon technologies such as EVs

What sites are solar PV suitable for?

- Those with a good amount of south-facing roof space are ideal e.g. distribution centres, manufacturing plants, large retail properties. However, smaller spaces can also be effectively used

What is the ROI?

- This depends on the size of the system and how it is funded. For example, a self-funded project could pay back in 10 years, whereas a third-party funded project where a developer owns the asset and the organisation purchases the power via a long-term PPA can be over a 10-20 year period

Wind

Wind is one of our most powerful natural resources and can be a highly efficient generator of renewable energy. This was demonstrated by it accounting for nearly 50% of the generation mix during a particularly blustery May bank holiday in 2021.

It has also been highlighted by the government as one of the key ways for the UK to hit net zero by 2050, with the Prime Minister saying that he wanted offshore wind farms to power every home in the UK by 2050.

For businesses, installing an onshore wind turbine can be a really effective way of generating its own zero-carbon energy.

What makes wind power an attractive option?

- Falling costs have made it more cost effective to install
- Wind can be a more reliable source of renewable generation in the UK
- It can be easily integrated with other low-carbon technologies such as EVs

What sites are wind power suitable for?

- Exposed areas, with a high average wind speed and good site access are ideal. Installing a wind turbine does require careful planning, and consent will be required to ensure there is sufficient distance between the turbine and any noise-sensitive neighbours, and whether the area has any special environmental or landscape designations

What is the ROI?

- This depends on the size of the system and how it is funded. For example, a self-funded project of a small turbine could pay back in under 10 years. If it is funded through a 10-20 year PPA, then savings on energy invoices could be around 10%

Combined heat and power (CHP)

A CHP unit provides on-site electricity generation, while the heat produced from the process is captured and used elsewhere in your building. It works by converting fuel into electricity through a generator to power on-site operations.

The heat generated during this process is then captured and can be used for heating, hot water or air conditioning.

What makes CHP an attractive option?

- On-site generation with a CHP unit can reduce energy costs by up to 20%, with the potential to sell excess electricity back to the grid
- The excess heat generated can be used to warm your building, or it can be converted and used for air conditioning
- Reducing your dependency on the electricity grid with a CHP unit will stabilise your energy supply and lower your risk of disruption

What sites are CHP suitable for?

- CHP can be used across a variety of sites, but it is particularly suited to industrial and commercial sites that use large quantities of heat and power. It is important to analyse the energy demand profile of your site to assess whether CHP is the best option

What is the ROI?

- If self-funded, CHP can achieve around 20% savings on energy costs and an average payback of around 2-5 years

Heat pumps

Heat pumps work by extracting heat from natural sources like the ground, air or water, or as a by-product of cooling equipment. The pumps then store the heat or distribute it as central heating or hot water - commonly in heating, ventilation and air conditioning (HVAC) systems.

What makes ground, water or air source heat pumps an attractive option?

- They can be combined with additional renewable sources such as solar PV or wind
- They can be used as a replacement for natural gas, helping to reduce emissions
- Reductions in your heating and cooling costs will help your business generate savings

What sites are heat pumps suitable for?

- Most businesses can install a heat pump. There are different types of heat pump - air, ground and water - and suitability can be assessed on a site-by-site basis. Ground source heat pumps (GSHPs) are more expensive than air source heat pumps (ASHPs), but arguably provide a more reliable energy supply

What is the ROI?

- The larger the pump, the lower the cost per kWh. If self-funding, payback can be between 5-8 years

Additional technologies

One other area to consider is ancillary technologies i.e. those solutions that can be integrated with a new or existing on-site generation solution.

These could include:

Batteries - these are particularly good to combine with 'intermittent' renewable technologies such as solar PV or wind, where excess power can be stored to be used at a later stage e.g. when the sun isn't shining or the wind isn't blowing

Orcan - a waste heat recovery system, ORC (Organic Rankine Cycle) is a closed cycle process similar to a conventional steam cycle process. Waste heat is used to generate a vapour, which through an expander drives a generator to produce electricity. The working fluid is often based on organic components, to be able to use medium to low temperature waste heat sources. It can result in significant carbon and cost savings

Demand Side Response (DSR) - you can maximise the value of your on-site asset by connecting it to our virtual power plant, and participating in DSR to identify sources of flexibility in your existing energy assets. Reducing your on-site demand during peak periods can help your organisation sell excess energy back to the grid

Energy management and monitoring software and services - these are vital to track the effectiveness of the on-site technology, and to help organisations make any adjustments based on real-time data

Section 05

On-site generation in action

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On-site generation in action

Installing your own generation asset can yield impressive results, as the following case studies demonstrate[1]:

The Arena and Convention Centre (ACC) Liverpool Group - solar PV

Since opening, over six million visitors have come through The ACC Liverpool Group's doors, for over 3,000 events. That demands a lot of energy. As a service business, it relies on everything running smoothly and that extra attention to detail to keep its customers happy.

The solution:

We installed 925 solar panels, which we run and maintain, providing around 5-10% of the venue's electricity. Now, we're exploring the potential benefits from solutions like standby generation and GSHPs, as well as sustainable lighting and HVAC systems.

The results:

- £20,000 - £25,000 renewable energy generated each year
- 130 tonnes of harmful carbon gasses saved each year
- One of the most sustainable venues of its kind

Russell Roof Tiles - CHP

In a demanding climate for UK manufacturing, Russell Roof Tiles needed to reduce its manufacturing costs and maximise its competitive advantage as a leader in sustainability and responsible sourcing - by improving the efficiency and reliability of its on-site energy generation and management.

The solution:

We designed, built and installed a sustainable 240kW CHP system and a new boiler, which provides Russell Roof Tiles with 100% of its thermal needs and around 70% of its electrical demand.

The results:

- £72,000 of cost savings delivered in the first year
- £1.2 million of cost savings predicted overall
- 100% of thermal demands met by new CHP

1 NB - ACC Liverpool, Russell Roof Tiles and Audi case studies profiled are E.ON customers. npower Business Solutions (nBS) is now part of the E.ON Group.

Audi - solar PV

As part of a joint project, Audi - at its plant in Győr in Hungary - wanted to reduce its emissions and become more self-sufficient.

The solution:

A solar energy park consisting of 35,000 solar cells was installed on the roofs of the two logistics centres at the plant covering about 160,000 square metres, creating Europe's largest photovoltaic system, with a peak output of 12 megawatts (MW).

The results:

- An annual output of more than 9.5 gigawatt hours (GWh) of electricity. This corresponds to the annual energy requirements of 5,000 households.
- 6,000 fewer tonnes of carbon dioxide released
- Helps Audi reach its goal of having a completely CO^2-neutral plant

West Sussex County Council - solar PV and battery storage and participation in DSR

Local authorities are required to meet substantial environmental targets to reduce carbon emissions. West Sussex County Council (WSCC) wanted to develop one of its disused landfill sites into an energy park to maximise return on its real estate while reducing its carbon footprint.

The solution:

In partnership with LASER, a public sector buying group, nBS worked closely with WSCC to co-locate a large-scale Lithium-ion battery with a 7.4MW solar PV array. The overall strategy included the sale of power and embedded benefits via a PPA, access to DSR including Triad export benefit, Firm Frequency Response (FFR), both Static and Dynamic, and Capacity Market (CM), as well as price arbitrage and targeted activity in wholesale markets.

The results:

- The asset was one of the first batteries to commence participation in National Grid's new weekly FFR auction trial, at the beginning of 2020
- The asset achieved the highest accepted tendered price in 2019 of £60.42/MW/hour in the Dynamic FFR market
- During the large national power outage in August 2019, the asset responded within two seconds to help reduce the sudden shortfall in supply

06

Section

The expert view:

why on-site generation should be a key part of a business's net zero strategy

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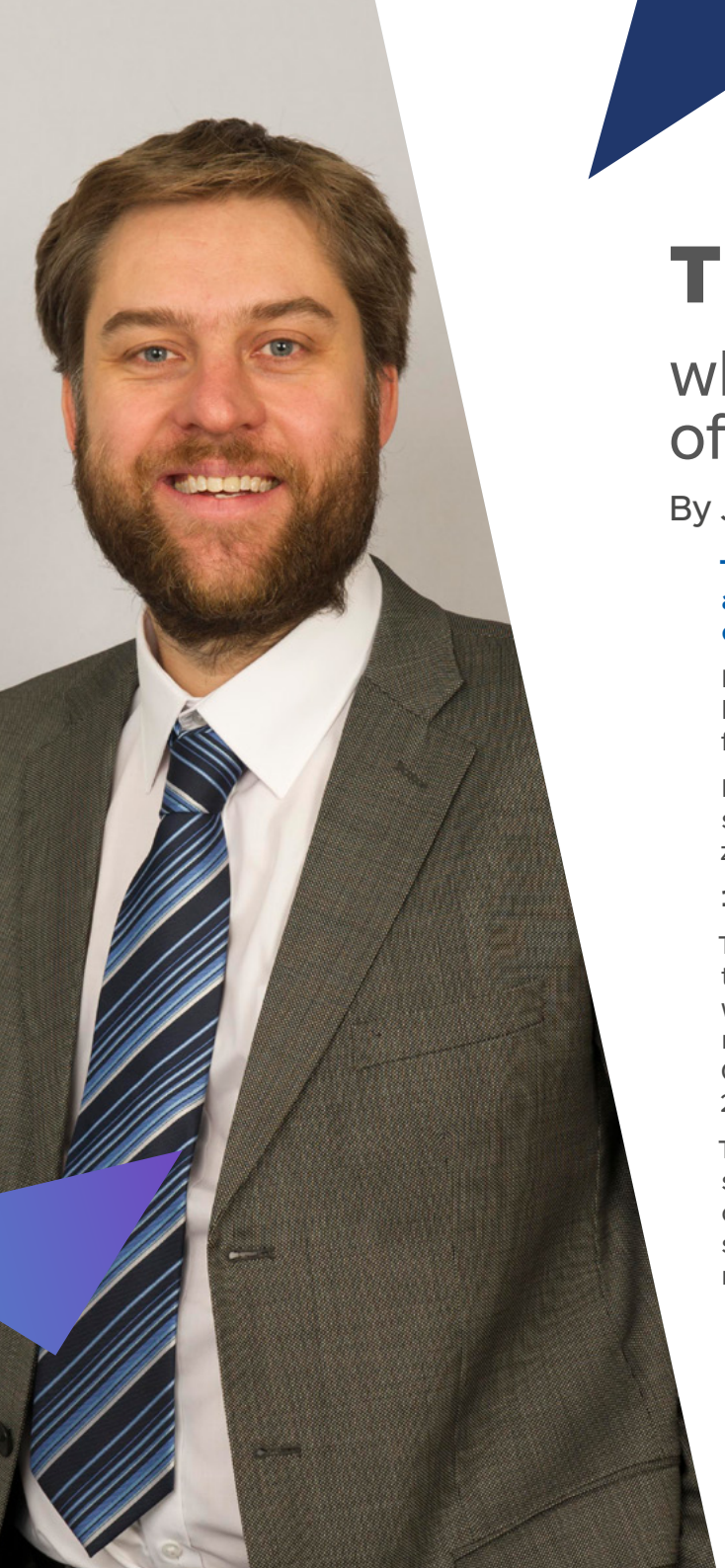

The expert view:

why on-site generation should be a key part of a business's net zero strategy

By John Martin, Product Development Manager

This report shows that businesses are not only considering investing in on-site generation, but that they are actively investing, and across various different technologies.This is great news and demonstrates the commitment towards achieving a net zero future.

For those that still need convincing, there are clearly hurdles to overcome, particularly when it comes to financing.

However, for us, there are five clear reasons why on-site generation should be a key part of a business's net zero strategy:

1. Reduction in carbon emissions

The UK government has set some very ambitious targets for the reduction of carbon emissions. As well as committing to net zero emissions by 2050, it recently announced a mid-point commitment of a Greenhouse Gas (GHG) emissions reduction of 78% by 2035 compared to 1990 levels.

The most effective way to reduce emissions is by switching to a zero-carbon supply. On-site generation options that use 100% renewable sources - such as solar PV or wind - will help your business significantly reduce its carbon footprint.

2. Reduction in energy invoices

Installing on-site generation technology can make a real impact on your bottom line through a reduction in energy invoices through increased efficiency, as your site will only generate the energy your business needs to use.

There is also the opportunity to avoid non-commodity costs, such as the third-party costs required to maintain and balance the grid, if you are generating your own electricity.

3. Protection against price fluctuations

Linked to a reduction in energy invoices, on-site generation helps to mitigate against price fluctuations in the market. As well as avoiding non-commodity costs, having your own on-site supply helps to protect against wholesale price volatility, meaning you can plan ahead with greater certainty.

In short, it puts you in control of your energy usage, and allows you to unlock flexibility in terms of demand.

4. Increased stability of supply

Hitting net zero emissions by 2050 relies heavily on mass-electrification, putting increased pressure on the central grid. The major power outage of August 2019 also served as a timely reminder of what can happen when there is too much demand on the grid. Any loss of energy - no matter how brief - can be costly, particularly to those mission-critical businesses that rely on 24/7 supply.

Installing on-site generation - particularly if combined with battery storage - helps to protect businesses from any downtime by increasing self-sufficiency and minimising the reliance on the grid.

5. Improved reputation and sustainability credibility

As more and more businesses announce their sustainability plans, there has been a greater focus on so-called 'greenwashing', particularly as the public become more climate aware.

A recent report from the Energy and Climate Intelligence Unit and Oxford Net Zero showed that one fifth of the world's largest companies have net zero targets.

However, it came with a warning against 'greenwashing' as only a little over a quarter of those met the report's 'robustness' criteria.

Installing on-site generation is a clear signal that your business is serious about sustainability, particularly in the eyes of customers and throughout your supply chain.

Future-proofing your organisation

When it comes to on-site generation, there is now a great deal of choice for businesses, with more innovative technologies on the horizon. That said, organisations need to make sure that any plans for on-site generation are scoped appropriately, so they strike the right balance between economic and environmental benefits.

In summary, investing in on-site generation makes business and reputational sense. As well as reducing emissions, it also makes businesses less reliant on the grid, mitigates against price changes, enables greater control of energy consumption, and provides future revenue opportunities by becoming a flexible asset.

How we can help

However ambitious your net zero goals, speak with our business experts to see how we can help you find the best on-site generation option for your organisation.

Get in touch with our experts now and start your on-site generation journey.

Contact us

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