

LEVERAGING ONSITE SOLAR ON THE PATH TO NET-ZERO





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Foreword

Over the past two years, inflation and rising energy prices have been a huge concern for businesses. While the situation has improved, prices are not expected to go back to where they were before the crisis. We have to live with longer-term higher energy costs and higher price volatility. This increased ongoing global energy market volatility - due to the ever increasing deployment of intermittent renewable resources - has brought the importance of **smart energy management** to the forefront of businesses' agendas.

The **urgency to decarbonise** business operations – as well as organisations' extended supply chains – is also a huge priority. Pressure from regulators, stakeholders and the general public means that overlooking sustainable targets – or failing to set them – is simply no longer an option.

In this context, renewable energy systems have increased in popularity among businesses. However, traditional options for onsite renewable energy assets come with some challenges.

Typically, solar panels are only installed to meet a company's daytime electricity demand. Installing more solar panels is generally considered inconvenient because of the poor returns from selling electricity back to the grid. Not only will the value of surplus solar - sold through power purchase agreements (PPAs) - continue to decline, but the impact of grid constraints will also limit the amount of energy generators can sell.

This complex puzzle of price volatility, net-zero targets, maximising solar generation, and overcoming grid constraints can be tackled in a variety of ways. I've outlined three routes for three very different kinds of businesses below to help you think about what setup would be most appropriate for your own organisation.

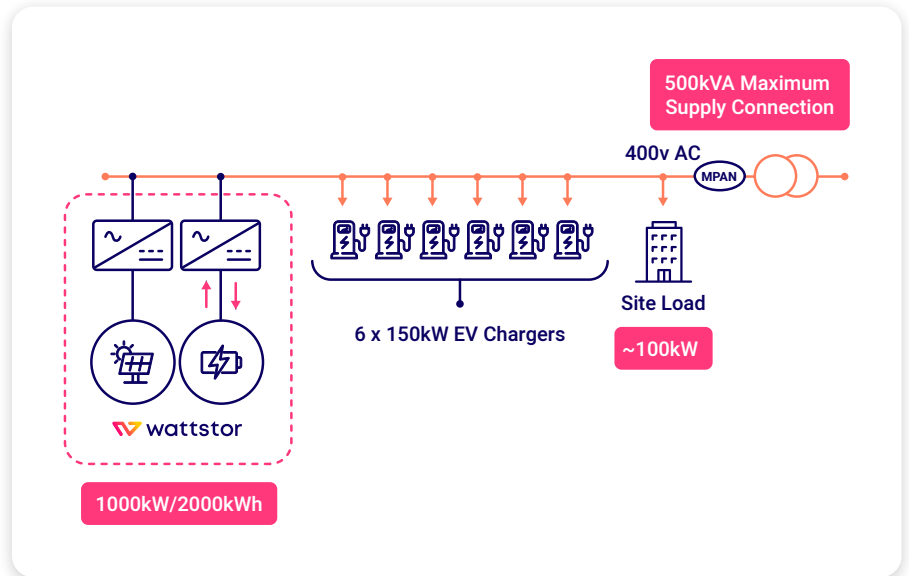
We are all facing the same challenges brought about by a rapidly changing global energy landscape. The key takeaways I share at the end of this document should help frame your thoughts on leveraging onsite solar on the path to net-zero. If you need any further support or have additional questions, please don't hesitate to get in touch.

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Use the QR code to set up a meeting or email me directly



Supporting Multi-Site EV Charging



The Business Challenge

National Highways own and operate over 200 motorway service stations across the country. They have begun to upgrade and install rapid EV charging stations, with the aim of providing ~1MW of EV charging on each site.

Motorway service stations set up in the 1970s were not designed with such a large and highly variable electricity load in mind. Grid upgrades are expensive and unavailable at those sites for another seven years.. As there is limited space to install solar panels, the amount of power they can reliably access from the grid is also limited. Without the ability to make full use of whatever solar capacity can be installed and to access unused grid capacity when onsite demand is low, National Highways would not be able to install the desired high powered EV chargers.

The Wattstor Solution

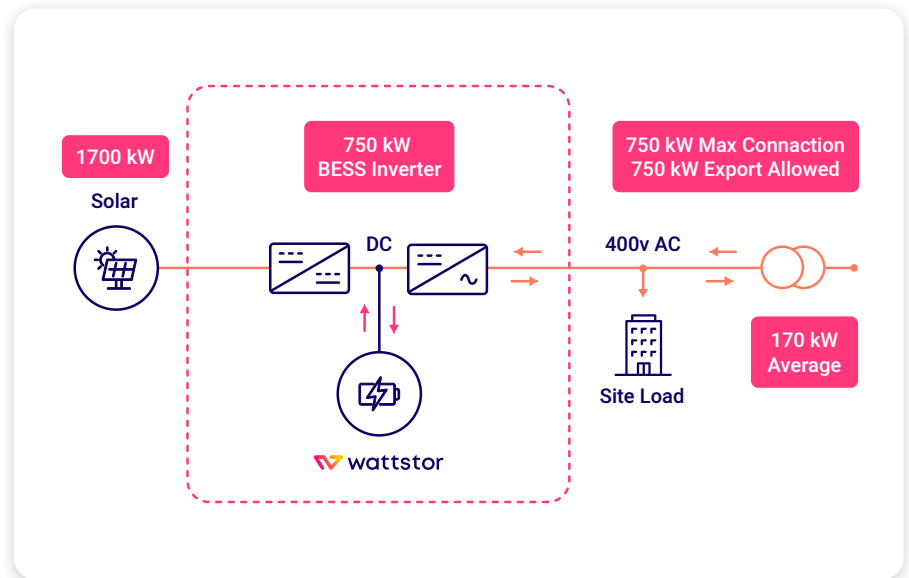
At each service station, we are supplying a containerised battery storage system, together with our dynamic energy management platform - Podium. This monitors the whole flow of energy to the site, and solar availability, charging the batteries during low demand periods and charging cars when people need to plug them in. If too many people need to power up at the same time, our system dynamically modulates and controls the chargers to ration the energy in those very peak periods.

This dynamic approach to energy use and storage helps to make full use of any onsite solar capacity while staying within the limits set by the original grid connection.

[Read more about overcoming grid constraints](#)

[Find out how we manage onsite energy through Podium EMS](#)

Reaching Net-Zero Through Solar Optimisation



The Business Challenge

Mawdsleys is the UK's largest pharmaceutical distributor, with a large operating fleet and multiple sites across the country. While planning the construction of a new flagship temperature controlled warehouse, their aim was to generate as much, if not more electricity as they consume, by maximising the installed capacity of solar panels on the roof.

The forecasted demand in the warehouse averaged out at around 170 kilowatts each hour, equating to 1.5 gigawatt hours (GWh) of consumption a year. A 1700 kilowatt solar array on the roof would be needed to generate that amount of power. The local distribution network operator (DNO) in charge of the network, however, would only allow them to connect 750 kilowatts of onsite generation, which would only allow them to self-generate 40% of what they were aiming for.

The Wattstor Solution

We deployed our DC direct coupled battery solution to enable Mawdsleys to maximise the size of its solar array. This setup decouples the sizing of the installed solar project from the sizing of the alternating current (AC) generation connection that distributes this power to the site load at 400 volts and is electrically connected to the grid. By using batteries – that are direct current (DC) devices, the same as solar panels – we can control the distribution of the solar generation as it comes off the roof, choosing when to convert it into 400v AC, to serve the Mawdsleys site load and how much to export/sell to the local grid network.

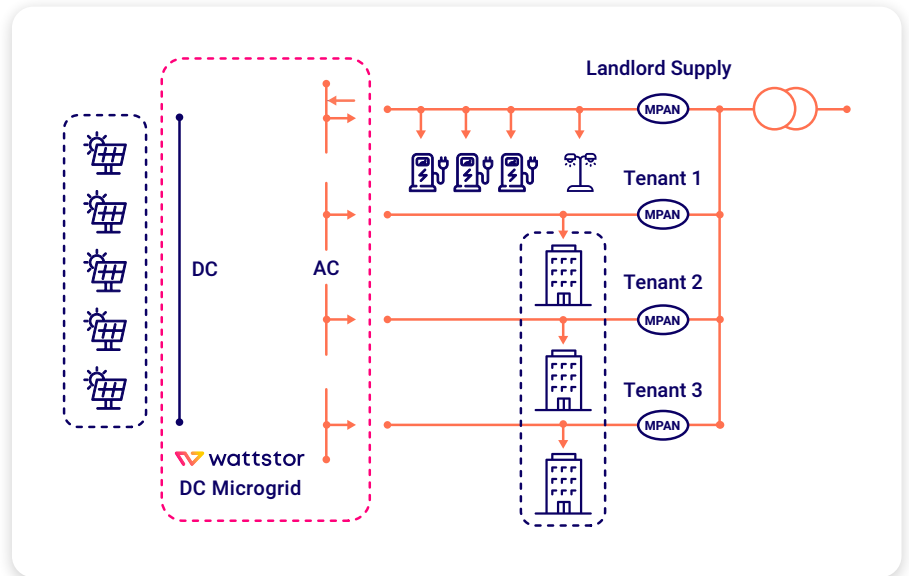
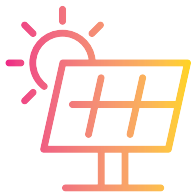
For Mawdsleys, this meant connecting a 2500kWh battery to the solar array via a Wattstor system of power electronics called a "DC/DC converter". This allows the solar panels to deliver whatever DC energy they have into one side of the converter, while Wattstor controls the DC power flow on the other. The Wattstor system decides how much power is sent to the battery and how much is sent out to the site. Normal site usage is expected to average 170kW, so initially some 25% of the annual solar production will be exported. As Mawdsleys expand their site operations, potentially introducing EV trucks in a few years' time, the business is future-proofed with this 25% surplus solar production available to support that load growth.

All this is optimised with our energy management system (EMS), Podium.

Our EMS, which predicts the total solar array output, the site load, and the forward market power price - all a day ahead of time - means we maximise the value of every kW of solar production, every day. This solution - by installing 10x the Solar kW compared to their average kW power demand - has achieved Mawdsleys ambition of becoming Net-Zero. In addition, they can expect a "net-zero" energy bill at the end of each year.

[Learn more about our DC coupled solution.](#)

Empowering Landlords and Tenants with Microgrids for Net-Zero



The Business Challenge

Commercial office complexes and retail parks are designed for use by multiple tenants: individual businesses increasingly looking to reduce their scope 2 emissions and reach net-zero. Each business will have their own unique energy consumption pattern. A bakery, for example, will use a lot of power in the early hours of the morning, while an office next door will have a standard daytime energy profile. The cleaning company two doors down, meanwhile, has a small EV fleet that needs to be charged overnight.

If the property owner were to install a large solar array across all roofs, the standard approach would be to install an electricity meter on each unit and charge the tenant for the power generated directly above their heads. This isn't a great way to optimise energy usage, as the load underneath each roof is unlikely to match the capacity of the solar panels up top. In practice, a lot of the renewable energy produced isn't used at source and instead gets exported to the grid in the middle of the day, exactly when power prices will be at their lowest.

The Wattstor Solution

We have developed a microgrid solution where all solar energy generated by a commercial complex is pulled together and managed in a single DC microgrid system, all controlled and optimised by Podium. Power is allocated to both the tenants (for their own unique usage) and the landlord (where they require power for street lighting, or EV charging points, for example) in an optimised way.

This can apply to both retail parks with a single, massive roof on an industrial estates where you might have many buildings. One may have a large roof area but low demand, while the neighbour across the road might have a high demand and a smaller roof area. By installing our microgrid solution you can optimise the system between buildings and fully leverage the power of onsite solar.

Key Takeaways

1. Electrification of all businesses is accelerating.
2. Grid constraint is the new norm for both demand growth and solar deployment.
3. Volatile electricity markets are also the new norm, where dynamic control of "behind the meter" energy generation assets, is needed in order to access this dynamic value.
4. Microgrid know-how is becoming essential as existing supply chains have capability gaps.
5. DC coupling of solar allows businesses to mitigate grid constraints, reduce their energy bills, cut carbon and accelerate their net-zero ambitions.
6. Through "Electricity as a Service" Wattstor can deliver net-zero for customers whilst managing the complexity of delivery and dynamic operations of "behind the meter" microgrids.

About Wattstor

Since 2013 Wattstor's mission has been to support businesses and communities with smart, flexible energy management technology. We specialise in managing energy assets on business sites and within local energy communities, helping our customers navigate the complex energy market while making the most of its opportunities.

Our award-winning EMS platform, Podium, intelligently decides how energy on a site should be generated, stored, consumed, and traded, taking into consideration variables such as market conditions, generation capabilities, and demand on site. The result is low-cost and efficient operations, reduced carbon emissions, and the possibility to contribute to the stability and sustainability of the national grid.

But we're more than our technology. Wattstor's team of expert energy specialists, together with our carefully selected energy partners, offer outstanding consultancy to guide businesses and communities on their energy management journey. We deliver transparent and honest advice, working collaboratively with our customers and partners to achieve the best ROI on any energy project

What's more, Wattstor can fund 100% of the project costs (Solar and Battery) and will arrange a tailored PPA with you at a lower than grid electricity cost.

Learn more about our [fully funded energy systems](#).

Wattstor provides the tech, resources and expertise to address your energy needs; so you can focus your time, energy and capital on what you do best: running your business.

Ready to take your next step towards net-zero onsite energy?

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