EM Magazine

ENERGY GUIDE

A GUIDE TO

ON-SITE GENERATION

FOR THE PUBLIC SECTOR

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As more and more businesses across the UK strive towards a net zero future, on-site generation has entered the spotlight as a viable solution for providing a sustainable energy supply.

From solar photovoltaic (PV) to additional technologies, organisations have a great deal of choice, but must ensure that any plans for on-site generation are scoped appropriately to achieve both the economic and environmental benefits.

But, how do organisations know which option is right for them and how do they secure the investment to reap the rewards? In this short guide we take a closer look at the different types of technology on offer, the key features, benefits and what public sector organisations in particular are currently investing in.

What is on-site generation and what options are available?

To keep it simple, on-site generation is defined as the 'production of energy at the point of use', e.g. where the energy generated will be primarily used. It can also be referred to as 'decentralised energy', as it means that an organisation can generate its own electricity at its own site, without having to rely on purchasing energy via the grid.

As the price of renewable energy has fallen in recent years, the process of on-site generation has become much more feasible, with financiers, regulators and businesses now more comfortable with the idea of distributed generation.

As a result, there are several different options for organisations to choose from, and the suitability of each depends on the size of the premises, its location and ease of installation.

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

Solar PV

Solar PV works by capturing sunlight with thermal or PV panels and converting it into 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 organisations to unlock value from existing assets like their roof, parking areas, or ground space and generate their own efficient energy supply.

The falling cost of solar PV components has made it an affordable option, while technology continues to evolve, meaning it can produce effective yields, even on a grey, cloudy day. What's more it can be easily integrated with storage technologies to provide round the clock electricity, as well as other low-carbon technologies such as electric vehicles (EVs).

Suitability and return on investment (ROI)

It is most suitable for sites with a good amount of roof space, such as distribution centres, manufacturing plants, large retail properties, or large hospital buildings. But, smaller sites can also be effectively used.

For solar PV, the ROI depends on the size of the system and how it is funded. For instance, a self-funded project could pay back in 10 years. However, some energy solutions providers

offer packages where they manage the design, installation, operation and maintenance of the solar panels under a Power Purchase Agreement (PPA), with the customer only paying for the power that they use through the grid. In some cases 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 and reliable generator of renewable energy. It works by converting the kinetic energy in the wind into mechanical power and it has been highlighted by the government as one of the key ways for the UK to hit net zero by 2050.

For organisations, installing an onshore wind turbine can be a highly efficient and effective way of generating its own zero-carbon energy.

Over the years, falling costs have made it more cost effective to install and it can be easily integrated with other low-carbon technologies.

Suitability and ROI

As you would expect, exposed areas with a high average wind speed and good site access are ideal for installing a wind turbine. However, due to the nature of the asset, it requires specific, location-dependent conditions and careful planning. Consent will also need to be obtained to ensure that there is enough distance between the turbine and any noise-sensitive neighbours.

Wind turbines are a great option if the location is right, but can involve substantial upfront capital expenditure (CAPEX) meaning that it is a long-term investment, so companies need to be certain that they will remain on-site for the next 10-15 years in order to achieve ROI.

Combined heat and power (CHP)

CHP, also known as cogeneration, provides on-site electricity generation, while capturing the heat produced from the process and using it elsewhere in the building.

It is a highly efficient process that works by converting fuel into electricity via a generator to power on-site operations. The excess heat generated during this process is then captured and can be used for heating, hot water or converted and used for air conditioning.

On-site generation with a CHP unit can reduce energy costs by up to 20%, and offers the ability to sell any excess electricity back to the grid. What's more, a CHP unit will stabilise your energy supply and lower your risk of disruption.

Suitability and ROI

CHP is an attractive choice as it can be used across a variety of sites. However, it is particularly suited to industrial and commercial sites that use large amounts of heat and power.

If self-funded, CHP can achieve around 20% saving on energy costs and

an average payback of around two to five years and, for many organisations, CHP is the measure that offers the most significant single opportunity to reduce energy costs while improving environmental performance.

Heat pumps

There is pressure growing on organisations to decarbonise their heating and cooling. To combat this, many organisations are looking at installing heat pumps, which are much more energy efficient than gas heating or electric air conditioners, as they use less electric energy than the heat energy they produce and can also provide cooling in summer.

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.

Heat pumps can be combined with additional renewable sources such as solar PV or wind, and they can be used as a replacement for natural gas, helping to reduce emissions. This results in reductions in your heating and cooling costs to generate savings.

Suitability and ROI

Most organisations of any size can install a heat pump and there are different types to choose from – 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 are arguably a more reliable source of energy supply.

As you would expect, the larger the pump, the lower the cost per kWh, and if self-funded, pay back can be between five to eight years. Another bonus currently is that they can qualify for payments under the government's Renewable Heat Incentive (RHI) programme, if eligible.

Additional technologies

Another area to consider is ancillary technologies, which can be integrated with a new or existing on-site generation solution.

These could include:

- Batteries - these can be combined with 'intermittent' renewable technologies such as solar PV or wind, where excess power can be stored for future use
- Energy management and monitoring software and services - these track the effectiveness of the on-site technology, and help organisations make any adjustments based on real-time data
- 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 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

What are public sector organisations investing in?

In our recent report 'Plot Your Path to Net Zero: A Focus on Sustainable On-Site Generation for the Public Sector', we took a closer look at on-site generation and its role in helping organisations reach their sustainability targets on the road to net zero.

We consulted with more than 50 organisations to find out whether they are investing, the different types of on-site generation they would consider installing and any potential barriers to investment. What we found is that organisations are already showing

ambition in this area, but would welcome further government support.

When it comes to investing in on-site generation, our research shows that it is the top area where organisations would welcome additional 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. Despite this, over 50% of our respondents said they had already invested - or were planning to invest - in an on-site asset.

When we asked which specific technologies organisations had already invested in, 77% said solar PV, which was also the most popular choice for those planning to invest in on-site generation, followed by CHP, while a quarter of respondents chose wind.

The growing popularity and interest in solar PV could be due to the falling costs over recent years, coupled with the fact that it is widely seen as one of the more 'mainstream' and straightforward technologies to install, requiring minimal effort and instant reward.

CHP has been used to help reduce energy invoices for many years and is likely to see continued popularity in the public sector. Now that systems can run on carbon-neutral fuels, CHP is able to provide a safe and cost effective options for many public buildings.

Within our report findings, 'Other' answers included batteries and energy storage, as well as ground or ASHPs, with several organisations stating plans to combine a renewable energy source such as solar PV or wind with storage, to better future-proof supply.

What are the common barriers to investment?

For organisations in the public sector, cost-effectiveness, ROI and access to funding are primary considerations when it comes to building a business case for investment in on-site generation.

The majority (65%) of the organisations we recently consulted with said that they use their own funds for any energy efficiency or sustainability initiatives and getting hold of CAPEX can prove difficult. And, in the current economic climate, it can be difficult to justify such a major capital investment at a time when finances are tight.

A quarter (24%) of organisations also questioned the suitability of on-site generation for their organisation. As outlined above, there is now a wide range of options for commercial installations, and while conducting a thorough site assessment is important, you don't necessarily need to rule out installing and managing your own asset.

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 through 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, removing the need for upfront investment.

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

Do the benefits outweigh the barriers?

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

An increasing number of public sector organisations are combining on-site solar PV with battery storage as a cost effective way to power both buildings and vehicles. It provides three-fold benefits: the security of having an uninterruptible back-up power source, the option of avoiding peak-time energy costs by switching away from the grid and the opportunity to earn additional revenue by participating in DSR schemes.

Although organisations 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.

This is reflected in what organisations believe are the main benefits of investing in on-site generation. When we asked our respondents 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

A future-proof sustainability solution

By installing on-site generation you are demonstrating that your organisation is serious about sustainability and on the right road to net zero.

With plenty of choice and options available to suit your on-site generation needs, as well as more innovative technologies to come in the near future, the time to act is now. It is clear that the benefits far outweigh the barriers; it can reduce emissions, reduce reliance on the grid, mitigate against volatile price changes and put you in the driver's seat when it comes to controlling your energy consumption by offering you a flexible asset.

In summary, investing in on-site generation truly does make financial, environmental and reputational sense, providing a future-proof sustainability solution – the question is, which one will your organisation choose?