



HELPING BRITAIN ACHIEVE

NET ZERO:

OUR PLAN FOR A GREEN RECOVERY



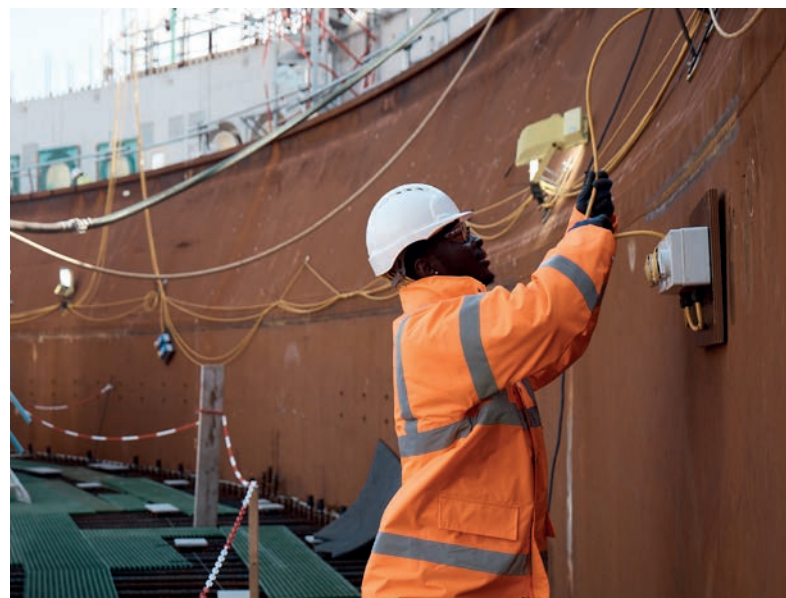
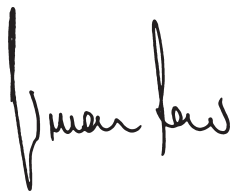
Introduction

This paper provides EDF's perspectives on how the energy sector can support economic recovery from Covid-19 in a way which helps Britain achieve net zero. That contribution can be huge. As a sector we are major long-term investors in the UK economy, we provide vital infrastructure, high skilled jobs, apprenticeships and training opportunities – and the energy customers need to power their lives.

Britain needs jobs now and investment in the energy we need can provide them. Our response to Covid-19 requires a focus on activities which will provide skilled jobs in the near term alongside measures to grow new low carbon industries across the UK in the long term – the industries that will help us meet net zero and keep our air permanently cleaner.

What is good for the planet and good for the economy should also be good for customers, providing people and businesses with the means to drive down their bills and their carbon footprint.

Publication of an Energy White Paper later this year can be a mechanism to drive progress to deliver these goals – we set out here our views on the steps that are needed.



About EDF



EDF is helping Britain achieve Net Zero by leading the transition to a cleaner, low emission electric future and tackling climate change. We are Britain's biggest producer of low carbon electricity, meeting around one-fifth of the country's demand and supplying millions of customers with electricity and gas.

With around 5 million accounts, EDF is one of the largest suppliers to British homes and business and a leading supplier of innovative energy solutions that are helping businesses become more energy independent. All our home customers get energy tariffs backed by zero carbon electricity as standard.

We generate low carbon electricity from eight nuclear power stations, more than thirty onshore wind farms and two offshore wind farms, and operate one of Britain's biggest battery storage units, one gas and one coal power station, thousands of EV charge-points, and combined heat and power plants. Wind, nuclear and solar all produce electricity that is zero carbon at the point of generation and have similar emissions over the build, run and retire lifecycles.

EDF is leading the UK's nuclear renaissance with the construction of a new nuclear power station at Hinkley Point C, and is leading the development of plans for a replica project at Sizewell C in Suffolk. Hinkley Point C and Sizewell C will provide low carbon electricity to meet 14% of UK demand and power around twelve million homes. EDF is one of the UK's largest investors in renewables, with 1GW of renewable generation in operation and over 4GW in construction, planning and development across a range of technologies including onshore and offshore wind, solar and battery storage. We also have several renewable generation projects in construction including the company's largest offshore wind farm in Britain, the 450MW Neart na Gaoithe project, which will be ready in 2023.

Our energy services business, Imtech, is one of the largest technical service providers in the UK and Ireland. EDF is part of EDF Group, the world's biggest electricity generator. In the UK we employ around 13,000 people.



Helping Britain Achieve Net Zero: Our Plan



A £50 billion low carbon programme to help Britain achieve net zero

With the right policies in place, we plan to enable investment in low carbon technologies in the UK worth over £50 billion by 2035. This amounts to 12GW of wind, nuclear and solar power – meeting one-fifth of UK demand.

1

Creating a decarbonised power system and an electrified economy. Delivered by investment in low carbon electricity generation from wind, nuclear and solar

OUR PLAN

- **Delivering Hinkley Point C**, meeting 7% of UK electricity demand with reliable, low carbon nuclear.
- **Developing Sizewell C**, replicating the low carbon benefits of Hinkley in the East of England.
- **Massively growing our renewables business**, with almost 4GW in planning and development, 600MW in construction including our 450MW NNG offshore project, and working with Government and industry to ensure continued use of the Contracts for Difference (CfD) scheme.
- **Investing in the UK's low carbon supply chain**, with 64% of contract values awarded to UK companies for Hinkley Point C and 70% for Sizewell C – building on the 2500 companies already working on the project.
- **Maintaining the world class nuclear expertise in Britain**, running eight existing nuclear power stations while investing in the current and next generation of nuclear experts.

2

Growing emerging low carbon sectors, with a focus on decarbonising transport, heating and industry

OUR PLAN

- **Growing electric vehicle ownership**, through expansion of our Pod Point charging network and supporting delivery of the £500 million rapid charging fund.
- **Expanding energy efficiency schemes**, and working with Government to expand the ECO scheme to benefit more people.
- **Supporting further investment and deployment of low carbon heating** options such as heat pumps.
- **Developing the UK's low carbon hydrogen** projects, including at Sizewell B and C.
- **Building new smart, flexible battery storage** technology at up to 40 sites across Britain.
- **Installing smart meters in millions of homes** to help our customers understand and save energy.
- **Researching future technologies**, including a global investment of £2 million a day on R&D to support a low carbon future.

3

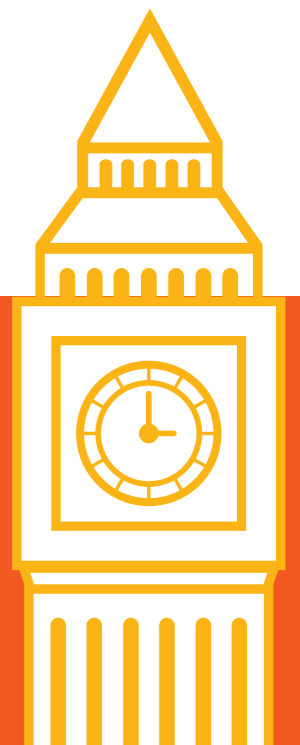
Ensuring a green recovery is affordable for all energy customers

OUR PLAN

- **Providing affordable, zero carbon energy tariffs** for homes and businesses.
- By 2035, **helping our household customers** reduce their combined carbon emissions by the equivalent of >70% of their 2019 electricity and gas carbon footprint.
- By 2035, **helping our business electricity customers** reduce their combined carbon emissions by >80% of their 2019 electricity carbon footprint.
- **Working with Government to ensure we have the right policies in place** to decarbonise at the lowest possible cost: including continuing carbon pricing, supporting the Treasury's net zero cost review, and investment at the lowest possible cost of capital.



To help deliver many of these commitments and give clear direction about our route to net zero, we need a clear strategy from Government in the form of an Energy White Paper in 2020.





1

Creating a decarbonised power system and an electrified economy. Delivered by investment in low carbon electricity generation from wind, nuclear and solar

Electrification of the economy is central to achieving net zero. The Committee on Climate Change foresees a need to quadruple the supply of low carbon power by 2050. While Covid-19 has led to a temporary drop in power demand, as we electrify much of our transport, heating and industrial activity, and return to economic growth, demand for power will rise.

We are committed to operating our existing nuclear power stations safely, until the end of their operational lives. They have and will continue to make a major contribution to tackling climate change and to the economic strength of their local communities. The economic benefits they bring will continue throughout the defueling process. However, the closure of coal and older nuclear stations in the 2020s means we need to make new investments in power generation.

Delivering the UK's biggest low carbon power projects

Hinkley Point C

EDF's focus in power generation is on new nuclear and renewables. These are the most proven and cost-effective forms of producing electricity with zero emissions at the point of generation. With economic recovery from Covid-19 in mind, our Hinkley Point C project in Somerset provides a vivid illustration of the huge economic benefits that new nuclear investment brings.

Recent figures show the project has spent £1.7 billion with more than 1,100 companies across the south-west, and more than 10,000 jobs have been created, with around 25,000 roles by the end of construction.

More than 600 apprentices have been recruited so far and 11,000 people have been trained in Somerset at the Construction Skills Centre. New facilities such as a Welding Centre of Excellence are being established.

Spending across the UK is boosting the UK's industrial capacity and creating new jobs. Spending on contracts in the Midlands and the North of England has already reached almost £1.1 billion and the project has engaged around 2,500 companies across its whole supply chain.



Hinkley Point C will generate enough low carbon electricity to power around six million homes.

New nuclear will be an essential part of getting the UK to net zero. There is no other energy project in the UK which can match the scale of Hinkley Point C for investment in industry, supply chain, jobs, skills and regional economies.

Prefabrication drives improvement

In response to learnings from Flamanville 3 and Taishan, both reactors' containment liners are being built in five giant sections in a specially designed, weather-proof building before being lifted into place by Big Carl. These cylinders contain the reactors and key equipment. Liner cup floor: **Construction time for the second liner cup floor is 30% quicker than unit 1**, while quality during prefabrication has remained high.





North West

Based across the North of England in Warrington and Immingham, Bilfinger UK supports major infrastructure developments across the oil and gas, energy and power, nuclear and chemical/ pharmaceutical sectors.



North East

Darchem is a world class engineering company based in Stillington in the North East of England. A £90 million contract from Hinkley Point C is ensuring that valuable skills are maintained and developed within the region.



Midlands

Based in Aldridge, West Midlands, Special Formwork is an SME that specialises in the design and manufacture of steel formworks for the casting of concrete. To date, the company has benefitted from Hinkley Point C contracts worth approximately £1.5 million.



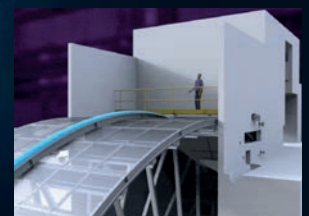
Wales

Based in Bridgend, South Wales, Vessco Engineering was founded to support local industry and specialises in the manufacture of pressure vessels and process equipment.



South West

North Somerset company, Osprey, provides marine and heavy logistics support to the Hinkley Point C project, with contracts currently totalling more than £5 million.



East of England

Essex firm, Ovivo UK Limited, was awarded a £27 million contract to supply the largest cooling water intake screening system in the world for Hinkley Point C.



Sizewell C

Our progress at Hinkley Point has given us confidence to develop the Sizewell C project in Suffolk – a copy of Hinkley Point C, which will deliver the same low carbon energy benefits and even higher levels of UK content with respect to skills, jobs and the supply chain.

Thanks to learning from Hinkley Point C, Sizewell C will deliver these benefits at significantly lower cost to consumers. We can see this through the progress we are making between construction of the unit 1 and unit 2 reactors at Hinkley Point.

We have achieved major increases in productivity on unit 2 through steps such as increased use of prefabrication.¹ The nuclear sector deal provides further illustration of how a 30% reduction in the cost of new nuclear can be achieved by a combination of design replication, risk reduction and new forms of financing.

We estimate that early progress on Sizewell C could create around 2,500-3,000 new FTE roles over the next 3-4 years, along with many more in the UK supply chain. These figures show that Sizewell C represents a significant opportunity for the UK and can play a major part in a lower carbon recovery.

To realise this opportunity, there is a need now for Government to set out the contribution it wishes to see from nuclear power, providing a roadmap that will enable an early investment decision on Sizewell C alongside progress on future nuclear power options.

1. See https://www.edfenergy.com/sites/default/files/hpc_efficiencies_brochure_final.pdf for further detail.

Our aim is that Sizewell C will be an independent British company, majority owned by UK investors, with EDF taking a minority shareholding and continuing to provide engineering and nuclear expertise. Like Hinkley Point C, Sizewell C will generate low carbon electricity for around six million homes and will create thousands of jobs.



Making the most of the UK's nuclear expertise

Our people with the expertise in nuclear operations and new nuclear build, including those in our eight existing nuclear power stations and world-leading centre of nuclear operations expertise in Barnwood, Gloucestershire and our growing engineering centre in Bristol, are poised to support the resurgence of the UK nuclear industry. We also recently launched a new Technical Client Organisation, which will provide clarity, direction and investment for our critical nuclear capabilities.

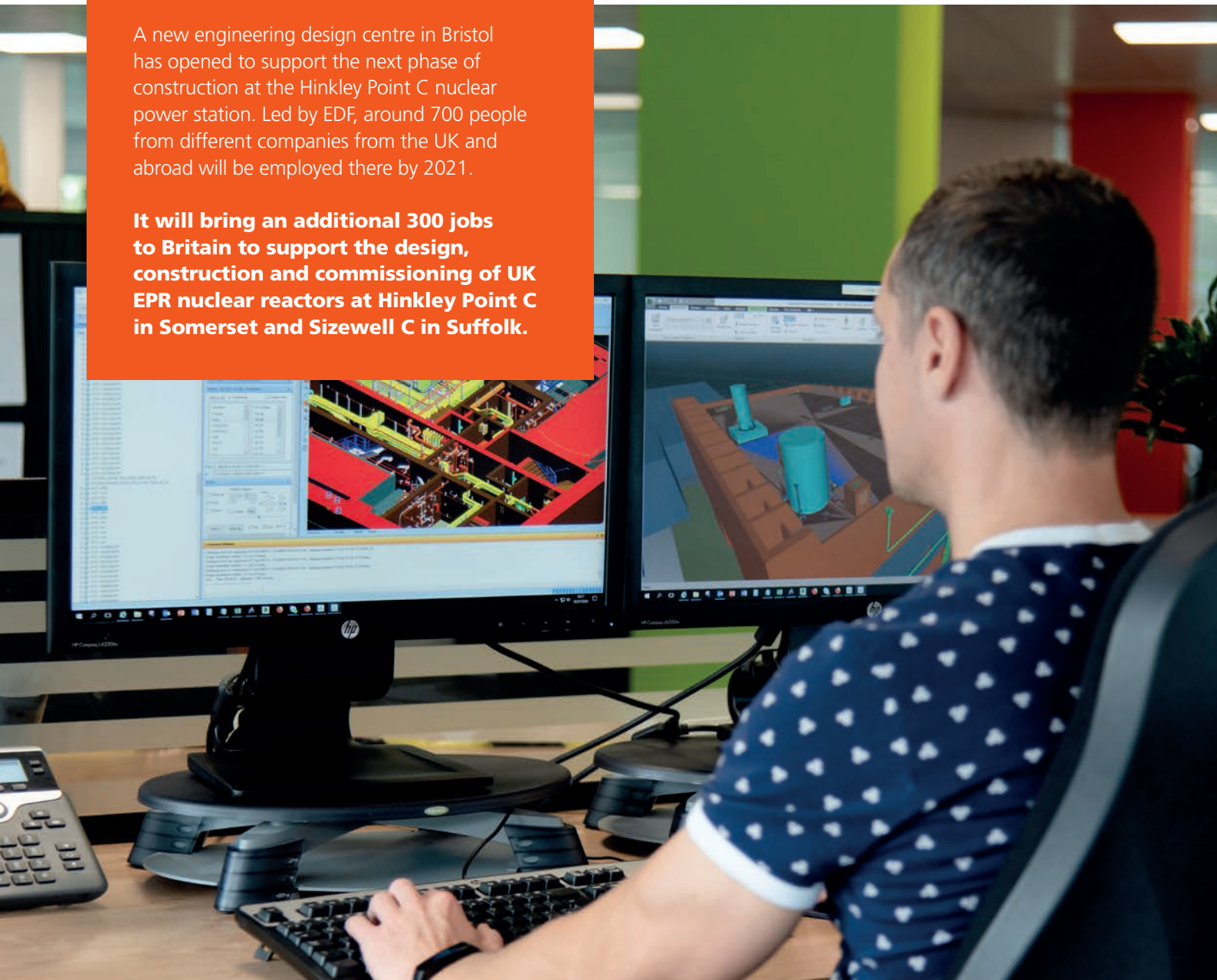
Small and advanced modular reactors will offer attractive decarbonisation and economic opportunities in the future. But they will take time to develop and the UK's ability to deliver these technologies depends on maintaining British supply chains and expertise capable of constructing and operating them when the time comes. Sizewell C is vital to maintain and develop these companies and skills.



UK EPR Design Centre, Bristol

A new engineering design centre in Bristol has opened to support the next phase of construction at the Hinkley Point C nuclear power station. Led by EDF, around 700 people from different companies from the UK and abroad will be employed there by 2021.

It will bring an additional 300 jobs to Britain to support the design, construction and commissioning of UK EPR nuclear reactors at Hinkley Point C in Somerset and Sizewell C in Suffolk.



Massively growing our renewables investment

Alongside new nuclear, investment in renewables and other low carbon technologies will be essential to quadruple low carbon power supply. We are a major developer of renewables, including onshore and offshore wind, solar and battery storage projects. In the UK we have almost 1GW of renewable power in operation across 36 sites, 600MW in construction and almost 4GW in planning and development. We see the UK as one of the world's best markets for growth in renewables and plan to massively increase the size of our renewables business in the coming years.

Through our apprenticeship scheme, our renewables projects provide opportunities for people to develop careers in the low carbon energy industry. Our new apprenticeship scheme, launched in September 2020, will train a group of young people to become wind turbine technicians. The apprentices, who come from across the UK, will gain the qualifications and expertise to advance their careers in the renewable energy sector by training on sites including Dorenell Wind Farm and Fallago Rig Wind Farm in Scotland.

The Contracts for Difference (CfD) framework has successfully supported large growth in renewable generation and helped drive significant reductions in costs.

Recent studies have demonstrated how investment in renewable generation delivers new jobs and export opportunities. There is much further we can go on renewables and EDF supports continued use of the CfD scheme with further auction rounds (incl. Auction Round 4 in 2021). In parallel, it is essential that Government continues to work with the sector and wider stakeholders to find solutions to potential barriers to growth of renewables, including onshore and offshore transmission and cumulative environmental impacts.

2. For example, see Vivid Economics: https://cdn.ymaws.com/www.renewableuk.com/resource/resmgr/media/Quantifying_the_Benefits_ofO.pdf

Offshore wind

The Neart na Gaoithe (NNG) offshore wind farm will be located 15.5km off the Fife coast and covers an area of approximately 105km². NNG is a £2 billion capital project that will have a major positive impact on jobs and the economy as a whole.

The project has the potential to generate enough power to supply around 375,000 Scottish homes and will offset over 400,000 tonnes of CO₂ emissions each year.

Onshore wind

EDF's largest onshore wind farm in Europe is Dorenell, which is in Moray in Scotland and has 59 turbines providing power for around 106,000 homes.

Dorenell has a visitor centre and two full time rangers – one of Scotland's newest ranger services. The Community benefit fund benefits the four surrounding towns of Dufftown, Auchindoun, Glenrinnes, Glenlivet, Inveravon and Cabrach. In the first year £447,000 has been paid.

The UK Government has committed to developing new onshore wind as part of its ambition for 'net zero' carbon emissions by 2050. The economic benefits of developing the 35GW of onshore wind suggested by the Committee on Climate change are clear – by 2035 the industry could support 32,000 jobs, £360 million in exports and, as the lowest cost form of electricity generation, reduce household bills by £50 each year.





Solar

Solar projects have especially short delivery timescales, with even the largest scale sites able to begin supplying power to the grid within 6 months of beginning construction. This speed of deployment, combined with a supply chain largely made up of SMEs and sites situated in rural areas, presents a significant opportunity for rapid economic recovery and job creation across all regions.

We plan to develop a 49.9MW solar farm next to the Sutton Bridge Power Station, which will be capable of generating enough renewable electricity for the domestic needs of 9,581 households annually. The Sutton Bridge scheme could save around 21,642 tonnes of carbon dioxide emissions each year.





2

Growing emerging low carbon sectors, with a focus on decarbonising transport, heating and industry

Plentiful supplies of low carbon electricity create the potential to decarbonise transport, heating and industry. In the process we can create new industries, skills and technologies in the UK – with potential to export. EDF invests £2 million every day in global

research and development to support our low carbon future. The recovery from Covid-19 should include a focus on growing these new and vital sectors, many of which also offer immediate prospects for jobs, skills and investment.

Increasing the uptake of electric vehicles

In the electric vehicles sector, there is a need to build on recent progress and give more drivers the confidence to switch to electric. With Government maintaining favourable incentives for new car and van buyers, industry can deliver the roll out of a comprehensive national re-

charging infrastructure –assisted by **early progress on delivery of the £500 million rapid charging fund announced in the Budget 2020**. EDF's Pod Point is one of the UK's leading EV charging companies and can support this process.



We are investing heavily in electric vehicles and decarbonising our transport sector, which still has the highest carbon emissions of any industry.

Recent acquisitions include Pivot Power, who are developing large-scale battery storage and electric vehicle charging projects in Britain, and Pod Point, one of the largest charging point operators in the UK with more than 62,000 charge points already installed. Furthermore, EDF already offer the market's most competitive low carbon electric vehicle tariff, "Go Electric". These end-to-end electric vehicle solutions back up EDF's strategy to be Britain's leading provider of power for Electric Vehicles by 2022. EDF data suggests a low carbon grid, featuring new renewables and nuclear, and switching the 32 million petrol and diesel cars on UK roads to electric, would avoid 65 million tonnes of CO₂, shrinking Britain's overall carbon footprint by more than 10%.

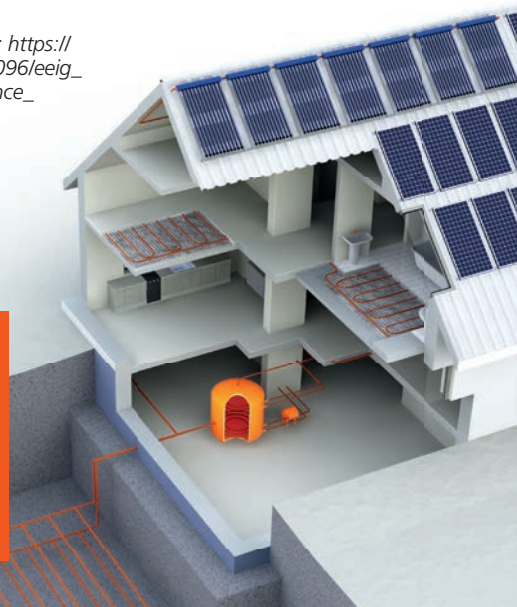


Decarbonising heat

Progress is also needed to decarbonise heat, through a combination of action on energy efficiency and investment in low carbon heating options such as heat pumps and hybrid heat pump systems. EDF supports an expansion of the ECO energy efficiency scheme including extension of eligibility to all households. A review of policies to help stimulate business energy efficiency would also be desirable. In the Covid-19 context, a clear benefit of early investment in energy efficiency and new low carbon heating systems is the rapid job creation potential it offers, alongside the opportunity to deliver both carbon and cost savings at the same time. A recent report by the Energy

Efficiency Infrastructure Group highlights that the sector could support over 150,000 skilled and semi-skilled jobs to 2030, as well as reducing household energy expenditure by £7.5 billion per year at today's prices.

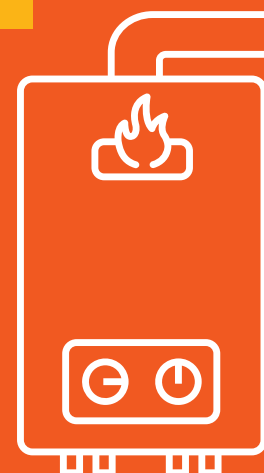
3. See *Building for Resilience*: https://www.theeig.co.uk/media/1096/eeig_report_rebuilding_for_resilience_pages_01.pdf



EDF is one of the UK's biggest installers of energy efficiency schemes in the UK. Last year we installed over 40,000 energy efficiency improvements in homes, helping people to stay warm and lower their bills, while working with UK companies. More investment in energy efficiency will be crucial to reaching net zero.

Energy efficiency improvements delivered by EDF from October 2018 to August 2020

Measure type	No of measures	Average annual bill savings (£)
Boiler Repairs	19,972	1,388
Cavity Wall	11,381	183
Under Floor Insulation	11,114	61
Heating Controls	9,906	126
Loft Insulation	8,075	117
Solid Wall	4,167	426
Electric Storage Heaters – Upgrades	2,793	670
Compensation	2,255	27
Room in Roof	1,358	437
First Time Central Heating	1,156	983
Smart Controls	210	114
Micro-Generation	178	342
Flat Roof Insulation	178	547
Smart TRV	119	44
Park Home Insulation – Wall	72	125
Cavity Wall – Partial	66	53
Park Home Insulation – Floor	52	98
Window Glazing – Single to Double	12	361
Park Home Insulation – Roof	11	64
Boiler Upgrade	6	188
Total	40217	



A strategy for hydrogen

Much recent discussion has been on the potential for hydrogen. EDF has set up a new subsidiary, Hynamics, to develop and commercialise low carbon hydrogen. Hynamics is exploring opportunities in the UK, including alongside our Sizewell C new nuclear project. Our focus is electrolytic hydrogen, which through nuclear and renewables, has the lowest carbon emissions over the full life cycle. Hydrogen can play a vital role in decarbonising sectors such as industry and heavy transport where few alternatives exist.

In the future it may also help to decarbonise heat and play a role in meeting peak demand for power. The policy need now is to develop mechanisms which will allow early deployment of low carbon hydrogen projects, facilitating the learning and economies of scale which would allow the UK to develop a major hydrogen industry over the longer-term.

Our Hydrogen to Heysham (H2H) project concluded that nuclear-powered hydrogen was feasible on technical and safety grounds. We are also exploring the long-term role hydrogen could play as part of an energy hub linked to our Sizewell C new nuclear development and the possibility for a demonstration project at the Sizewell B site.

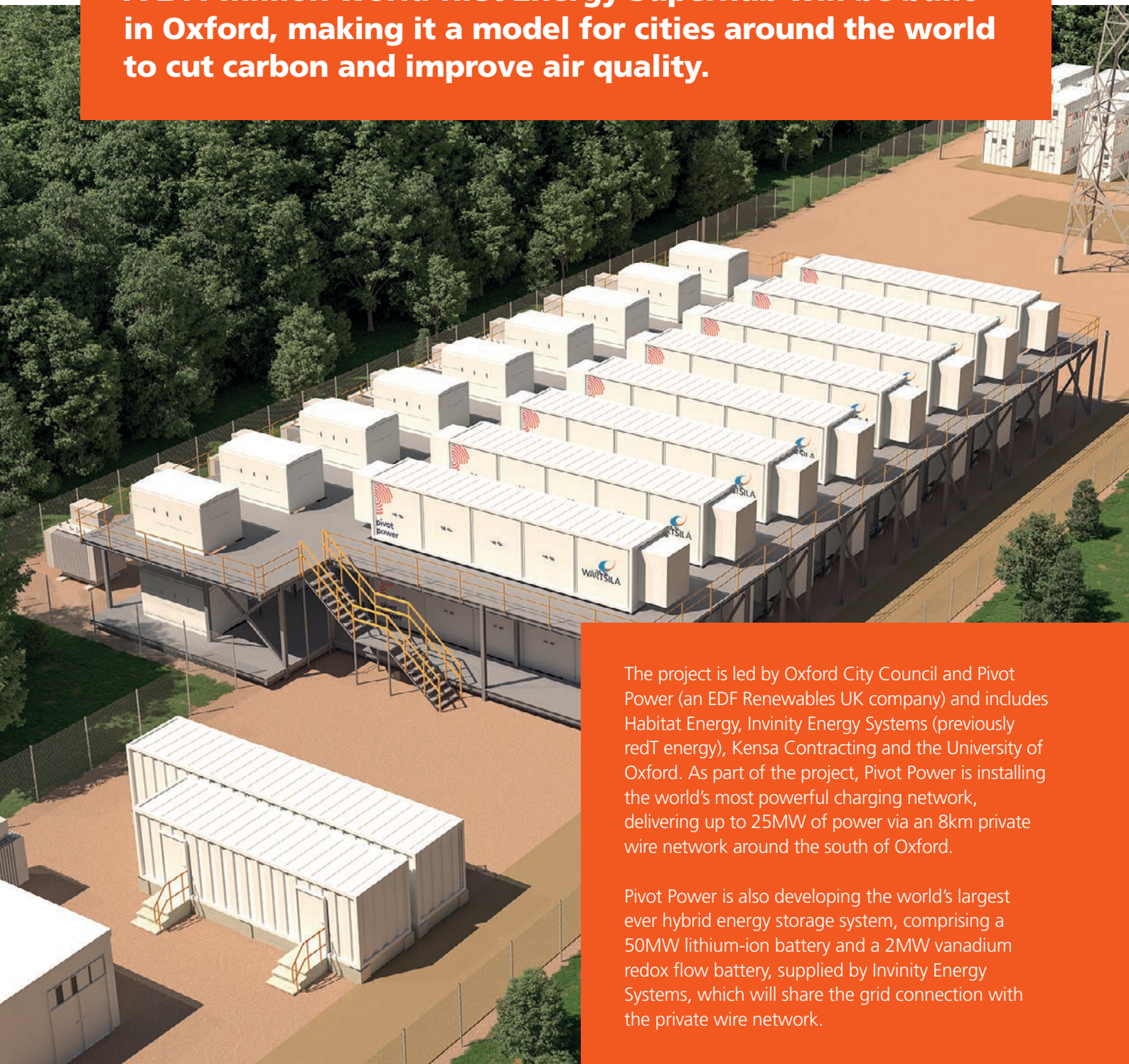


Investing in storage

Running across all these new sectors is a need to develop smart, flexible and digital approaches which will allow the energy system to operate in the most optimal way and at the lowest cost for consumers. Another EDF company, Pivot Power, is installing the UK's largest battery storage

network, helping to improve the resilience of the energy system and respond to increased intermittent generation. At 2GW across 40 sites, Pivot Power's battery portfolio can deliver a huge increase in storage capacity.

A £41 million world-first Energy Superhub will be built in Oxford, making it a model for cities around the world to cut carbon and improve air quality.



The project is led by Oxford City Council and Pivot Power (an EDF Renewables UK company) and includes Habitat Energy, Invinity Energy Systems (previously redT energy), Kensa Contracting and the University of Oxford. As part of the project, Pivot Power is installing the world's most powerful charging network, delivering up to 25MW of power via an 8km private wire network around the south of Oxford.

Pivot Power is also developing the world's largest ever hybrid energy storage system, comprising a 50MW lithium-ion battery and a 2MW vanadium redox flow battery, supplied by Invinity Energy Systems, which will share the grid connection with the private wire network.

Customer expectations

The way customers engage with energy is changing, with new ways for individuals and businesses to use, save, store and even generate their own electricity. It is vital that we encourage and support this shift in behaviour. The changing nature of Britain's energy mix, with greater penetration of intermittent renewables, means the country needs new ways to adapt the shape of demand to match the availability of power at different times. Storing energy and producing hydrogen can help at a system level. As a supplier, EDF is also developing Time of Use Tariffs to encourage our customers to consume their energy during off-peak periods when the energy is less expensive.

Smart meters are the technical enabler of such innovations, but the shift will also require regulations to evolve so that customers who subscribe have their consumption recognized and settled half hourly.

The challenges to smart meter installations resulting from Covid-19 provide an opportunity to add **new approaches to the smart meter roll-out which deliver increased incentives for adoption**, helping to overcome the consumer resistance which has been encountered to date.



Last year, EDF installed over 500,000 smart meters in our customers' homes, helping them to save and better understand their energy use.





3

**Ensuring a green recovery
is affordable for all
energy customers**

Covid-19 has brought great challenges to national, household and business finances and these make it imperative that policies are designed for maximum cost-effectiveness and with the energy consumer in mind. Energy suppliers can play a vital role, engaging their customers with tariffs and services which are

lower carbon, energy efficient and which flexibly meet both customer and energy system needs. This requires a regulatory framework that ensures robust, reliable companies, rewards genuine carbon reduction and which recognises that suppliers are themselves facing significant Covid-19 impacts.

A fair price for carbon

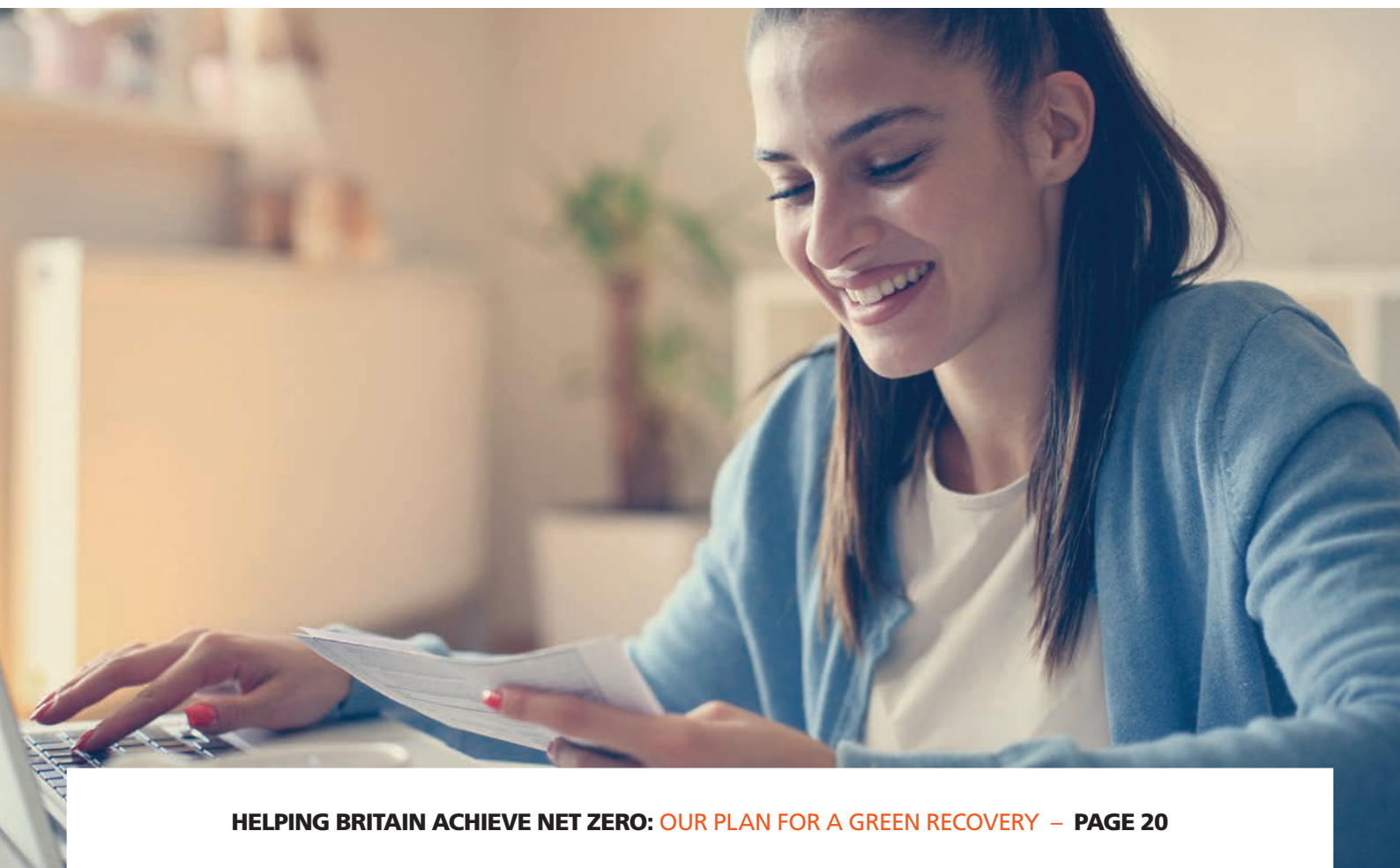
Strong carbon pricing should be a key part of the policy response. There is wide agreement that carbon pricing is the most economically efficient, technology neutral policy measure available to support progress towards lower emissions – allowing markets and consumers to find the lowest cost routes to lower carbon from a range of options. Carbon pricing has played an essential role in lowering emissions in the last decade - the carbon intensity of power generation has fallen around 60% between 2012 and 2019. Yet today there is little clarity on carbon pricing in the UK after Brexit – this is needed urgently so that the price of carbon can properly be factored into energy trades and investment decisions over the coming decade.

There is a clear case for strengthening carbon pricing over time and extending it to new sectors such as domestic and commercial gas consumption. This will facilitate the most efficient technology choices in areas such as the decarbonisation of heat.

A more robust carbon pricing regime can also raise important funds to help meet the many calls on Government funds. A recent report by the LSE and Grantham Institute estimated that stronger and broader based carbon pricing could raise revenue for Government of around £20 billion a year until the early 2030s.⁴

Of course, higher carbon prices impact on energy consumers. Through HM Treasury's net zero review Government should explore how to find the right balance between revenue raising and the charging of costs associated with net zero. This includes both the balance of costs between fuels such as gas and electricity (where today costs fall very largely on electricity) and between taxpayers and energy consumers.

*4. How to price carbon to reach net-zero emissions in the UK.
<http://www.lse.ac.uk/GranthamInstitute/publication/how-to-price-carbon-to-reach-net-zero-emissions-in-the-uk/>*



Helping our customers reduce their carbon footprints

By 2035 we aim to:

- Help our household customers reduce their combined carbon emissions by the equivalent of >70% of their 2019 electricity and gas carbon footprint.
- Help our business electricity customers reduce their combined carbon emissions by >80% of their 2019 electricity carbon footprint.



Funding energy infrastructure using Government intervention to lower costs

Another way in which Government can give substantial help to energy consumers is by using its powers to facilitate energy infrastructure investment at the lowest cost of capital. This may involve direct Government investment on some occasions, drawing on its low cost of borrowing, or interventions such as the CfD and regulated asset base (RAB) models which, by reducing investor risks, will enable projects to tap into the large pools of infrastructure and pension finance seeking long-term assets paying predictable returns. Structures which enable private sector investment at low costs of capital can bring forward many billions of pounds of financing and deliver huge value to consumers over the long-term thanks to the lower cost finance they enable.



The way we achieve net zero emissions in our own business is just as important to us as playing our role in decarbonising the UK's energy.

As we innovate our business to further reduce our emissions, it's vital to us that our transition is safe, just and positive for our people, the communities we are a part of and the land we care for.

Our three ambitions:

- 1.** To demonstrate real progress towards a net zero environmental impact by reducing our carbon emissions, waste, water use and effect on biodiversity.
- 2.** To create a great workplace for our people by supporting their health and safety, diversity and inclusion and skills development.
- 3.** To make a positive social contribution by supporting vulnerable customers, local economies and the STEM skills of tomorrow's energy innovators.

GENERATING LOW CARBON ELECTRICITY

WIND + NUCLEAR + SOLAR

HELPING BRITAIN ACHIEVE NET ZERO

