

Distributed Energy

Powering the future of healthcare

June 2018



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Foreword

“

I believe energy could – and should – be a force for good for the NHS, helping to create financial efficiencies and unlock opportunities to make improvements in patient care.”

In recent times, our National Health Service has come under increasing pressure and significant financial strain.

News of a cash boost in the last few weeks is very welcome. But what is rarely talked about in the debate is the largely untapped financial opportunity I see when I visit the energy centres powering our hospitals and health facilities across the country.

Energy technology has come a long way in the past few decades. The days of just focusing on energy efficiency are gone.

Forward-thinking organisations around the world are adopting new technologies and harnessing the power of data analytics and the digital world to turn their energy consumption and energy resilience into a source of advantage.

But many healthcare providers still see energy as a high fixed cost, a commodity that is delivered to them, something over which they have little control. This is something we must change if we are to ensure the longevity of our health services.

In this report we demonstrate that, by adopting the full range of what are called distributed energy solutions, the NHS could save £130 million per year – and that’s just a conservative estimate. The savings could be double this.

More significantly, we also show how this could help to create 15,000 jobs and boost overall economic growth.

At Centrica, we believe that the energy system of the future will look fundamentally different to how it does today. We are committing hundreds of millions of pounds in new investment over the next few years, so we can support organisations from all industries to make this opportunity a reality.

Adopting new energy technology could help our NHS to unlock savings that can be used to support frontline patient care for many years to come.

After reading this report, I hope that you too will share this vision.

Jorge Pikunic, Managing Director,
Centrica Business Solutions

June 2018

Executive summary

Energy is vital to the operation of our National Health Service. Ensuring it is reliably available, used efficiently and priced competitively is essential. In this report, we argue that the healthcare sector need no longer see energy as an immovable cost.

Context

As set out in the UK Government’s 2015 financial settlement for the NHS to 2020/21, the NHS needs to achieve almost £22 billion of savings by 2020. This means savings of 2-3 per cent are required every year, with the majority (£14.9 billion) of that to be delivered locally¹. With the NHS spending over £6.5 billion annually maintaining and running its estate and facilities, energy cost-reductions can make an important contribution².

This has already been recognised by the Government. In his 2016 report into operational efficiency in English NHS acute hospitals, Lord Carter of Coles highlighted “a significant opportunity for [NHS] trusts to achieve cost efficiencies by reducing their energy consumption...if trusts were able to invest in energy savings schemes such as LED lighting, combined heat and power units, and smart energy management systems”³. He further pointed out the demand for such investment, with the 2013/14 energy efficiency fund being oversubscribed four-fold, due, in part, to pay-back periods of under four years.



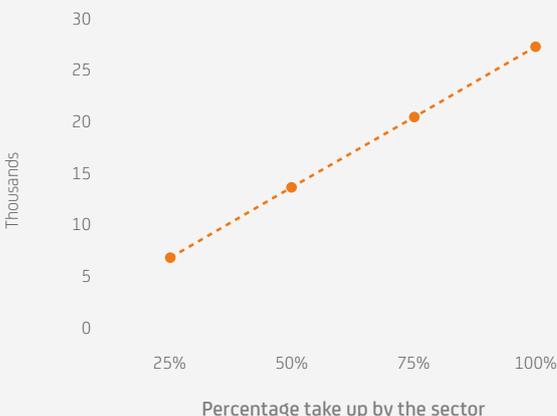
NHS England spend on energy per year



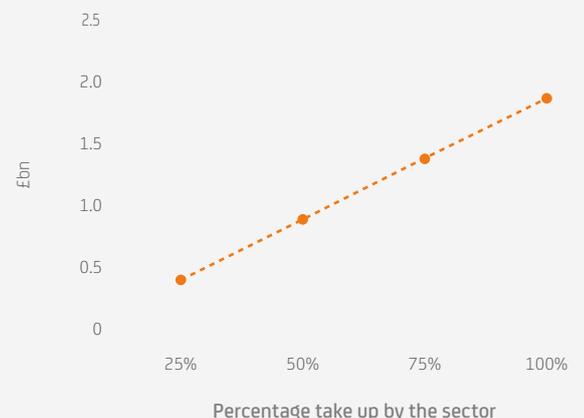
Potential reduction in annual energy costs

Lord Carter identified that acute trusts spend around £500 million per annum on energy, and estimated potential savings for local NHS trusts of around £36 million per annum, if all trusts could meet the median benchmark for energy costs. Installing the measures suggested by Lord Carter, that figure rose to £125 million per annum. It was because of these potential savings that he recommended establishing an ‘invest to save energy efficiency fund’ by April 2017.

Healthcare employment



Healthcare GVA



“

a significant opportunity for hospitals to achieve operational efficiencies [is] by reducing their energy consumption.”

Healthcare economic benefits

In contrast to Lord Carter’s research which estimated savings based on adoption by all NHS England trusts, our report reviews what the impact would be if just 50% of the NHS adopted distributed energy solutions.

Our findings suggest that the NHS in England, for example, could reduce energy costs by £130 million per annum, enough to fund an extra 4,000 nursing roles across the country⁴. This means that if all NHS England trusts utilised new energy technology, the savings could in fact be in the region of £260 million per year, more than double Lord Carter’s estimate.

In the 50% scenario, it could create £900 million for UK GVA, and support around 15,000 jobs that would be needed to help deliver distributed energy technology to the sector⁵.

It is important to note that the figures quoted here are for the public sector only, due to a lack of data available for private sector healthcare provision.

As such the additional benefit would be even higher if the private sector - which accounts for 17 per cent of healthcare expenditure⁶ - also took up the opportunities of distributed energy solutions.



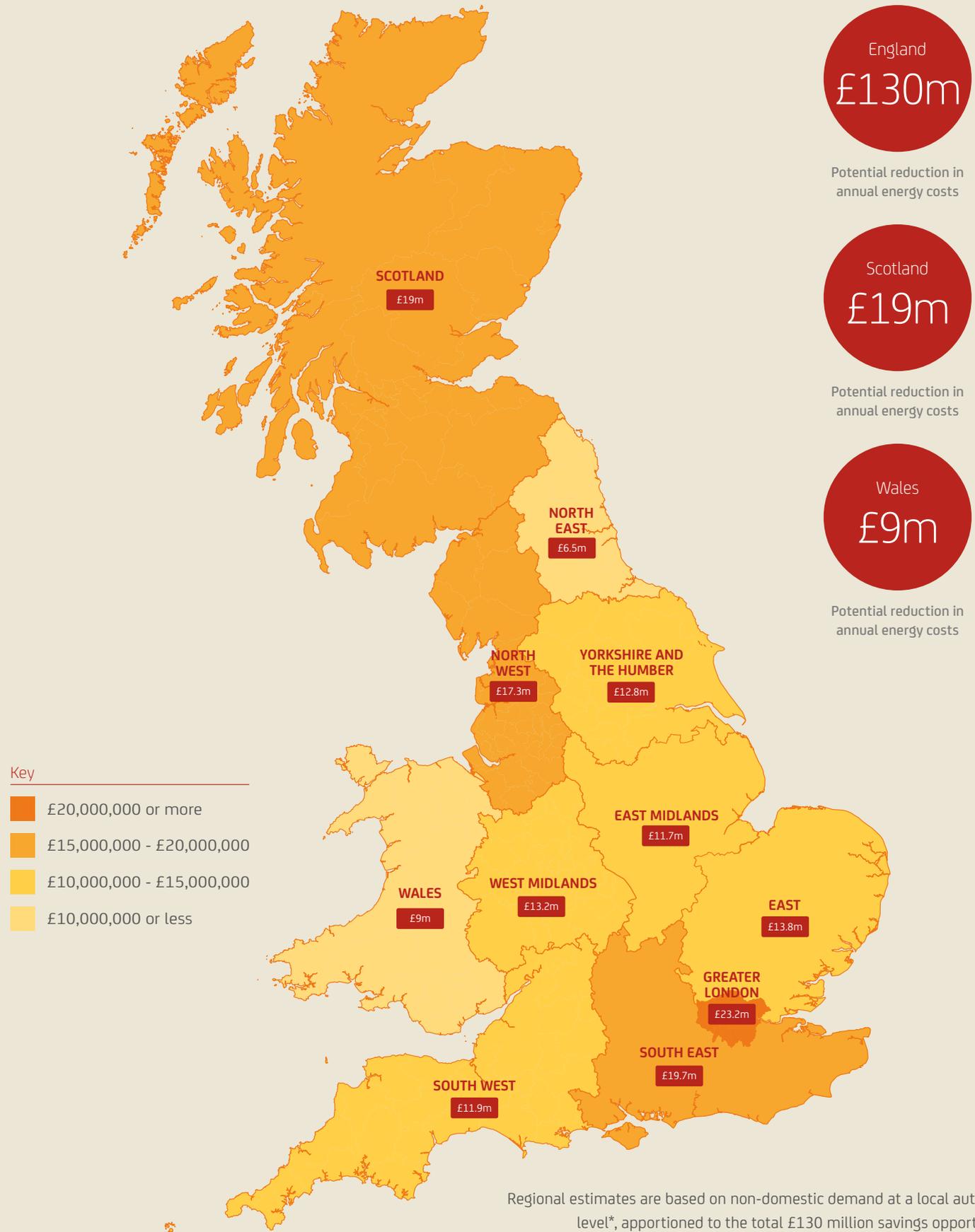
GVA to UK



Jobs supported

- ¹ NHS, NHS Five Year Forward View, Chart 4.2, May 2016
- ² NHS England
- ³ Lord Carter of Coles, ‘Operational productivity and performance in English NHS acute hospitals: Unwarranted variations’, an independent report for the NHS, February 2016
- ⁴ Average nurse base salary is £31,409 (NHS Staff Earnings Estimate, December 2017)
- ⁵ See centrica.com/economicfuture for inputs and assumptions
- ⁶ ONS, Healthcare Expenditure in the UK, March 2015

Breakdown of projected savings by region

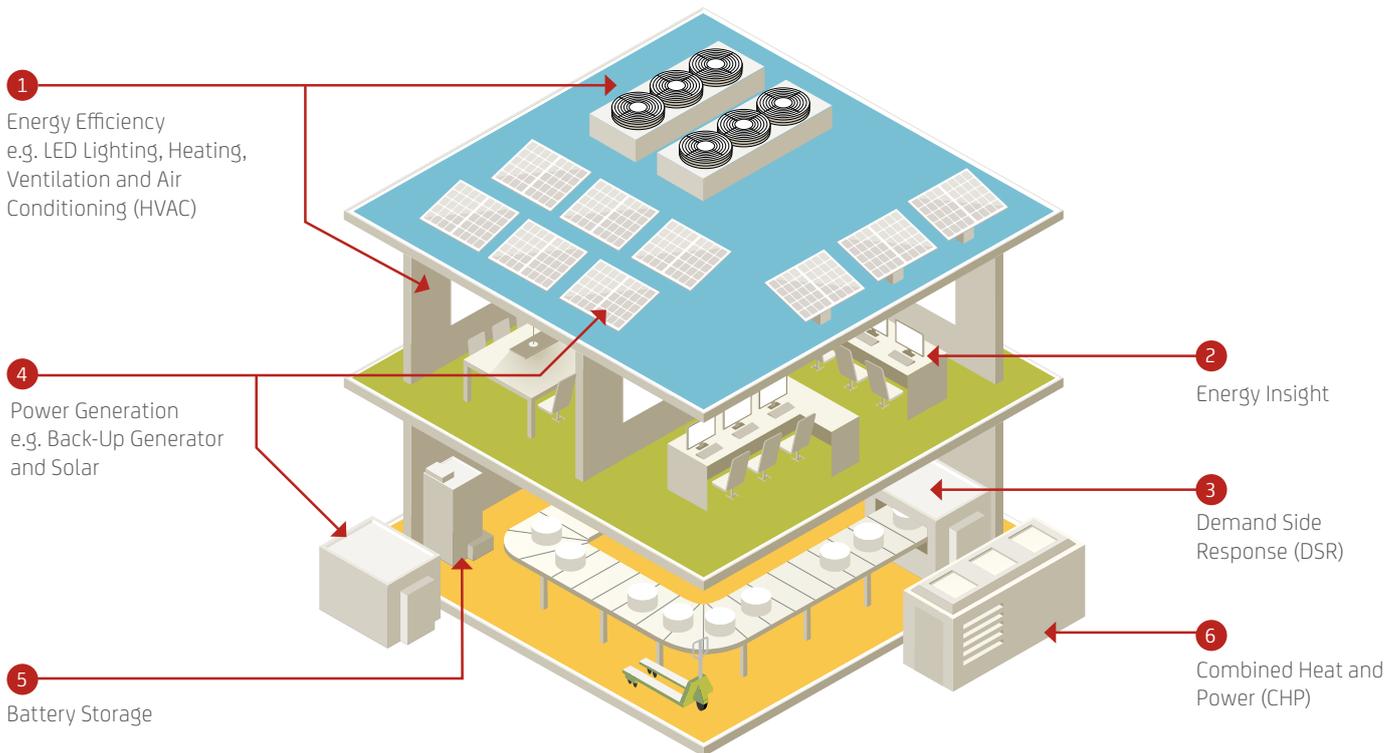


Background: What is distributed energy?

The first step in understanding the potential of distributed energy solutions is understanding what the term means.

The World Alliance for Decentralised Energy defines this as “electricity production at or near the point of use, irrespective of size, technology or fuel used – both off-grid and on-grid.” We believe that this is a good start, but is too narrowly defined.

Distributed energy should also cover a much broader range of solutions, including energy efficiency, monitoring and on-site generation, that can help healthcare providers to take control of their energy and turn it into an opportunity.



1. Energy Efficiency

Reducing costs by upgrading or improving a range of energy-consuming processes.

2. Energy Insight

New technology is available that allows larger energy users to accurately monitor their energy use across all equipment and devices. For example, Centrica Business Solutions' own Panoramic Power technology.

3. Demand Side Response (DSR)

Revenue streams are available for energy users if they are able to reduce, or even increase, their energy consumption at times when the grid demands it. New technology allows energy users to respond to these changes in demand quickly and easily and without putting security of supply at risk.

4. Power Generation

A range of small-scale power generating technologies can provide on-site generation; delivering back-up power and the ability to sell excess energy back to the grid.

5. Battery Storage

Lithium-ion battery storage systems can be charged at cheaper times and then used when prices increase to better manage energy costs. They can also work alongside renewable technologies, which on their own are intermittent, and can be used to support the grid, which will create new revenue.

6. Combined Heat and Power (CHP)

CHP plants work by converting gas into both electricity and heat in a single process. It's one of the most efficient sources of energy and allows significant amounts of energy to be produced on-site, improving the resilience of supply, reducing costs and helping to reduce carbon emissions.



The opportunities for the healthcare sector

Energy can help healthcare providers to protect and improve patient care, through making their operations more efficient and resilient, and by reducing their energy costs.

1 | Maximising operational efficiency

Many NHS trusts are running ageing and inefficient energy estates, leading to unnecessary wastage and consuming budget that could be better invested in patient care. According to the Nuffield Trust, The Health Foundation and the King's Fund, continued underinvestment in capital projects means the NHS is having to cope with deteriorating facilities, while facing a £2.8 billion cost to address those parts of the estate with high or significant maintenance risks ⁷.

We believe it's essential that trusts eliminate avoidable spend and optimise operational performance. Some energy wastage can be avoided with relatively simple fixes such as automated lighting sensors and regular boiler maintenance schedules. Trusts could also take advantage of more efficient technologies like combined heat and power (CHP) systems or LED lighting.

35%

Of healthcare respondents in a recent Centrica survey cited managing rising costs and providing a comfortable care environment as the joint number one challenges for the next 12 months ⁸.

2 | Ensuring the resilience of critical services

Few industries rely on the continuity of their energy supply quite as critically as healthcare. Any downtime can increase costs, decrease productivity and affect the quality of patient care.

It's our firm conviction that limiting and managing risk means taking advantage of newer energy technologies and new approaches to managing energy.

This might be by using combined heat and power (CHP) systems, back-up generators and renewables such as solar for on-site generation. Organisations are taking advantage of falling battery costs and procuring backup storage facilities. Or it could be by arranging a regular management and maintenance partner to lower the risk of failures.

46%

Of healthcare respondents stated that their organisation had suffered an interruption of energy supply due to external factors in the last 12 months ⁹.

77%

Of healthcare respondents agreed that the cost of being energy resilient is far less than the impact of an energy failure ¹⁰.

3 | Improving environmental performance

Regulatory targets and the NHS' own commitments to carbon reductions are forcing trusts to improve their environmental performance. According to the King's Fund, "The NHS is the most significant public-sector contributor to climate change" ¹¹.

By taking advantage of low-carbon technologies, healthcare providers can improve their environmental impact. For example, many healthcare facilities have under-utilised real estate (including roof spaces) that could be used for renewable energy generation. They also have a usage profile which requires lots of energy during the day, making technologies such as solar highly feasible.

90%

Of healthcare respondents agreed that there were opportunities for energy strategies to help enable a sustainable business model ¹².

15%

Of healthcare respondents have implemented solar panels across most of their sites (16% have CHP installed at most sites) ¹³.

⁷ Joint statement on health and social care, Nuffield Trust, The Health Foundation and The King's Fund, Nov 2017

^{8, 9, 10} Centrica Power of Power research, Nov 2017

¹¹ <https://www.kingsfund.org.uk/projects/time-think-differently/trends-sustainable-services>

^{12, 13} Centrica Power of Power research, Nov 2017

Generating significant savings for the NHS

Centrica is helping an increasing number of hospitals to overhaul their approach to energy through new energy centres that include combined heat and power (CHP); boilers; efficient lighting; heating and ventilation systems; renewable technology; and building management systems.



Case study: University Hospitals of North Midlands NHS Trust

- Providing services for approximately 900,000 people locally and three million regionally at Royal Stoke Hospital and County Hospital in Stafford, energy consumption is consistently high for the University Hospitals of North Midlands NHS Trust.
- To better manage this, the Trust needed a cost effective energy saving solution that would improve environmental performance and reduce the expense associated with energy generation.
- We replaced their old system with a new combined heat and power (CHP) plant on the Royal Stoke University Hospital site. The unit is helping to reduce the hospital's carbon emissions by almost 2,800 tonnes a year and is delivering annual savings of around £500,000, equivalent to approximately 20 full time nurses.

£500,000
annual savings

2,800
tonnes of carbon
saved

“

We were attracted to this new system as not only will it save money and conserve resources, it also complies with government targets to cut down carbon emissions and damaging greenhouse gases.”

Geoff Fox

Facilities Manager of Estates, Heart of England NHS Foundation Trust

5,600
tonnes

CO₂ cut every year

£532,000
savings

Annual energy savings

15
years

CHP performance levels
guaranteed for 15 years

Case study: Birmingham Heartlands Hospital

Reduce CO₂ and boost patient care

Birmingham Heartlands Hospital was tasked with reducing its carbon emissions. At the heart of this was finding a viable replacement for its ageing coal-fired boilers. These had served the Trust well for many years, but they simply couldn't perform to the standard of a modern generation system.

Creating a healthy alternative to deliver long-term results

ENER-G (now Centrica Business Solutions) provided a new purpose-built Energy Centre, housing a highly efficient ENER-G Combined Heat and Power (CHP) system, plus other technology including steam-raising boilers and an absorption cooling system.

The trigeneration system works by recovering most of the heat created in the generation process to provide electricity, steam or hot water for winter heating, and chilled water for use in the air conditioning systems during the summer.

By connecting the CHP unit to the hospital's main heating system, Birmingham Heartlands can minimise the use of the existing electricity-powered chillers during the summer. The spare cooling capacity can also be used to provide air conditioning to new areas of the hospital.

The hospital also upgraded its lighting with 1,800 high efficiency, low energy fittings. The £3.8 million programme

was funded through a Public Private Partnership contract, which includes a £311,000 grant from the Carbon Trust.

The results

The CHP system is cutting the hospital's CO₂ emissions by 5,600 tonnes per year – the equivalent of a forest of 560,000 trees. CHP savings and performance are guaranteed for 15 years.

“

ENER-G was the only supplier that would guarantee us savings and this is a marriage between the company and the Trust. They have brought their expertise to the table with a future-proven system and we have formed a solid partnership with them.”

Mr. Andy Hudson

Shrewsbury and Telford NHS Trust



Case study: Royal Shrewsbury Hospital

Meeting the cost and carbon reduction challenge

Shrewsbury and Telford NHS Trust faced the challenge of meeting stringent carbon reduction targets, while reducing energy costs and finding a way to fund the replacement of ageing heating, lighting and energy control systems.

In 2004, we were selected to supply, finance and help operate and maintain a major energy services package. Our investment is being re-paid via the energy savings and providing additional cost savings that the Trust can use for patient care. We also helped the Trust to obtain a Community Energy grant of £547,000.

Win-win solution

This was a win-win solution that included the installation of an ENER-G (now Centrica Business Solutions) 1150kWe combined cooling heat and power (CCHP)/trigeneration system, together with new boilers, replacement of the asbestos lagged district heating main, new energy efficient lighting, and a new building energy management system.

Our trigeneration technology provides the hospital with both medium temperature hot water and steam. This is supplemented by a new composite boiler and a gas fired boiler. We created an innovative chilled water system to convert the waste heat generated by the CHP into chilled water for the hospital cooling

system. This included a chilled water ring main, which linked a variety of chilled water plant, including a new 700kWe absorption chiller.

Delivering on objectives

The Trust's aim was to maximise energy cost and CO₂ emissions savings through innovation; reduce the maintenance backlog of energy infrastructure; transfer risk from the Trust; secure grant funding, and create a self-funded, cash neutral scheme.

All of these objectives have been met and the project has enabled the hospital to save more than £780,000 a year, simultaneously shrinking its carbon footprint by some 2,000 tonnes annually.

The national picture

The information in this report is taken from 'Distributed Energy: Powering Britain's Economic Future', published by Centrica Business Solutions in November 2017.

This research provides a picture of the scale of the potential economic benefit for the UK economy if the opportunities from distributed energy solutions are taken up in the healthcare, industry, and hospitality & leisure sectors.

Our analysis shows that if just 50 per cent of the three sectors utilised these solutions it could deliver:



Potential reduction in annual energy costs



Economic boost to UK GVA



New jobs



Boost to UK economic output

Centrica commissioned FTI Consulting to help develop the quantitative analysis for this report.

FTI Consulting is an independent global business advisory firm, with deep expertise and significant experience in energy markets, and in performing economic analysis across a range of sectors.

To read the report in full and view our methodology, visit centrica.com/economicfuture

About Centrica

The world of energy is changing and, with our chosen businesses, distinctive positions and current capabilities, Centrica is well placed to deliver for its customers and for society.

We will satisfy our customers, deliver cash flow growth and returns for our shareholders and be efficient and excellent in our operations.

We are shifting investment towards our customer-facing businesses – organised around two global customer facing divisions: Centrica Consumer and Centrica Business focused on the residential consumer and the business customer respectively.

Our areas of focus are Energy Supply & Services, Connected Home, Distributed Energy & Power, Energy Marketing & Trading.

We supply energy and services to over 27 million customer accounts mainly in the UK, Ireland and North America through strong brands such as British Gas, Direct Energy and Bord Gáis supported by around 12,000 engineers and technicians.

We are focused on delivering high levels of customer service, improving customer engagement and loyalty. We aim to be a good corporate citizen, employer of choice and to provide leadership in a dynamic and changing world.

We are developing innovative products, offers and solutions, underpinned by investment in technology. In February 2017 we announced the creation of a new venture 'Centrica Innovations' that will identify, incubate and accelerate new technologies and innovations. We will look to invest up to £100 million over the next five years in start-ups, giving us access to technology and entrepreneurial capability and resources.

For more information: centrica.com

About Centrica Business Solutions

Centrica Business Solutions has been established to develop new thinking, new technologies and new ways of working to help our customers take control of their energy and improve their performance, resilience and growth.

Our energy intelligence, products and solutions are already powering the ambitions of more than 2,000 energy users around the world. From retail and manufacturing to health and education, we help our customers improve their operational efficiency, increase their resilience, and unlock new sources of value and revenue. Centrica will be investing over £700 million in this area by 2020.

For more information: centricabusinesssolutions.com

Disclaimer

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