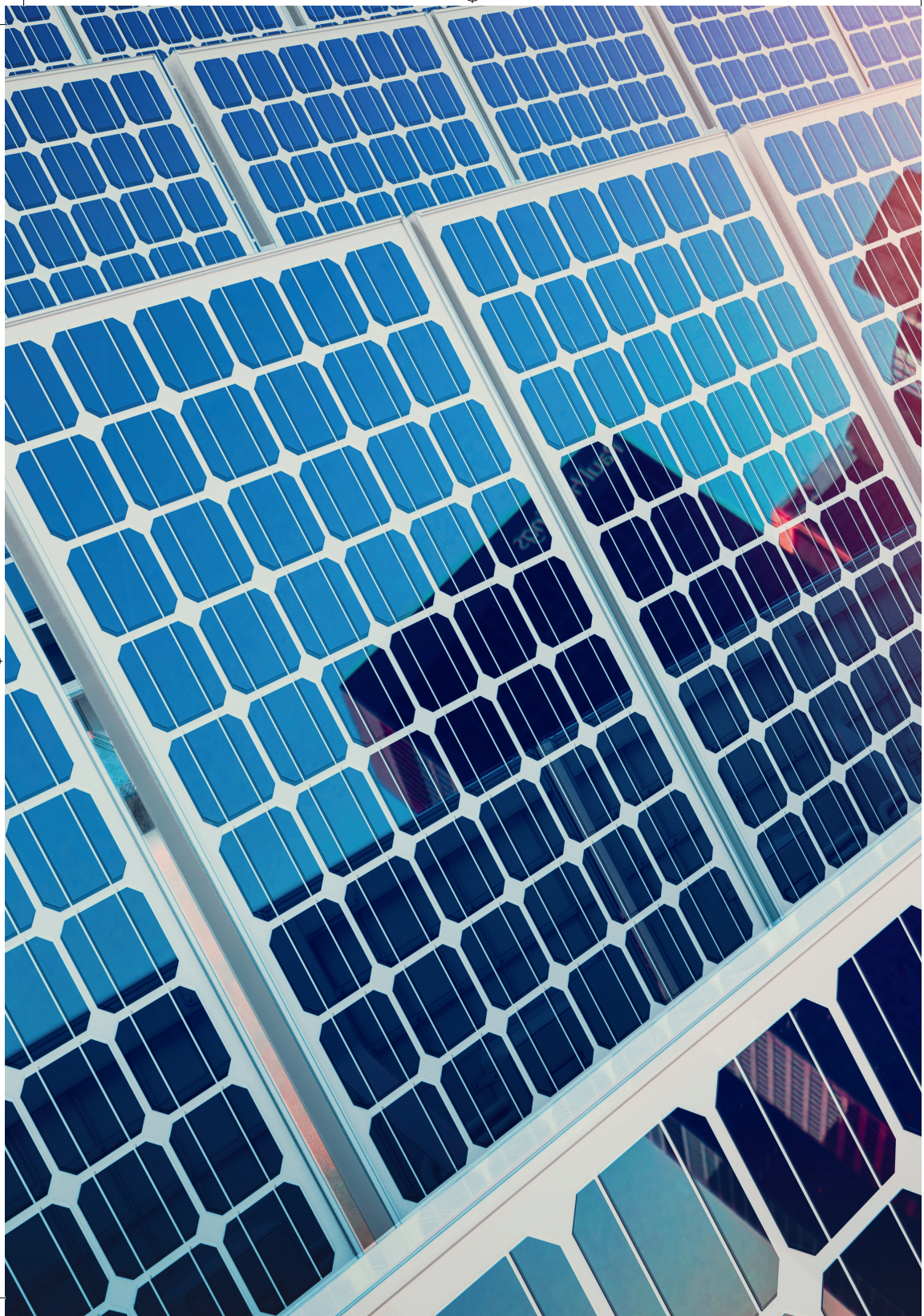
Energy Investment Opportunities

INVEST IN GREAT
BRITAIN & NORTHERN IRELAND



Contents

DIT's Capital Investment team

The Department for International Trade helps businesses export, drives investment, opens up markets and champions free trade.

As an international economic department, our role is to:

- Enable and support firms to seize the opportunities of trade and international investment to establish a culture of exporting in the UK
- Ensure the UK is recognised as the best place to invest and to attract, retain and grow international investment that strengthens the economy, supported by the UK's Industrial Strategy
- Open markets, building a trade framework with new and existing partners which is free and fair
- Use trade and investment to underpin the Government's agenda for a Global Britain and its ambitions for prosperity, stability and security worldwide

DIT's Capital Investment team acts as a one stop shop to align investors with a credible project pipeline, helping them understand the associated returns. We work closely with a range of UK based commercial and governmental organisations to understand their capital raising priorities and ensure their offer is investable.

We also support international investors in identifying suitable opportunities and help navigate their investment journey. We realise the value government can add to the investment process, using our global network of international offices to manage relationships with investors, large corporates, high net worth individuals and families, private sector agents and other governments.

The UK is a leading global destination, and No.1 in Europe,[2] for attracting foreign direct investment. DIT's Capital Investment team promotes investment into energy, infrastructure, property and high growth firms. We have a strong track record, having attracted billions of pounds of foreign investment into major projects.

We work in the fields of:

- Large capital projects in property development, regeneration, energy and infrastructure.
- Attracting growth capital from venture capital and private wealth investors into high growth potential businesses, for example in technology sectors.

We are able to offer expert guidance, utilising a range of specialists in property development and finance, project finance, energy, transport, regulated assets, venture capital and entrepreneurship.

For further details or to arrange a meeting to discuss potential opportunities, please email: **capitalinvestment@trade.gov.uk**

2 EY 2018 UK Attractiveness Report: https://www.ey.com/uk/en/newsroom/news-releases/18-06-11-uk-remains-top-destination-for-inward-investment

The energy transition – changing the UK's energy landscape

The UK energy system is in transition. It is changing rapidly and is transforming the way in which we:

Generate electricity

Today, there is more low carbon generation in our energy mix. There are also many more localised clean generation resources in our energy system.

Consume energy

The decarbonisation of our transport and heating systems is changing the way we use energy. In addition, the application of innovative technologies is providing more data on the way in which we use energy, thereby increasing control for consumers over their energy consumption.

Interact with the energy system

Due to a steady demand for renewable energy and the emergence of smart technologies, many individuals and households are becoming both consumers and producers of electricity. This trend is leading to a change in the role consumers typically play within our energy system.

Energy transition drivers and UK investment opportunities

There are three major trends driving the ongoing reshaping of the energy landscape in the UK and globally - decarbonisation, decentralisation and digitisation.

Decarbonisation

Under the 2008 Climate Change Act, the UK has committed to reducing greenhouse gas emissions by at least 40% by 2030, and by 80% by 2050 (compared to 1990 levels).[3] Our Industrial Strategy prioritises the decarbonisation of electricity generation, heat and transportation in order to achieve these targets.

To meet our decarbonisation challenge we will need to mobilise significant public and private capital into decarbonisation projects across electricity generation, heat and transportation. We will also need to invest significantly into research and development to stimulate innovation and deployment in these sectors of our economy.

Decentralisation

Electricity is increasingly being generated closer to where it is used. Localised electricity generation reduces energy costs and improves security of supply nationally as the system does not have to rely on relatively few, large and remote power stations.

The fragmentation of generation assets into smaller distributed units will open investment opportunities to new investors who previously had limited exposure to the power generation industry. Also, investment will be required into technology that integrates distributed energy assets into the electricity system.

Digitalisation

Digital technologies provide great potential to improve the efficiency and sustainability of energy systems worldwide. As a result, digitalisation is becoming increasingly important across the energy industry. When integrated within the energy system, smart technologies and data analysis software can provide significant efficiency and integration improvements, helping to reduce costs and improve performance.

An effective shift to decarbonisation in power generation, transport and heating will require large scale investment into digital technologies and innovation, providing significant investment opportunity.

3 Committee on Climate Change: UK Climate Action Following the Paris Agreement, October 2016

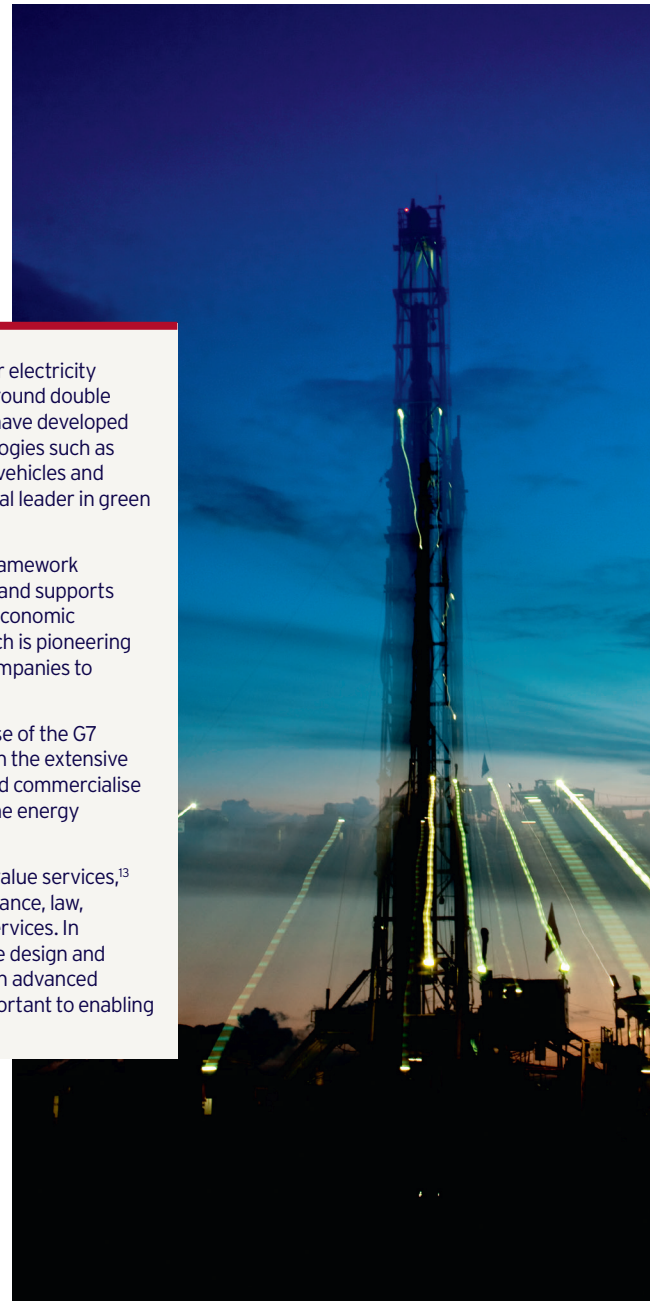
The UK's role in the global energy transition starts from a position of strength

In response to the challenges and opportunities presented by our changing energy landscape, we published our Clean Growth Strategy in 2017.[4] Clean growth was one of the four Grand Challenges put forward in our Industrial Strategy as areas of priority for Government in growing Britain's competitive advantage in the sectors that will define the global economy over the coming decades. These strategies set out the UK's ambitions in cutting greenhouse gas emissions and achieving clean growth while providing consumers and businesses with an affordable, stable energy supply.

The UK is well-placed to take advantage of the shift to a clean energy economy, as well as leverage our competitive advantages, including:

- Being one of the first countries to recognise and act on the economic and security threats of climate change. We have been among the most successful countries in the developed world in growing our economy while reducing emissions. Since 1990, we have cut emissions by over 40 per cent while our economy has grown by more than two thirds.[5]
- Since 2010 over 30GW of new capacity has been added to the electricity grid, around 75% from renewable sources.[6]
- We were an early adopter of clean energy generation technologies, allowing us to become a world leader[7] in the development and deployment of low carbon energy generation. As an example, the UK generates more electricity from offshore wind generation sources than any other country.[8]

4 www.gov.uk/government/publications/clean-growth-strategy **5** BEIS (2018) Provisional Greenhouse Gas Emissions Inventory Statistics 2017 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/695930/2017_Provisional_Emissions_statistics_2.pdf; ONS (2018) Series ABMI. Seasonally adjusted chained volume measures https://www.ons.gov.uk/economy/grossdomesticproductgdp/timeseries/abmi/pgdp **6** Infrastructure and Project Authority: Analysis of the National Infrastructure and Construction Pipeline, December 2017 **7** BEIS: The Clean Growth Strategy - Leading the way to a low carbon future, October 2017 **8** Infrastructure and Project Authority: Analysis of the National Infrastructure and Construction Pipeline, December 2017



- In 2017, approximately half of our electricity came from low carbon sources, around double the level in 2010.[9] In addition, we have developed world leading expertise in technologies such as power electronics for low carbon vehicles and electric motors, and we are a global leader in green finance.[10]
- A stable policy and regulatory framework that provides long-term direction and supports innovation, with an independent economic regulator for energy markets which is pioneering in its approach to encouraging companies to innovate.[11]
- The most productive science base of the G7 countries[12] – a valuable asset, given the extensive innovation required to develop and commercialise low carbon technologies across the energy industry.
- World leading expertise in high-value services,[13] with strengths in areas such as finance, law, consultancy, software and data services. In addition, we offer excellence in the design and manufacture of products based on advanced technologies. All of which are important to enabling the low carbon transition.

9 Statistics from UK Energy Trends, July 2018 https://www.gov.uk/government/statistics/electricity-section-5-energy-trends; https://www.gov.uk/government/statistics/energy-trends-section-6-renewables **10** BEIS: The Clean Growth Strategy - Leading the way to a low carbon future, October 2017 **11** OECD (2002) Reviews of Regulatory Reform, Regulatory Reform in the United Kingdom, Regulatory Reform in Gas and Electricity and the Professions **12** Elsevier (2017), International comparative performance of the UK Research Base 2016 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/651174/uk-research-base-international-comparison-2016.pdf
13 Green Alliance (2016) Will the UK economy succeed in a low carbon world? http://www.green-alliance.org.uk/UK_low_carbon.php.

According to the Infrastructure and Projects Authority, the UK has over £57 billion of energy investment projects in the pipeline to 2021.[14] As our energy system transitions to one that is cleaner, flexible, and more efficient, investment opportunities will increase across this industry.

Since 2010 over 30GW of new capacity has been added to the electricity grid, around 75% from renewable sources.[15]

The UK has the most offshore wind generation built anywhere in the world, with around 40 per cent of the global installed capacity.[16]

The UK is predicted to need an additional 500MW of new energy from waste processing capacity, unlocking an approximately £4 billion capital investment opportunity.[17]

14 Infrastructure and Project Authority: Analysis of the National Infrastructure and Construction Pipeline, December 2017
15 Infrastructure and Project Authority: Analysis of the National Infrastructure and Construction Pipeline, December 2017
16 IRENA (retrieved September 2017) http://www.irena.org/home/index.aspx 17 Suez Energy: Mind the Gap 2017-2030 – UK Residual Waste Infrastructure Capacity Requirement

Government has highlighted the need for investment in nuclear by committing £460 million to support innovation and research and development.[18]

The value of capital projects yet to be developed in the UK's oil and gas sector is anticipated to be up to £40 billion.[19]

The Global energy storage market is expected to require $103 billion in investment to 2030.[20] Government has committed £256 million in innovation funding to develop the market in the UK.[21]

By 2020, £45 billion of new investment is required to upgrade our energy networks to meet the requirements of a clean and flexible energy system.[22]

18 BEIS: The Clean Growth Strategy - Leading the way to a low carbon future, October 2017 19 UK Oil & Gas, Economic Report 2017: https://cld.bz/825WAMy/48 20 Bloomberg New Energy Finance: 2017 Global Energy Storage Forecast 21 BEIS: The Clean Growth Strategy - Leading the way to a low carbon future, October 2017 22 BEIS: The Clean Growth Strategy - Leading the way to a low carbon future, October 2017

Investment Opportunities

The global energy transition will create significant investment opportunities. An estimated $13.5 trillion of public and private investment in the global energy sector will be required between 2015 and 2030.[23] In the UK, we have over £57 billion of energy investment projects in the pipeline to 2021.[24] As the UK's energy system transitions to one that is cleaner, flexible and more efficient, investment opportunities will increase across our energy industry, including the following sub-sectors:

Offshore Wind

The UK has the most offshore wind generation built anywhere in the world, with around 40 per cent of the global installed capacity.[25] At the end of 2017 UK offshore wind installed capacity stood at 5.8GW, with 6.0GW under construction and a further 2.2GW with final investment decisions pending.[26]

The cost of offshore wind has fallen significantly, making it an attractive technology for generating grid scale electricity whilst reducing carbon emissions and increasing security of supply. The UK government continues to encourage investment in renewable technologies such as offshore wind through allocating up to £557 million[27] for further subsidy support (in the form of contracts for difference (CFDs)).

The next CFD auction will open by May 2019 with subsequent auctions every two years after that. Depending upon auction clearing prices this could mean 1-2GW of new offshore wind capacity every year in the 2020s. The offshore wind sector has said it could deliver 30GW by 2030, providing a £48 billion investment opportunity.[28]

Nuclear

Nuclear energy plays an important role in the UK energy mix, contributing around 20% of total electricity generation.[29] As the UK energy systems transitions toward a low carbon future, growing low carbon sources of electricity, including nuclear generation, will remain a key priority.

Government has highlighted the need for investment in nuclear by committing £460 million to support innovation in areas including future nuclear fuels, new nuclear manufacturing techniques, recycling and reprocessing, and advanced reactor designs,[30] including £56m announced for nuclear R&D as part of a Nuclear Sector Deal agreed with industry in June 2018.

23 BEIS: The Clean Growth Strategy - Leading the way to a low carbon future, October 2017 **24** Infrastructure and Project Authority: Analysis of the National Infrastructure and Construction Pipeline, December 2017 **25** IRENA (retrieved September 2017) http://www.irena.org/home/index.aspx **26** The Crown Estate: Offshore wind operational report 2017 **27** https://www.gov.uk/government/news/government-confirms-up-to-557-million-for-new-renewable-energy-projects **28** Renewable UK: UK Offshore Wind Industry Reveals Ambitious 2030 Vision (https://www.renewableuk.com/news/391723/UK-Offshore-Wind-Industry-Reveals-Ambitious-2030-Vision.htm) **29** Energy UK, Energy in the UK, 2017 **30** BEIS: The Clean Growth Strategy - Leading the way to a low carbon future, October 2017

Oil and Gas

The UK oil and gas industry has a key role to play in the UK's transition to a low carbon energy system. Through its commitment to the Driving Investment strategy, Government has played a key role in promoting investment into the UK's oil and gas sector by rewarding investment at all stages of the industry lifecycle and providing a high level of support to the sector in the 2015, 16 and 17 budgets.[31]

The UK oil and gas industry offers opportunities to investors across exploration, development, production and downstream activities. Whilst investment in oil and gas is sensitive to global oil prices and wider market factors, the value of potential capital development projects in the UK is anticipated to be almost £40 billion.[32] As oil and gas facilities approach the end of production they will need to be decommissioned in a safe and environmentally sound manner, generating new investment opportunities and creating the opportunity for the UK to become a market leader in oil and gas decommissioning activities.

Energy from waste

The UK is well placed to see increased activity in energy from waste project development. This is, in part, due to restrictions on access to landfill waste capacity, and the closure of many landfill sites across the country.

Based on current market trends, a capacity gap for energy from waste and other non-landfill treatment facilities of approximately 4.6 million tonnes is expected by 2025. This capacity gap will require new energy from waste processing capacity of more than 500MW,[33] thereby unlocking an approximately £4 billion investment opportunity[34] in the UK's energy from waste sector.

31 https://www.ogauthority.co.uk/about-us/investing-on-the-ukcs/fiscal/ **32** UK Oil & Gas, Economic Report 2017: https://cld.bz/825WAMy/48 **33** Suez Energy: Mind the Gap 2017-2030 – UK Residual Waste Infrastructure Capacity Requirement **34** Suez Energy: Mind the Gap 2017-2030 – UK Residual Waste Infrastructure Capacity Requirement

Electricity storage and system balancing

With increasing levels of intermittent and decentralised renewable generation, storage and electricity system balancing are increasingly becoming a priority. Electricity storage and system balancing services could be used to manage generation intermittency and provide critical system services to the system operator.

Whilst revenue profiles for energy storage projects are developing, revenue diversification or 'stacking' opportunities exist for energy storage projects, including frequency response services, grid charge reductions and arbitrage opportunities. From an investment opportunity perspective, the global electricity storage market is anticipated to grow to a cumulative 125GW/305GWh by 2030, attracting $103 billion in investment over this period.[35]

The UK is well placed to leverage this investment opportunity. Government has committed £256 million in innovation funding for energy storage and grid balancing services to develop this sector within the UK.[36]

Electricity networks

As the UK transitions to a low carbon energy system, our electricity networks will require significant development. Factors such as the increased level of decentralised and renewable electricity generation requiring grid integration, and the anticipated uptake in the level of electric vehicles (and charging infrastructure) will require our electricity networks to become smarter and more flexible.

The changing role of our networks will create significant new investments opportunities. It is forecast that by 2020, £45 billion[37] of new investment is required to upgrade our electricity grid to meet the requirements of a clean and flexible energy system. In order to encourage this investment into our energy networks, Government has committed £265 million[38] to support innovation and technology development in this area.

35 Bloomberg New Energy Finance: 2017 Global Energy Storage Forecast **36** BEIS: The Clean Growth Strategy - Leading the way to a low carbon future, October 2017 **37** Energy Networks Association: Response to Cost of Energy Review Call for Evidence **38** BEIS: The Clean Growth Strategy - Leading the way to a low carbon future, October 2017

Building on the success of others

Working with stakeholders and partners, the DIT Capital Investment team have facilitated the flows of international capital into UK-wide projects, across our energy industry. Here are some of our successes where we have supported project developers and international investors.

Offshore Wind Project, Hull - £870 million

This £870 million project is 100% owned by Ørsted and with a capacity of 1.2GW will be the largest offshore wind farm in the world. Once completed in 2020, it will produce enough energy to power over 1 million homes.

Located off the Yorkshire coast, the Hornsea Project One spans a huge area of 407 square kilometres, which is over five times the size of the city of Hull. The offshore wind farm will use 7 MW wind turbines, with each one 190 metres tall.

Investment in Oil & Gas Assets, UK North Sea - £2.4 billion

Harbour Energy acquired a diversified package of North Sea operating and non-operating oil and natural gas assets from Royal Dutch Shell in 2017. The strategic outcome of the investment was to create the UK's leading independent oil and gas company focused on the North Sea.

The acquisition included Shell's interests in ten operated and non-operated field areas, in addition to associated infrastructure and midstream assets. Collectively, the assets produced 115,000 barrels of oil equivalent per day in 2016. With this investment, assets set to be decommissioned have remained operational. The acquisition will provide a platform for future Harbour Energy investments potentially worth $780 million from 2018 – 2021.

Energy from Waste Facility Project, Bedfordshire - £300 million

Covanta and Veolia, two market leaders in the energy from waste industry, partnered to develop the Rookery South Energy from Waste Facility at a former brick clay extraction pit in Bedfordshire. The facility will use municipal, commercial, and industrial waste as fuel to generate heat and electricity.

The facility will generate over 60MW of electricity from over 500,000 tonnes of waste per year and meet the electricity requirement of 75,000 homes. In addition, heat generated by the facility will be utilised to support a local district heating system. The facility represents waste infrastructure that will help the UK achieve national recovery, recycling and renewable energy targets.

Offshore Electricity Transmission Investment, UK, Irish Sea £90 million

Mitsubishi (via its 50% ownership of the Diamond Transmission joint venture) was awarded the licence to develop the connection between the Burbo Bank Extension windfarm and the UK mainland electricity network.

The Burbo Bank Extension Offshore Wind Farm is located off the west coast of the UK in the Irish Sea. The connection infrastructure includes both subsea transmission, as well as the offshore and onshore electricity substations. The connection has a transmission capacity of up to 258 MW and is valued at £194 million.

Five Reasons to invest in UK energy sector

1. According to the World Bank[39], the UK consistently ranks within the top 10 countries globally for ease of doing business.
2. Our stable policy and regulatory framework that provides long-term direction and supports innovation.
3. An independent economic regulator for energy markets which is pioneering in its approach to encouraging companies to innovate.
4. Strong government support for the energy industry reflected in its Industrial Strategy and significant fiscal measures to encourage investment and development funding.
5. Internationally renowned capability in technology, innovation and high-value services.

39 Doing Business 2018, A World Bank Group Flagship Report http://www.doingbusiness.org/rankings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BRITAIN & NORTHERN IRELAND

Department for International Trade

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DIT
The UK's Department for International Trade (DIT) has overall responsibility for promoting UK trade across the world and attracting foreign investment to our economy. We are a specialised government body with responsibility for negotiating international trade policy, supporting business, as well as delivering an outward-looking trade diplomacy strategy.

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