

POSITIVE DISRUPTION

The power of flexibility in
our low-carbon future





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WELCOME TO GENERATION ELECTRIC

There is a new generation of businesses profiting from the UK's shift towards low-carbon electricity.

This new generation of businesses are not defined by their size. You'll rarely hear them identify themselves as small, medium or large.

They're not defined by their sector. Often they have more in common with similar businesses from very different industries.

They're not defined by whether they are publicly or privately owned. Whatever their ownership model, they know they ultimately work for their customers.

What does define these businesses is a common ambition and a shared trait.

Their common ambition is to drive sustainable profitability while creating increased value for their customers.

Their shared trait? Flexibility.

Flexed for success

This new generation of businesses are flexible with their **business models**. After all, how many companies today are pivoting so they can more profitably meet their customers' evolving needs?

They're flexible with how they manage their **premises**. Virtual working, co-working and hotdesking keep overhead costs low, whilst ensuring they can upsize or consolidate their teams based on their workload.

They're flexible in how they address their **employees' needs**. Research has shown that companies with positive attitudes to flexible working, sabbaticals, degree apprenticeships and returnships are more profitable.

Now, the UK's shift to low-carbon electricity means it's time for a flexible approach to **energy** too.

Business-as-usual to the power of flex

Pioneering businesses are not just switching to low-carbon electricity, but flexing the way they see, buy, use, save, manage, even generate it.

Leveraging what we call 'energy flexibility' is giving businesses more control over their energy and opening up opportunities for new profit streams, new sustainability goals and new ways to drive growth.

So, it's business as usual – just with added power.

The fast way to get your circular edge

In our last white paper, we explained how the circular economy has helped businesses realise they can find innovative ways of working that replace a make-use-waste approach to driving profit with a repair-reuse-recover one, using low-carbon electricity to power their transition.

In this white paper, we explore how taking a more flexible approach to their energy is helping businesses get that circular edge.

We're here to help you flex

We'll explain why flexibility is crucial to keeping Britain's lights on. We'll show you how you can make practical everyday changes to the way your business uses energy so you can share your excess capacity. And we'll give you our experts' inside tips on how you can maximise extra savings and earnings as a reward.

What better way to power sustainable growth than to use what you already have?

We're helping businesses across Britain do just that – and we're doing it ourselves by putting our own energy solutions to work on our own sites. We'll share those stories, too.

The future is electric. Let's share in it.



VINCENT DE RUL

Director of Energy Solutions at EDF Energy





DISRUPTIVE TRENDS ARE CHANGING THE LANDSCAPE - BUSINESS, SOCIAL AND ENVIRONMENTAL. IF WE CONTINUE TO DO WHAT'S ALWAYS BEEN DONE, BUSINESS WILL NOT GO ON AS USUAL.

Trend 1: Our natural resources are getting scarcer and more costly

The natural resources that our businesses have relied on for making our products, and powering our businesses, are becoming scarcer. And as competition increases for shrinking supplies, prices will continue to escalate and get even more volatile, increasing the challenge of delivering profitable growth.

Trend 2: Our global population is getting wealthier and more urban

The scarcity of resources is set to become more acute. As global populations grow and become wealthier, the demand for new products and more energy-intensive lifestyles is only going to rise. Meanwhile, our collective waste looks set to increase as the expanding middle-class buy into our fast-retail consumer culture.

1. UN Intergovernmental Panel on Climate Change (IPCC), 2018

Trend 3: Our window for tackling climate change is small and closing

We have just eleven years to take effective action on Climate Change, according to the UN Intergovernmental Panel on Climate Change (IPCC)¹. This puts greater clarity on the challenge at hand and escalates the urgency to cut greenhouse gas emissions and prevent the large-scale instability and rising operating costs businesses will face as we mitigate and manage the symptoms of a warming planet.

Trend 4: Our world is being revolutionised in the post-digital era

We're living in what has been called the 'Fourth Industrial Revolution'. New technologies are emerging at an ever-accelerating rate. From the cloud and big data to drones. From synthetic biology to artificial intelligence. From robotics to blockchain. They're transforming whole sectors. And that brings its own challenges for businesses. After all, we need to ensure we can change sustainably and profitably.

“The burning question for energy is, how can we each be part of a solution that powers our businesses in a way that is more efficient, cuts waste and curbs emissions?”¹



Low-carbon electricity has helped us make great strides in decarbonising our national supply of energy. In fact, carbon savings in the UK energy sector alone accounts for roughly half of all our reductions in greenhouse gas levels since 1990.²

We need to do more, together

But we still need more of our energy to be low-carbon. After all, our energy supply still accounts for **24%** of our total greenhouse gases.²

Of course, part of the solution is to increase production of renewable energy. And we're doing that. By 2035, renewables will account for around **55%** of our total energy mix in the UK, from just **30%** today.³

The problem is that fluctuations in the weather cause volatility in the availability of renewables. This in turn can lead to imbalances between the supply and demand of electricity across the UK via the National Grid.

The balancing challenge

The challenge is how to balance the network at times of peak demand without switching on coal- or gas-fired power stations.

That's where energy flexibility comes in.

2. Department for Business, Energy and Industrial Strategy, "2017 UK Greenhouse Gas Emissions, Final Figures", 5 February 2019

3. EDF Energy, "The case for a diverse generation – EDF Energy's future market vision", 2018



TO START EARNING EXTRA REVENUE FROM YOUR LOW-CARBON ELECTRICITY, YOU SIMPLY NEED TO THINK OF, SEE AND USE ENERGY DIFFERENTLY.

1

Shift the way you see low-carbon electricity, from a mandatory 'cost' to a valuable 'commodity'.

Now you can buy it, manage it and sell it as you would other commodities.



2

Shift the way you use low-carbon electricity, from a utility you passively 'switch' on and off to one you can actively 'flex'.

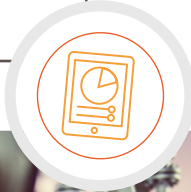
Now on any given day, or even hour, you can use energy in the way that best powers business as usual *and* earns savings and revenues.



3

Shift the way you think of your business, from a 'consumer' of low-carbon energy to a 'prosumer' of it.

So you can produce and use your own energy, and even store it to use when it's cheaper or sell it when it's more valuable.



So, have you got energy to flex?



HAVING ENERGY TO SHARE STARTS WITH HAVING A MORE FLEXIBLE APPROACH TO HOW YOU USE ENERGY IN YOUR BUSINESS.

LET'S PUT IT ANOTHER WAY.

It's about identifying how much spare energy capacity you have within the assets of your existing business operations.

There are two types of capacity.

Demand capacity is about dialling back unnecessary use of your electricity-powered assets, reducing or storing the energy they use and releasing it to share. You can do this with any asset that connects to your electricity supply - your electric vehicles, solar panels, chillers, air cons, machinery and furnaces.

Supply capacity is about switching on a back-up generator, engine or CHP plant to create energy to share, or storing it to share later.

Either way, at peak times when the National Grid needs some demand capacity or supply capacity to achieve a balance, you're ready to trade your excess capacity.



And when you do, you're joining the hundreds of businesses that are saving, earning, generating and benefitting from taking a more flexible approach to their energy.

It's an opportunity to maximise the value of the assets you already have, but don't fully need for business as usual. Your excess energy capacity then becomes a new commodity that you can flex, trade and earn from.

Of course, it's also a powerful way to help solve the challenge of balancing and stabilising our energy supply so we can reach our national climate goals together.





The era of flexible energy sharing

The good news is that most businesses have some spare capacity in their energy operations.

This means your business could join the many others that are taking the leap right now, from being passive energy consumers to becoming proactive energy ‘prosumers’.

These prosumers are pioneering businesses that both consume energy *and* produce energy to trade with the wider energy system so they can help balance supply and demand.

By making one change to their business at a time, they’re releasing, sharing and monetising the spare capacity within the assets they already use for their business as usual.

Getting started is as simple as making one change to one asset you already have in your operations, or installing flex assets, so you have the capacity to share too.



Why businesses need to bring flexibility into business-as-usual

The industrial, commercial and public sectors account for over half the UK’s total power demand⁴. That means our organisations have the collective potential to dramatically reshape the collective demand.

Unlike households, the energy consumption of Britain’s businesses and public sector is concentrated on a fewer number of sites which means fewer changes can add up to a bigger difference much faster.

And it’s future-facing organisations that have access to the data, tools and systems they need to turn the possibility of managing our demand into a working reality.

Homes will join the energy sharing platform in the near future. Indeed, technology and systems are already being developed to enable smart home appliances, like washing machines and fridges, to be able to adjust their energy consumption to free up small pockets of capacity that together can add up to help balance the Grid.

But until then, the opportunities lie with business.

4. The Association for Decarbonised Energy and Renewable UK, “Industrial flexibility and competitiveness in a low-carbon world”, June 2018



WHAT BUSINESSES ARE DOING TO FLEX THEIR ASSETS, SHARE THEIR ENERGY CAPACITY AND UNLOCK HIDDEN VALUE FROM THEIR OPERATIONS.

The collective power of businesses is reshaping Britain's energy flows

The conditions are ideal for energy sharing to disrupt the way the energy sector works.

The regulations are in place. The government schemes are open. New markets are emerging all the time. New technologies are ready to go, even as new prototypes are being tested.

Fortunately, more and more businesses are realising that they have everything they need to energy share. They have the assets, from lighting to servers, air con to heating, machinery to furnaces. They have the spare capacity to flex, either in their assets standing idle or by upping efficiencies. They have the excess energy to share and profit by.

In fact, National Grid is banking on relying on businesses flexing and sharing their energy to meet between **30%** and **50%** of the balancing market by the end of 2020.⁴

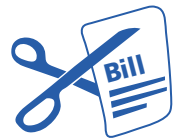


As much as **50%** of the balancing market will come from external response.

It's well within the means of businesses to achieve this goal, and the rewards for all energy users make it worth striving for.

After all, energy sharing could save British energy users between **£2.9** and **8.1 billion** a year by 2030.⁴

£2.9-8.1bn



The savings British energy stand to gain from effective demand response.

4. The Association for Decarbonised Energy and Renewable UK, "Industrial flexibility and competitiveness in a low-carbon world", June 2018

THERE ARE 4 KEY WAYS THAT BUSINESSES CAN FLEX AND TRADE THEIR SPARE ENERGY CAPACITY IN THE ENERGY SYSTEM TO HELP MEET THE GRID'S BALANCING CHALLENGES, AND GENERATE ADDED REVENUES.



The flexibility potential of just 200 of EDF Energy's business customers.

1 Reduce consumption

Our system challenge: To reduce the size of our national peaks in demand, so we have less need to top up our supply with fossil fuel generated power.

The flexible business solution: To reduce demand by cutting consumption through efficiency measures or DSR, and/or contributing self-generated energy.

2 Store for later

Our system challenge: To slow the speed of change in demand as it ramps up and down.

The flexible business solution: To reduce or shift consumption away from these periods through storage. You can store your energy to use it later, when it's cheap, or to trade.

3 Shift or turn down

Our system challenge: Renewable energy supply often peaks when demand is low.

The flexible business solution: To increase or move consumption to when there is enough renewable energy.

4 Trade your excess energy

Our system challenge: The increase of renewable energy on the Grid means our peaks of demand don't always match with our supply, creating large energy price fluctuations.

The flexible business solution: Smart businesses are flexing their energy buying, using, storing and generating to track supply highs and lows and boost savings



What's good for your energy system is good for your business too

By flexing and sharing their energy capacity, businesses are helping to create the smarter, cleaner energy system we all need.

Not only that, but each time they put their enhanced energy usage, storage and generation abilities to work, they stand to gain four different forms of added value from the assets they already have in their business.

1 Create new revenue streams

Participate in the national and regional demand side response (DSR) schemes and programmes - and depending on the scheme, you could get two payments. One is for simply committing, and one is for the capacity you contribute when called on. Outside of these schemes, you can flex and trade your energy capacity on the wholesale markets to boost your returns. Like many businesses, you can also offset your earnings against your energy bills or add it to your revenue streams.

DSR

2 Save on energy costs

Curb your demand during the peak periods and you also make cost savings on your energy bills. You can use these to invest in growing your core business or, like many are doing, invest it in achieving even greater energy efficiencies across your operations.



3 Cut carbon emissions

Reduce your energy consumption during peak demand and you also help your business reduce its overall carbon emissions from energy too. Plus you will be doing your bit to help Britain increase the volume of renewable energy we can bring into our mix.



4 Enhance your energy security

The process of analysing your site's assets and then using them more frequently and more smartly brings new insights to pre-empt and avoid potential fail points.



York City Council – A second life for EV batteries

How they flexed: Working with our partners Route Monkey and Connected Energy, EDF Energy's Research and Development team installed and integrated an innovative storage system that utilises EV batteries that have reached the end of their first automotive life. In their second life, these batteries are put to work to help York City Council's Eco Depot maximise the energy they self-generate through their solar array and reduce the impact of their EV charging demands on the local energy system.

What do they gain? Maximised value from their existing assets, trimmed emissions, and reduced energy bills.

EV

Battery





GETTING FLEXIBLE STARTS WHERE YOU ARE, WITH WHAT YOU'VE GOT.

Your opportunity is now

Flexibility offers businesses seeking a boost to their sustainable growth a key opportunity: you can start generating added value from your existing energy assets, right now.

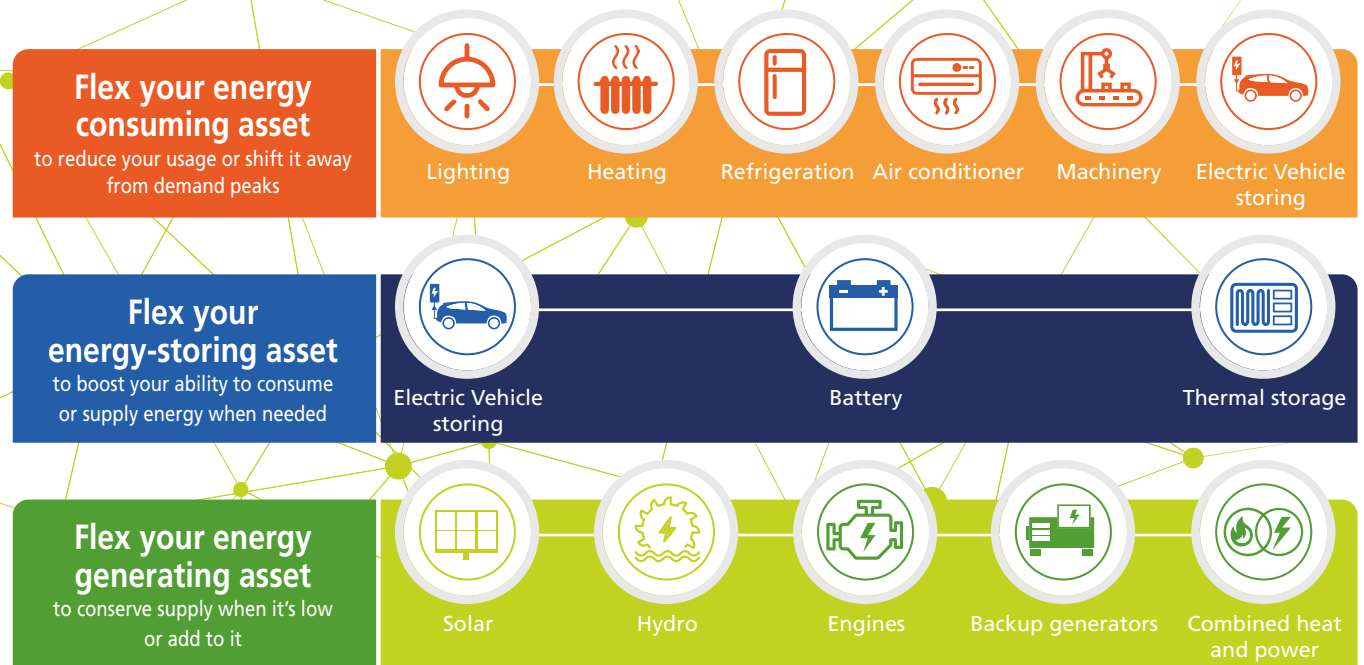
Most businesses from small to large have at least one type of energy asset with spare capacity that they can free up to get started, often with low levels of initial investment.

One change is all it takes

Getting off to a good start needn't be difficult. A review of your operations will not only show you which assets offer the most potential to flex their capacity, it will also show you how much and when you can flex them around your core business processes. There's a range of energy assets that often have significant levels of flexible capacity. You're sure to find at least one worth flexing in your business. Then you're just one change away from lower energy costs, reduced carbon emissions and boosted revenue.

Let's take a look at the changes you could make.

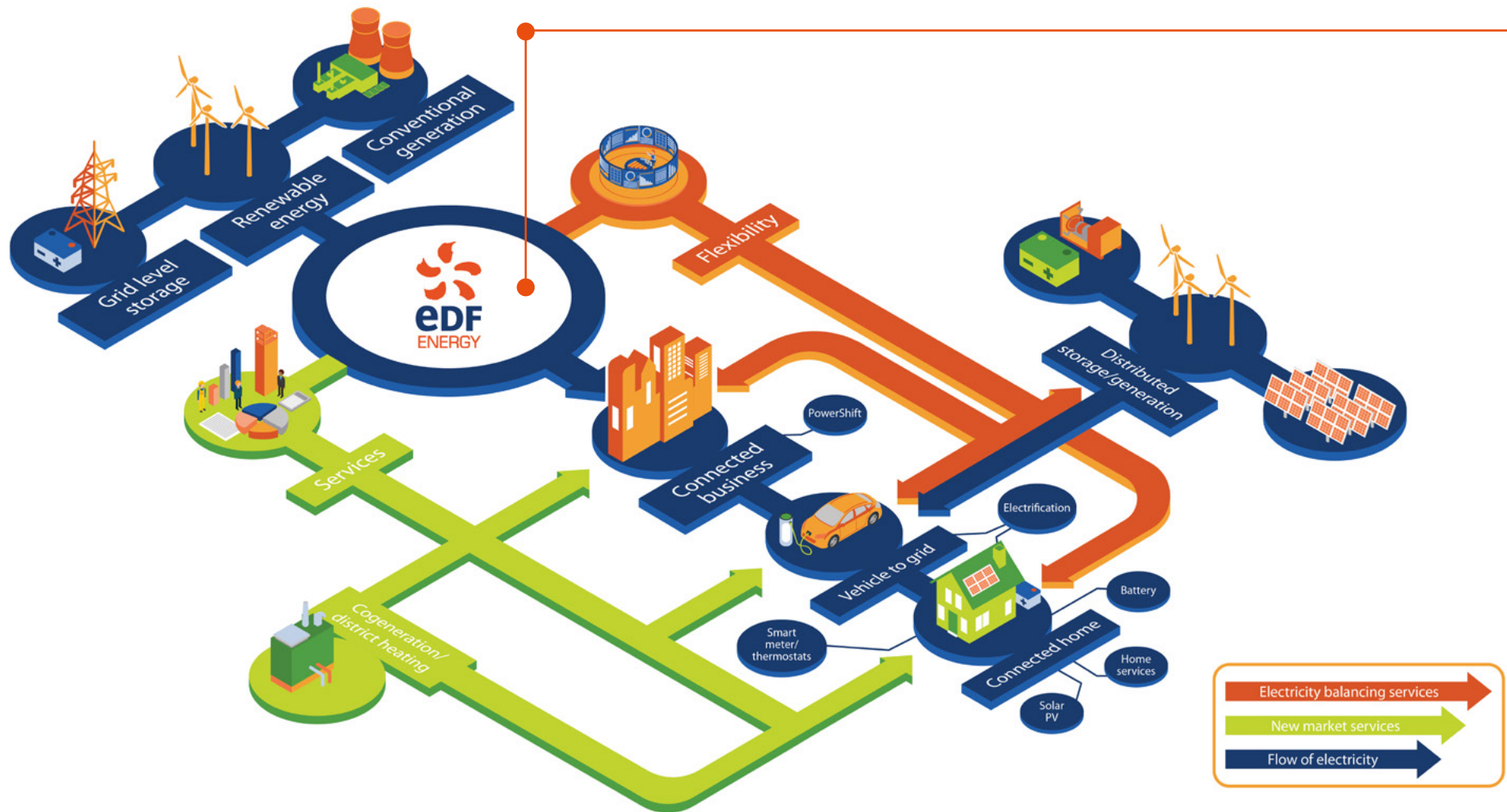
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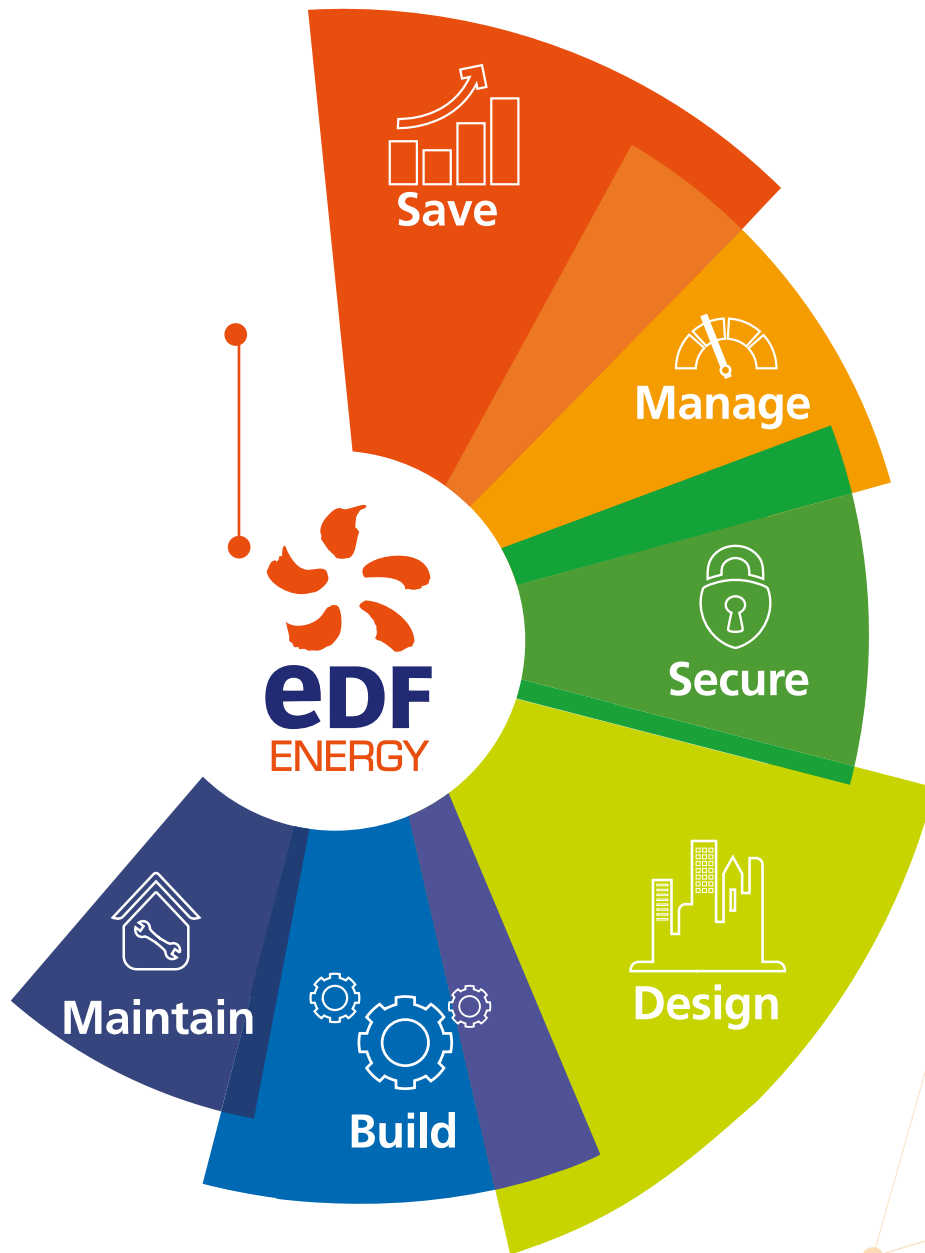




HOW WE CAN HELP YOU FLEX AND SHARE YOUR ENERGY TO POWER YOUR BUSINESS' GROWTH

The UK's energy system is undergoing a transition as it decentralises, decarbonises and digitises. And that brings new opportunities for today's smart, connected businesses to tap into a host of new services and flexibility opportunities.





To help you see the potential of turning your energy from cost-centre to value-generator, we created our proprietary decisioning tool: the 'Energy Solutions Wheel'.

Wherever your business is on its energy journey, there are 6 ways we can work together to unlock the full value that flexibility can bring to your business: save, manage, secure, design, build, and maintain.

We can help you choose the best flexibility change for you to make to your business. Then we can implement that change and manage the payback, leaving you free to put the value it unlocks to work in growing your business. That's because EDF Energy has the end-to-end energy solutions, capabilities and expertise to partner your business on your end-to-end energy journey.

One change at a time.



YOU KNOW THE ONE CHANGE YOU WANT TO MAKE. YOU ALSO KNOW THE ASSETS YOU CAN FLEX. YOU KNOW WHEN AND HOW MUCH THEY CAN FLEX. SO NOW, YOU'RE READY TO SHARE YOUR ENERGY ON THE MARKET AND MAXIMISE THE PAYBACK.

Full expertise for fuller returns

Your business will have its own way of using energy to power your assets to create value. So that means your flexibility plan needs to support your way of working to protect business as usual and maintain continuity.

You'll also have different assets that can flex at different times and for different durations. So that means your business will have its own unique shareability profile.

The good news is that there are already a host of ways you can generate value from sharing your flexible assets, with even more coming on-stream over time. From the mature Demand Response markets to emerging regional flexibility schemes - and, of course, there is the wholesale market.

There are three different ways you can share your flexible capacity across different schemes, programmes and markets:

You can answer system stress signals.

You can respond to system price incentives.

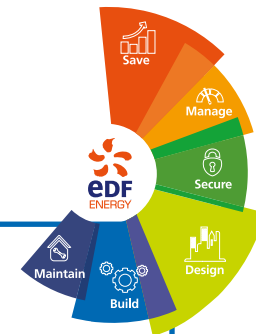
You can boost your energy savings and earnings.

Hands on or hands off? You're in control.

Of course, like many people managing energy within businesses today, you have your hands full with your day-to-day operations. So it's good to know there is an easy way to make the most of your business' flexibility assets.

Flexibility optimisation and energy trading platforms, like EDF Energy's PowerShift, give you full visibility of all your assets. They enable you to see where your assets are and adjust how much and when they flex to release energy to share. Then you can decide which programmes, schemes and markets you want to trade the capacity in.

If you have the time and know-how in your business, you can do it all yourselves. Or if you don't have the know-how in-house or the time to implement it, you can trust a partner like EDF Energy to put their energy expertise to work for you. Whatever your shareability profile, we can give you the right market access, insight and expertise to help you maximise your return.





Short Term Operating Reserve

£££

Potential return

What it does: At certain times of the day, National Grid may need to use STOR to access sources of extra power to help manage actual demand on the system being greater than forecasted or due to unforeseen generation unavailability. We don't offer STOR at EDF Energy just yet.

Your response: Adjust your consumption or onsite generation when National Grid issues a STOR call.

Speed Duration Number

20 Min 2-4Hrs 10-15

Static Frequency Response

£££

Potential return

What it does: It helps the Grid rebalance its frequency standard to 50Hz when there are deviations caused by the loss of generation on the Grid.

Your response: Turn your energy consumption down or off when a loss of energy means the frequency deviates significantly from the 50Hz standard (+/- 1%) 49.7 to 50.2.

Speed Duration Number

30 Sec 30 Min 10-12

Dynamic Frequency Response

£££

Potential return

What it does: Ongoing monitoring and adjustment of smaller variations in frequency to help the Grid rebalance its frequency standard to 50Hz when there are deviations caused by the loss of inertia on the Grid.

Your response: Automatically toggle demand or generation to help maintain the frequency range to maintain the 50Hz standard within +/- 0.015Hz.

Speed Duration Number

1 Sec 30 Min ∞

Demand Turn Up

£££

Potential return

What it does: Helps the energy system reduce the waste of renewable energy by encouraging businesses to increase their consumption when national demand is low but here's a plentiful supply of renewable power.

Your response: Boost your energy consumption, or decrease your onsite generation when you receive a text or email from the Grid.

Speed Duration Number

4+ Hrs Variable Variable

The Capacity Market

£££

Potential return

What it does: Usually, it helps ensure there is sufficient power generation connected to the Grid to meet demand. But it is currently suspended following a European Commission ruling.

Your response: Sign up and be prepared to reduce your demand or boost your generation when called on.

Speed Duration

4 Hrs 0.5-5Hrs



Balancing Mechanism

What it does: It balances electricity supply and demand as close to real time as possible. It's a financial tool used by National Grid to incentivise energy users to help maintain the balance because energy can't be stored in large quantities and must be made at the time of demand.

Your response: After submitting a notification of expected load/generation, you place an offer (to be paid) to decrease your consumption or increase your generation, or place a bid (offer to pay) to do the opposite.

Speed: 20 Min
Duration: Variable
Number: Variable

Potential return: £££



Live Balancing

What it does: Monitoring real-time system stability and our own portfolio activities, and either turning up or turning down to receive the system price at the end of a settlement period.

Your response: Automatically adjust your demand and supply capacity to help balance your local system.

Speed: 20 Min
Duration: ∞
Number: ∞

Potential return: £££



Locational Markets

What it does: An emerging market that helps local Distribution System Operators (DSO) to balance voltage and frequency constraints on the local energy network.

Your response: Dial down your consumption or increase your generation to meet DSO needs.

Speed: 20Min
Duration: Variable
Number: Variable

Potential return: £££

“The energy system is decentralising to get smarter and more flexible. So District Network Operators (DNOs) are now able to create their own targeted demand response programmes and incentives for businesses in their catchments to address their specific energy-balancing challenges. These often have excellent upsides for local businesses.”



Short-term trading

Potential return (£££)

What it does: Maximises your earnings on your flex capacity by trading it on the wholesale energy market (Day Ahead and Within Day). You could increase your overall flexibility returns by as much as 30-70%.*

Your response: Buy and sell your energy at the right times to play the fluctuating market prices.

Speed: 20 Min

Duration: 0.5-5Hrs

Number: Variable Year

Triad management

Potential return (£££)

What it does: Trims down or eliminates your Transmission Network Use of System (TNUoS) charge in your bill. Your TNUoS charge is calculated on your actual levels of demand over 3 peak periods in winter. It's only defined after the fact so the only way to reduce it is to be sure to have low or no demand in all the likely peak periods of Triad season (November to February).†

Your response: Respond to our Triad warnings to reduce your consumption in all the key winter peak periods turn up your onsite generation.

Speed: 4 Hrs

Duration: 2-3Hrs

Number: 25 Year

* At the moment, this is only possible with energy suppliers, like EDF Energy, who also have a trading function embedded within their business.

† The charges and rewards for flexing to assist Transmission and Distribution networks is under review by Ofgem as part the Targeted Charging Review and Review of Access and Forward-looking charges.

Trim your Distribution Charge

Potential return (£££)

What it does: Shift as much consumption as possible away from your DNOs designated higher costs time zones. Your Distribution Charge makes up roughly 20% of your bill so it's worth flexing to minimize it.†

Your response: Shift or reduce your consumption during red and amber times zones.

Anesco - Clayhill solar farm

16 MW Solar + battery

How they flexed: Renewable energy firm Anesco are working with EDF Energy and its tech partner, Upside Energy, to introduce an industry first: a guaranteed floor price for revenue from their five battery storage units at their 16MW Clayhill solar farm. This floor price will be used to de-risk Anesco's storage usage, and enable output from the farm to be bid into wholesale markets and contracted to grid operators at economically attractive times.

What do they gain? The first subsidy free solar farm supported by storage floor price.

Battery **Solar**



Flexibility and the sharing economy

The sharing economy is a customer-led phenomenon which works by exploiting spare, unused or excess property or capacity for mutual benefit.

Take Airbnb. The unused asset is a property, and the excess capacity is the unused space. By creating a user-friendly online property sharing platform, Airbnb enables owners to offer their unused space for sale.

Energy can now present businesses like yours with just such an opportunity.

In the new era of energy sharing, the unused asset in your business can be anything that connects to your electricity supply, stores electricity or generates it. The excess capacity is the unused energy. With many more businesses and households becoming energy prosumers, there's a growing opportunity to help people buy and sell their energy capacity directly with one another.



“By collaborating with our partners and using blockchain technology, Project COMMUNITY in Brixton aims to show how small communities in dense urban areas could benefit from a low carbon and local energy system in a new and transformative way.”

*Dan Bentham,
Head of Smart Research & Development
at EDF Energy*

Peer-to-peer energy trading made viable

Today our energy sharing still relies on centrally organised and regulated markets and schemes to enable safe, secure trading of spare capacity at fair prices.

In the future, blockchain technology will enable households and businesses to buy and sell the type of energy they want, when they want it. And they'll be able to do so with complete confidence - securely, efficiently and cost-effectively.

Blockchain-enabled peer-to-peer trading could also help onboard and maximise more renewable energy from variable sources, like wind and solar. This is currently a big challenge for our centralised systems to overcome as they strive to reduce our national emissions.

Tomorrow's possibilities forged in a real community right now

EDF Energy's Research and Development team are working on a pioneering project called 'Project COMMUNITY' with our partners, Repowering London. Together, we're working with a community in Brixton, South London that's enabling residents to generate, store and trade solar energy with one another via an app, powered by blockchain technology.

So, with the future of energy sharing already being developed and tested, now's a good time to make your change to get more energy flexible.

IT'S TIME TO MAKE ONE CHANGE

You're agile, you're responsive, you're flexible.

Because you're not just about business that survives, but thrives.

Time to take the same approach to the energy your business uses.

All it takes is one change.

What will it be?

Whatever is best to ensure you can save and earn from your electricity, while ensuring business continuity.

It could be flexing your lighting, heating and air con to trim your bills.

Or flexing your shift work to shift to a cheaper tariff.

You could switch to an electric fleet and flex what are really your 'batteries on wheels'.

Or flex your energy storage to boost savings.

Or do the ultimate flex and sell your energy on the markets, just another valuable commodity that's part of your business-as-usual in the C21st.

After all, that's the advantage of belonging to Generation Electric.

Are you ready?

Make your change

If you'd like to talk about what change is right for your business to flex right now, get in touch with us at:

energysolutionsales@edfenergy.com

or call us on 0800 068 7171

To find out more about our energy solutions, visit:

edfenergy.com/energysolutions





References:



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<https://www.ipcc.ch/sr15/>

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3. EDF Energy, "The case for a diverse generation – EDF Energy's future market vision", 2018

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