

CLIMATE CHANGE

Introduction

CC0. Introduction page

CC0.1: Introduction [maximum 5000 characters].

About

The supply of energy and related services is fundamental to people's lives and society's progress – from keeping homes warm and well-lit, to fuelling industrial processes. As an international energy and services company focused on satisfying the changing needs of our customers, we have a vital role in society.

Our 36,500 employees work hard to deliver for our customers and for society. Our investment is increasingly shifting towards our customer-facing businesses, with our areas of focus being Energy Supply & Services, Connected Home, Distributed Energy & Power (DE&P), Energy Marketing & Trading (EM&T) and the optimisation of our Central Power Generation business. We serve our 28 million customer accounts through strong brands with distinctive capabilities which include British Gas in the UK, Bord Gáis Energy in the Republic of Ireland and Direct Energy in North America.

Our impact on climate change

We recognise that fossil fuels are the biggest contributor to climate change, which is one of society's greatest global challenges. We believe that we can play an important role tackling energy's impact on the environment and contribute positively to carbon emission reduction targets set at a national and international level.

We are therefore committed to minimising carbon emissions from the energy we generate and supply as well as those created from customer consumption. Our direct carbon emissions under scope 1 include those from sources we own or control such as power generation, gas production and storage as well as emissions arising from our property, fleet and travel. Indirect carbon emissions under scope 2 come from electricity purchased and consumed across our offices and assets. Scope 3 emissions are those we do not produce, but are the result of the products and services provided, such as electricity and gas sold to customers from wholesale markets alongside the products and services purchased to run our business.

Reducing our impact

We are committed to combating climate change by transforming the way energy is generated and consumed. With around 90% of our carbon emissions arising from customer consumption, the greatest contribution we can make to combat climate change is to empower our customers to reduce their emissions.

To achieve this, we provide market-leading products and services that give customers greater choice, control and understanding over their energy. This includes our expected £1.2bn investment in our new global Connected Home and DE&P businesses during 2015-20.

We recognise our ongoing responsibility to source, generate and supply competitively priced energy for our customers. As we transition to a lower carbon energy future, gas remains an important part of our strategy because it is the lowest carbon fossil fuel, provides an increasingly important back-up to intermittent renewables and is more affordable than most other energy sources. In addition to our gas fired power stations in the UK, we are a sizeable gas and oil producer and while we are reducing the scale of these operations, we will expand our trading capabilities to secure diverse and competitive supplies on the global market. For example in 2016 we acquired Neas Energy, whose renewable energy trading and Virtual Power Plant (VPP) platform allows commercial and industrial customers to aggregate and optimise distributed energy loads and resources. At the same time, we are taking a leading role in creating a new model for generating and supplying energy through our global DE&P business, in which we expect to invest £700m. As part of this in 2016, we announced the construction of a 49MW battery storage facility at Roosecote and a £19m pioneering local energy market trial in Cornwall, testing the use of flexible demand, generation and storage. These activities are supported by sourcing low carbon energy through our 20% stake in the UK's existing nuclear power fleet. Although we took the decision to exit being an operator of wind generation, with the sale of our remaining wind farm Lincs completed in February 2017, we will continue to be an enabler of other operators' wind projects through a limited number of Power Purchase Agreements. In addition to targeting carbon emission reduction in our power generation, we target reductions in the emissions associated with our property, fleet and travel.

We also understand the wider role we can play in mitigating climate change in supply chains and communities. For example, we work collaboratively with partners to raise and maintain high environmental standards in our supply chain through our responsible procurement programme and engage communities via dedicated educational initiatives that ensure future generations use energy more sustainably.

CC0.2: Reporting Year

01/01/2016 – 31/12/2016

CC0.3: Country list configuration

Select country
United Kingdom
United States of America
Canada
Ireland
Norway
Netherlands
Denmark
Israel
France
Germany
Hungary
Romania
Singapore
Sweden
India
Italy

CC0.4: Currency selection

GBP (£)

Management

CC1. Governance

Group and Individual Responsibility:

CC1.1: Where is the highest level of direct responsibility for climate change within your organization?

Board or individual/sub-set of the Board or other committee appointed by the Board

CC1.1a: Please identify the position of the individual or name of the committee with this responsibility [maximum 5000 characters]

Centrica's Chief Executive has overall responsibility for the business' impact on climate change. Issues associated with climate change are represented consistently at the highest level through his membership of the Board, the Centrica Executive Committee (CEC) and regular attendance at the Safety, Health, Environment, Security and Ethics Committee (SHESEC). The Chief Executive also Chairs the CEC's sub-Committee, the Health, Safety, Environment and Security Committee (HSES), where climate-change related issues may be discussed bi-monthly.

Individual Performance:

CC1.2: Do you provide incentives for the management of climate change issues, including the attainment of targets?

Yes

CC1.2a: Please provide further details on the incentives provided for the management of climate change issues

Who is entitled to benefit from these incentives?	The type of incentives	Incentivized performance indicator	Comment [maximum 2400 characters]
Environment/Sustainability managers	Monetary reward	Emissions reduction target	Delivery of certain Centrica and Business Unit specific environment plans are incentivised and may include reductions in internal carbon footprint, carbon intensity and total carbon emissions.
Other: Employees within Centrica's UK Home Industry Development team (formerly British Gas Energy Efficiency (BGEE))	Monetary reward	Efficiency project	Incentives are provided to ensure we meet our Energy Company Obligation (ECO) targets for improving domestic energy efficiency, and to ensure we do so in the most cost-effective way possible.
Other: Power Generation and Exploration and Production (E&P) - operation teams	Monetary reward	Efficiency target	Power generation and Exploration and Production (E&P) incentive targets are a combination of business profit and individual performance measures. Individual performance targets are determined by employee role and may include combined-cycle gas turbine (CCGT) efficiency, compliance with EU Emissions Trading System (EU ETS) and management of greenhouse gas emissions from E&P operations.
Facility Managers	Monetary Reward	Emissions reduction target	Facility Managers are incentivised under their KPIs to achieve carbon targets through gain share incentives, whereby the individual can share the cost benefits.
Other: Employees nominated by colleagues	Monetary reward	Other: Environmental recognition	Employees in Direct Energy can nominate colleagues who exemplify core company values, including those championing the environment. Individuals or teams selected as winners receive recognition alongside a prize of US\$2,500 (£1,866).

CC2. Strategy

Risk Management Approach:

CC2.1: Please select the option that best describes your risk management procedures with regard to climate change risks and opportunities

Integrated into multi-disciplinary company-wide risk management processes.

CC2.1a: Please provide further details on your risk management procedures with regard to climate change risks and opportunities

Frequency of monitoring	To whom are results reported?	Geographical areas considered [max 500 characters]	How far into the future are risks considered?	Comment [max 1000 characters]
Six-monthly or more frequently	Board or individual/sub-set of the Board or committee appointed by the Board	UK, Republic of Ireland, Netherlands, Norway, Canada, United States of America, Denmark, France, Germany, Hungary, India, Israel, Italy, Romania, Singapore, Sweden.	>6 years	<p>The Board is responsible for determining the nature and extent of the principal risks it is willing to accept, including those relating to climate change. The Board and its Committees set objectives, performance targets and policies to attain a balanced and transparent approach to the management of these risks and opportunities, supported by a robust system of internal control. This is underpinned by a clear delegation of authority and effective policies and standards that span our core operations.</p> <p>Our Group-wide Enterprise Risk process looks over a period of up to 3 years, although longer term external trends are monitored and reviewed.</p> <p>In addition to our Group Enterprise Risk process, the Board also explored climate change related risks and opportunities out to 2020 as part of our strategic review during 2015.</p> <p>We also assess climate change risks through our forecasting of carbon prices through to 2030, which is approved by the Centrica Executive Committee (CEC) every 6 months.</p>

CC2.1b: Please describe how your risk and opportunity identification processes are applied at both company and asset level [maximum 2000 characters]

Identifying our principal risks and developing strategies to mitigate them is essential to delivering our strategy. Climate change is a categorised risk area, managed through our enterprise risk management processes. Each identified risk from asset to company level, together with related controls, is consistently assessed and reported according to the Group Enterprise Risk Management Policy, Standards and Guidelines. Risks that threaten the business undergo robust assessment and form the basis of our annual viability statement.

At an asset level, Business Units (BUs) and Group Functions are confronted with risks and opportunities (R&O) that could impact the Group's assets, liabilities, financial position and reputation; these are identified, assessed and subject to quarterly reporting, monitoring and challenge.

At a company level, the Safety, Health, Environment, Security and Ethics Committee (SHESEC) is authorised by the Board to review the effectiveness of identifying and managing environmental R&O that could materially affect performance and reputation. The Health, Safety, Environment and Security (HSES) Committee, a sub-committee of the CEC, sets objectives, targets and policies for managing R&O in relation to these areas, which are monitored, discussed and agreed quarterly by the SHESEC. The SHESEC Chairman provides a report to the Board following each meeting.

The BUs develop plans to execute strategies while maximising opportunities and modelling commercial returns. As part of this process, the CEC review the strategy against key R&O in the external environment, market landscapes, operating strategies and plans as well as any investment or future regulation. We also hold an annual Board Planning Conference during which the external environment and strategic plans are examined alongside other issues. R&O presented by climate change are considered in the course of these processes.

CC2.1c: How do you prioritize the risks and opportunities identified? [maximum 2000 characters]

At least quarterly, BUs and Group Functions review the internal and external environment for new and emerging risks or changes to existing risks, that could impact the delivery of our strategy. Risks are reported to the relevant BU or function's Risk, Assurance and Control Committee (RACC) to evaluate, challenge and advise on material risks, whether we are within risk appetite and consider the adequacy of mitigating controls and assurance.

Risks are prioritised by assessing potential financial and non-financial impacts alongside the likelihood of materialisation. A 1-6 impact and 1-8 likelihood scale is used with the overall rating (1-48) the product of impact by likelihood. Financial impacts are relative to operating cash flow targets. Further statistical modelling, scenario planning and commercial analyses are carried out where applicable.

The most material risks, including High Impact/Low Likelihood risks, are reported to the Group Risk, Assurance and Control Committee (GRACC), to ensure a clear understanding of our risk profile, in the context of our risk appetite, and the effectiveness of controls, which are informed by related assurance activity. The GRACC is chaired by the Group Chief Executive, with membership comprising of the CEC.

Following the GRACC, the Audit Committee, a sub-committee of the Board, receives the updated paper which includes a CEC-approved assessment of our principal risks and the adequacy of associated controls. These reports, supplemented by management discussions, enable the Audit Committee to monitor performance and ensure remedial action is taken if significant failings or weaknesses are identified, or we are operating outside our risk appetite.

Ultimately, the Board, SHESEC and CEC are responsible for identifying and prioritising R&O. Meetings occur throughout the year to continually evaluate the Group strategy in relation to the external economic, competitive, regulatory and policy context, including climate change R&O.

Business Strategy:

CC2.2: Is climate change integrated into your business strategy?

Yes

CC2.2a: Please describe the process of how climate change is integrated into your business strategy and any outcomes of this process [maximum 7000 characters]

i Business strategy influence - The Board and the CEC have dedicated meetings to agree and review strategy. Changes to the external environment including economic, competitive, regulatory and policy factors, are assessed. Changes in climate policy are routinely reviewed alongside regulatory and operational information to help understand the R&O associated with low carbon markets.

ii Examples & vii business decisions – We explored climate change related R&O in our 2015 strategic review. Having determined that our focus should be on satisfying the changing needs of our customers, we expect to invest £1.2bn in our Connected Home and DE&P businesses during 2015-20, acquiring Energy-G Cogen and Neas Energy in 2016 to increase our ability to provide energy management services that can lower carbon emissions and reduce bills. Our commitment to construct a 49MW battery storage facility will also facilitate greater renewable generation.

iii Climate change influence on strategy - Our climate change strategy must balance the need for secure and competitive energy supply while transitioning to a lower carbon future. Legislative R&O such as national and international emissions reduction and renewable targets, significantly influence our strategy. For example, UK Government commitments inform our UK power generation strategy and our target to reduce carbon intensity to 200gCO₂/KWh by 2020. Moreover, the UK's mandated smart meter roll-out, give customers actionable insights into their energy usage while presenting new opportunities to provide propositions that help customers further reduce consumption. Climate change and regulatory policies underpin our strategy and were factors in determining DE&P and Connected Home as growth areas.

iv Short term strategy - We are building on our strengths as a customer-facing business by delivering products that enable customers to use energy more efficiently through Connected Home and distributed generation technology. This capitalises on opportunities arising from Government policies such as the smart meter roll-out. in the UK and North America, as well as meeting demand from customers for products that allow greater control over energy.

v Long term strategy - Following our strategic review, we decided that we should focus on satisfying the changing needs of our customers, including changes driven by climate change. This informs the role we can play on climate change; providing customers with the products and services that enable greater choice, control and reduction over their energy use.

vi Strategic advantage –

Low carbon and energy efficient products – Expanding our market-leading position in Connected Home products enables us to differentiate our range of services beyond the supply of gas and electricity. We have sold over 527,000 Connected Hubs in the UK and North America, helping customers better manage their energy to save time, money and carbon. This builds on our leadership position in the UK's mandated smart meter roll-out, having installed 3.9m since 2009. This means we can offer more customers the opportunity to reduce their energy use through greater insights into consumption, while providing us with a greater platform to offer smart-enabled products.. Our team of 12,000 engineers and technicians give us a strategic advantage by installing Connected Home and energy efficient products. In the UK, we calculate this has helped our customers save 27mtCO₂e since 2008, supporting fulfilment of mandated carbon reduction targets.

DE&P – DE&P has significant growth potential and can help reduce climate impacts by revolutionising the traditional way energy is generated and consumed. We give large-scale energy users the ability to take control of their energy and reduce, generate and manage it themselves by bringing together flexible and local generation, energy storage, renewables, energy efficiency measures and smart building management systems. which help reduce costs and emissions. We also operate a small gas fired generation portfolio and are investing £180m in four flexible power facilities that will provide the grid flexibility required to increase renewable generation.

Low carbon generation fleet – Nuclear and gas are essential components of decarbonising our energy mix. We have consistently had one of the lowest carbon intensities among major UK energy generators, which in 2016 was 137gCO₂/KWh. Nuclear provides a stable low carbon baseload and our 20% stake in EDF's eight nuclear plants, helped avoid nearly 4.5mtCO₂e based on our equity share. In 2015, we concluded that owning and operating wind farms no longer fitted our strategy and we have exited wind generation. We continue to be an enabler of other operators' wind projects through a limited number of Power Purchase Agreements and provide route to market services for around 8.6GW of distributed assets via Neas Energy. Nuclear and wind constituted 67% of all power we sold in the UK during 2016 and we had the lowest carbon intensity of power sold among major UK suppliers and 53% lower than the UK average.

E&P – Gas remains an important part of our strategy. It is one of the most affordable energy sources, is the lowest carbon fossil fuel and backs up intermittent renewable energy. In North America, gas also reduces emissions by displacing coal. We are reducing the scale of our E&P business, with a growing share of our energy secured on the global market.

viii Paris agreement – The deal reached at COP 21 was a turning point in the response to climate change which Centrica firmly supports. We believe the bottom-up set of commitments and the ratcheting mechanism together with technological advancement, will drive forward the energy transition. We believe Carbon Budgets also help achieve long-term emissions targets and are key for governments to develop energy policy. The greatest contribution we can make to the agreement is to empower our customers to reduce their emissions which is why we are improving customer energy efficiency and giving them greater control over their energy.

ix Scenario analyses – We use long-term macro-trends across scenarios in our strategic planning. Some variables are influenced by climate change, such as commodity prices or the cost of carbon. Following the FSB report from the Task Force on Climate-related Financial Disclosures, we have reviewed the recommendations and are assessing how we might augment our strategic review process and use forward-looking scenario analyses to enhance long-term planning on climate change, including 2°C scenarios. We have also commenced testing our existing carbon targets against a 2°C scenario to assess the feasibility of having them validated as science based targets.

CC2.2c: Does your company use an internal price on carbon?

Yes

CC2.2d: Please provide details and examples of how your company uses an internal price on carbon [maximum 5000 characters]

Our power generation operations in the UK and Republic of Ireland together with some of our oil and gas assets in the North Sea and Netherlands, are currently subject to the EU Emission Trading System (EU ETS) carbon price and/or the UK carbon price floor, which are set at an EU and UK level respectively. In 2016, the combined impact of EU ETS carbon price and UK carbon price floor was around £22/tCO₂e. The costs mostly apply to our scope 1 emissions from gas fired power generation and are reflected in the traded price of electricity.

We produce internal forecasts of both the EU ETS carbon price and the UK carbon price floor at least to 2030. These projected carbon prices are used for near-term forecasts of business performance as well as longer-term forecasts, which are factored into new capital investment decisions for which these carbon prices apply.

We support the use of carbon prices as a mechanism for incentivising decarbonisation. This is because we believe that if carbon pricing mechanisms continue over the long term, it will impact attractiveness of investment opportunities by providing financial incentives to grow lower carbon generation. For example, following a previously volatile EU ETS carbon price, we forecast an upward trajectory in carbon prices in the future which will impact the viability of high carbon power investments such as coal versus lower carbon power investments in gas, nuclear and renewable energy.

CC2.3: Do you engage in activities that could either directly or indirectly influence public policy on climate change through any of the following? (tick all that apply)

- Direct engagement with policy makers
- Trade associations
- Funding research organizations
- Other

CC2.3a: On what issues have you been engaging directly with policy makers?

Focus of legislation	Corporate position	Details of engagement [max 2400 characters]	Proposed legislative solution [max 2400 characters]
Other: Renewable Heat Incentive (RHI)	Support	<p>Renewable Heat Incentive (RHI)</p> <p>In the context of Brexit and based on UK specific sector decarbonisation requirements under the fifth carbon budget, we believe the design and function of the RHI scheme needs to be revisited for domestic households to support a step change in heat decarbonisation.</p> <p>We have worked with a third party economist organisation (Vivid Economics) and leveraged our own internal research to identify shortcomings associated with the RHI, notably long pay-back periods for customers and a limited range of qualifying technologies.</p> <p>Our work has focused on the role a re-purposed RHI could play in tackling the early stages of heat decarbonisation. We have begun engaging Government bodies and other stakeholders on changes which could be made to the scheme.</p>	<p>We consider that the Government could introduce changes to the RHI through a consultation to support scheme changes at the end of the current spending review period (2020-21). Legislation would then need to be introduced to reframe the new scheme design.</p> <p>Changes to the RHI scheme could include:</p> <p>a) A re-design of assignment of rights to allow third parties to provide domestic customers with up front subsidy for technologies and active consideration of transitioning from a Feed-in-Tariff (FIT) model to a capital grant model, which will both improve scheme cost effectiveness and demand.</p> <p>b) Some form of ring-fencing of RHI funding to ensure the domestic sector secures a higher overall proportion of funding, given the progress that needs to be made here.</p> <p>c) Bringing low carbon technologies, such as Gas Absorption Heat Pumps (GAHP), hybrids, and CHP into scope, as is the case in other countries such as Germany.</p> <p>d) Exploring opportunities for better blending of funding between RHI and ECO III.</p>
Energy efficiency	Support	<p>Energy efficiency in homes and businesses</p> <p>Energy Company Obligation (ECO)</p> <p>We support the delivery of energy efficiency measures across the UK and believe programmes like ECO, can play a significant role in meeting carbon reduction targets, tackling fuel poverty and increasing energy security.</p> <p>Ahead of the conclusion of the second phase of ECO in 2017, we engaged extensively with the Department of Business, Energy and Industrial Strategy (BEIS), other Government</p>	<p>ECO</p> <p>The design for future energy efficiency obligations should ensure targets are achievable, based on an accurate assessment of remaining housing stock, the cost of identifying eligible households are viable and proper consideration given to consumer demand. Central to this, is our belief that the Government should be realistic about the extent to which the obligation can focus on the fuel poor and the necessity of a new way to identify these households up-front. Improved data sharing and proxies are therefore essential. In the long term, we also propose that obligation costs be moved into general taxation from bills, which is a less regressive model.</p>

		<p>departments, trade bodies and other interested organisations on the future of the obligation.</p> <p>Our engagement focused on ensuring ECO has deliverable targets for suppliers, is affordable for consumers and that sufficient time is provided to suppliers for implementing the scheme. This will reduce the risk of destabilising the energy efficiency supply chain which could drive up costs.</p> <p>As part of this engagement, in 2016 we submitted an extensive response to the Government's consultation on extending ECO.</p> <p>Digital Economy Bill We also engaged with officials in the Department of Culture, Media and Sport (DCMS), Cabinet Office and BEIS on the Digital Economy Bill (now Act) – working to secure the inclusion of new data sharing provisions to help energy suppliers better target fuel poor households for energy efficiency and financial support.</p> <p>As part of this engagement, we submitted a response to the Cabinet Office's consultation on the 'Better Use of Data', highlighting the potential benefits to consumers of greater data sharing.</p> <p>Businesses While energy efficiency in homes has steadily improved since the mid-1990s, the energy efficiency of the non-domestic stock has improved little in recent years.</p> <p>We therefore support the Government's 2016 announcement that it would bring forward a new industrial strategy. We continued our programme of engagement with BEIS officials and trade bodies, aiming to ensure that energy measures for businesses were included in the subsequent Government green paper on the topic.</p>	<p>Businesses To drive energy efficiency uptake with businesses, a range of approaches must be considered which reflects the different energy demands, fuel types and use - from public sector and manufacturing to offices and community centres. For example, larger commercial and industrial businesses tend to already invest in energy efficiency but could benefit from changes to the Enhanced Capital Allowance, which would enhance attractiveness of measures while supporting development of distributed energy systems that can potentially generate substantial carbon and cost savings.</p>
Other: Smart meters	Support	<p>UK Centrica is a strong, long-standing advocate of the smart meter roll-out which is a Government mandated programme. We have installed 3.9m smart meters in homes and businesses since 2009 and have seen first-hand the positive impact they have on helping people understand and control their energy usage. We will ensure that where it is technically possible, we will be able to install smart meters in the home of every</p>	<p>UK We continue to work with both Government and industry to guarantee that as many of our customers as possible, are able to benefit from smart meters. Given the importance of customer acceptance of the smart meter roll-out, we need visible leadership from the Government on the benefits of smart meters.</p>

		<p>customer that wants them by 2020. Currently we are installing smart meters in homes at a rate of one every 30 seconds.</p> <p>To support an effective roll-out, we have shared learnings through industry working groups, consultations and regular meetings with Government and other stakeholders. These include how to engage customers, handling of consumer data and achieving maximum consumer benefits including benefits for vulnerable customers.</p> <p>We also jointly lead the ‘energywise’ project with UK Power Networks, which is a three-year smart grid trial in Tower Hamlets. The Trial aims to facilitate learning from smart meters and how they can better support vulnerable customers. The trial explores how smart meters and decentralised energy can make demand and supply more flexible and is the first smart grid project to focus on the impact of pre-payment smart meters which are often used by vulnerable customers, as well as customers living in flats.</p> <p>North America Direct Energy continued to share learning and customer insights from our innovative, smart-enabled products through major industry conferences as well as at meetings with regulators and legislators across different states and legislative bodies in 2016.</p> <p>This has enabled us to highlight the positive impacts of load-shifting to off-peak periods and show how increased energy awareness helps customers reduce consumption. In Texas, we engaged regulators and other key stakeholders to encourage regulated utilities who own the smart meters to provide increased regularity and completeness of smart meter data to retail energy providers (REPs) so that we can maximise our smart offerings. Direct Energy is also working with policy makers in many jurisdictions to address key regulatory barriers such as smart meter deployment, data quality, access to smart meter data, the billing relationship and privacy concerns around customer data.</p>	<p>The UK Government should also help facilitate innovation to maximise the customer benefits of Smart. For example, the current opt-in regime for half-hourly metering results in only around half of customers having access to the full benefits of smart meters. We would like to be able to experiment with new innovations such as virtual in-home displays in a more nimble way than the current Ofgem derogation process.</p> <p>We are supportive of the proposed smart meter architecture. We are working with other industry participants through Smart Energy GB, an independent organisation designed to champion and communicate the switch to smart meters with the public. The Government-appointed, Data Communications Company (DCC), are making good progress towards system completion. We are an early and active participant in testing.</p> <p>The UK Government should be pragmatic around the ‘cutover’ between SMETS1 and SMETS2 smart meters, in order to create the best customer outcomes and keep the costs of the programme down. Prior to DCC ‘Go-Live’, we will continue to install the current industry specified smart meters that will subsequently be migrated onto DCC systems, ensuring the continued delivery of smart meter benefits to millions of customers. We also believe there is consumer benefit in receiving appropriate energy efficiency advice with smart meters. Our smart meter engineers are therefore trained to provide relevant advice to customers during installation.</p> <p>North America We believe it is critical that smart meter data be timely, accurate and consistent. This will enable REPs to offer innovative products using 15-minute interval usage data that will empower the introduction of energy saving products and applications for customers. In addition, Direct Energy encourages utilities to increase service levels as smart meter deployment completes, to ensure optimal availability and quality of associated data.</p> <p>Direct Energy is also supportive of legislation which balances the protection of privacy interests with provision of innovative new energy products and applications.</p>
Carbon tax	Support	<p>Carbon Price Floor Centrica is a major investor in gas fired generation and nuclear. We have 5 power stations, 4 new rapid response gas fired</p>	<p>Government has announced that longer term clarity over the CPF will be provided in the 2017 Budget. We would welcome further clarity on the near-term trajectory.</p>

		<p>projects in the pipeline and have a 20% equity stake in the UK's existing 8 nuclear power plants.</p> <p>We believe the Carbon Price Floor (CPF) has an important role to play in delivering cost effective decarbonisation. Since its introduction in 2013 the CPF, alongside other environmental policy, has had a material impact in reducing UK carbon emissions. It is estimated that UK carbon emissions have fallen by around 13.5% over this period, and there has been a significant switch from coal to gas fired generation.</p> <p>Investors in generation, such as Centrica, rely on certainty in the investment framework to commit expenditure long term. The CPF is one important part of wider mechanisms which determine investment in generation. The announcement of a reformed capacity market and clarity over the transition from coal to gas and nuclear are also components which build investor confidence.</p> <p>We welcomed confirmation in the 2016 Autumn Statement that the CPF would remain frozen at £18/tonne (plus inflation) to 2020-22. Industry now needs some forward clarity regarding the longer term CPF trajectory post 2020-22.</p>	
Carbon tax	Support	<p>EU Emissions Trading Scheme</p> <p>In light of the benefits of international carbon markets for cost-efficient emission reductions, we support the continued participation of the UK in the EU ETS following Brexit.</p> <p>We believe a proper European approach reduces costs, making decarbonisation both cheaper and faster. A robust EU ETS that delivers a level-playing field could reduce the need for a separate Carbon Price Floor in the UK over the longer term.</p> <p>We have therefore actively supported within the EU and with other stakeholders, proposals which will lead to the strengthening of the EU ETS including:</p> <ol style="list-style-type: none"> a) Doubling the annual rate of allowances (to 24%) taken out of the market and placed in the Market Stability Reserve (MSR). b) Introducing a process whereby future imbalances caused by policy decisions can be corrected, such as if energy efficiency targets reduced demand. 	As part of Brexit, government will need to determine what arrangements are necessary under the Great Repeal Bill process to preserve participation in the current phase, phase III of the EU ETS, and what separate legislation/ arrangements will be necessary to preserve membership post phase III.

		Going forward, there might be ways to link a new UK ETS to the EU ETS but we would need to examine the details of such mirrored or linked systems before supporting alternatives. At first sight, we believe it would be very complicated and in all likelihood the UK ETS would need to follow the same price trajectory as the system it is linked to.	
--	--	--	--

CC2.3b: Are you on the Board of any trade associations or provide funding beyond membership?

Yes

CC2.3c: Please enter the details of those trade associations that are likely to take a position on climate change legislation

Trade association	Is your position on climate change consistent with theirs?	Please explain the trade association's position [max 2400 characters]	How have you, or are you attempting to, influence the position? [max 2400 characters]
Energy UK	Consistent	<p>Energy UK is the trade association for the energy industry. It represents over 80 members made up of generators, gas and electricity suppliers as well as other businesses operating in the energy industry.</p> <p>Energy UK and its members are committed to driving the sustainability agenda by reducing the sector's environmental impact. This is reflected in Energy UK's vision for the UK to have, 'a more decarbonised energy supply and one that is secure, diverse and affordable with greater local heat and power'.</p> <p>The association has a range of initiatives underway to make these ambitions a reality, which will ensure the industry makes a positive contribution to society, economy and the environment.</p>	<p>Centrica is represented on Energy UK's Board and chairs the Heat Decarbonisation, New Energy and Services and Flexibility working groups. We are also active members of working groups that for example, focus on power generation and environmental policy.</p> <p>While views held within Energy UK on climate change related issues are predominantly consistent with our own, there are occasional divergences between members, such as over the smart meter roll-out.</p> <p>As leaders in the UK's mandatory smart meter deployment and a firm believer in the value they can create in giving customers greater control and understanding over their energy consumption and costs, we aim to influence and increase awareness of smart meter benefits with members throughout the association.</p>
Heating and Hot Water Industry Council (HHIC)	Consistent	<p>The Heating and Hot Water Industry Council (HHIC) is committed to driving, supporting and promoting the sustained growth of the UK's residential heating and hot water industry. The HHIC informs and advises on these issues to tackle challenges and influence Government on how best to meet the 2020 and 2050 carbon targets.</p>	<p>We are a proactive member of HHIC, participating in the Low Carbon Technology, Micro CHP, Hybrid and Boiler technical and policy working groups that help inform and shape Council positions.</p> <p>Through participation on these working groups, we can also contribute to industry responses, standards and</p>

		Membership is made up of heating manufacturers together with new renewable entrants to the market.	consultations from Government and regulators while developing initiatives that support the introduction of innovative renewable and low carbon heating technologies in the UK.
Energy Manager Association (EMA)	Consistent	<p>The Energy Managers Association (EMA) was established to bring cohesion to the energy management profession in order to help the UK meet its energy obligations, which include those relating to carbon reduction.</p> <p>To accomplish this, the EMA aims to establish a best practice approach to energy management that will improve the standing of the profession and drive it into the heart of British businesses.</p> <p>The EMA works closely with energy managers across the UK to influence future policy development so that it functions at optimal levels for practitioners. Engagement largely focuses on Government departments such as BEIS and the Department for Environment, Food and Rural Affairs (DEFRA).</p>	<p>Centrica is represented on various advisory boards within the EMA and provides input on carbon reporting, training standards, behavior change and industry standards.</p> <p>We have used our involvement in the Association to influence and increase awareness of best practice Energy Performance Contract policy development.</p>
Association for Decentralised Energy (ADE)	Consistent	<p>The Association for Decentralised Energy (ADE) is an advocate of an integrated approach to delivering energy locally, designed around the needs of the user.</p> <p>As an industry leader, the ADE brings together interested parties from across the sector to develop a sustainable environment for combined heat and power, district heating and cooling technologies as well as demand-side energy services.</p> <p>Being an advocate for the proliferation of decentralised energy generation, our views are consistent with those of the ADE.</p>	<p>We are a member of ADE and represented on the board. We work with them to promote decentralised energy, including Combined Heat and Power (CHP) and demand side response, and create the policy environment to encourage growth in the sector.</p>
Oil and Gas UK (OGUK)	Consistent	<p>Oil & Gas UK (OGUK) aims to strengthen the long-term health of the UK offshore oil and gas industry by working closely with stakeholders across the sector on issues ranging from safety and skills to innovation and environmental impact.</p> <p>We agree with OGUK that sourcing and generating energy is an industrial process that inevitably has an environmental impact but we believe this impact can be justified when we look at the benefits energy brings to society. We collectively agree that it is essential however that energy companies collaborate with Government and wider stakeholders alongside employing effective management practices, that ensures adverse environmental impacts are mitigated as much as possible. We strive to be in a position where stakeholders agree these impacts are acceptable.</p>	<p>Centrica is well represented across a broad spectrum of OGUK workgroups and forums. Most notably, we hold a seat on the influential Oil and Gas Operator Council and are members of the OGUK Board, which sets the association's position on policy. We are also represented across the full range of Environmental, Health and Safety work streams to drive and share improvements across the industry.</p> <p>Through these engagements, we ensure that OGUK's aims and actions align as closely as possible with Centrica's own responsible approach to safeguarding the environment.</p>

		Our views are consistent with those held by OGUK. This is demonstrated by our commitment to operate to the highest operating standards wherever we work in the world, ensuring we maximise the positive contribution our presence can make in society while reducing negative impacts.	
Confederation of British Industry (CBI)	Consistent	The Confederation of British Industry (CBI) represents large sections of British business. It recognises climate change is a real threat and is committed to identifying cost effective policies to tackle the risks. The CBI also helps identify and support the prospects for growth and wealth creation through the development of the low carbon economy.	We are a full member of the CBI and sit on the CBI's Energy and Climate Change working groups and board. We share industry insight and data where appropriate to help inform CBI policy positioning on key issues such as carbon pricing and UK carbon budgets. We played an instrumental role in helping develop the CBI's 2030 Vision which was published in February 2017 and focused on the policy choices relating to UK decarbonisation.

CC2.3d: Do you publically disclose a list of all the research organizations that you fund?

No

CC2.3e: Please provide details of the other engagement activities that you undertake [maximum 5000 characters]

We believe that regular and meaningful stakeholder engagement is important because it enables us to better understand and manage issues most important to our stakeholders and our business. By involving stakeholders, we can demonstrate our accountability, increase our understanding of their views, identify opportunities as well as manage risks and impacts more effectively. Our engagement is mainly as an individual company rather than as a group of companies. Stakeholder interactions are conducted through a variety of methods from one-to-one meetings to formal committees and workshops, spanning a range of issues which includes safeguarding the environment.

Government -Throughout the year, we engaged Government through direct meetings and consultation responses on evolving energy policy to help it become more cost-effective, while strengthening energy security and enabling a lower carbon future. This included discussions with the UK Government on a range of issues such as the content of the recent Energy Bill which has since been passed into law, the smart meter roll-out and the future of energy efficiency schemes.

Customers - We also engaged various stakeholders and seek feedback from a variety of consumers on expanding the range of innovative products and services we provide, giving them greater understanding and control over their energy. For example, we make considerable investment in ongoing understanding of customer needs and their relationship with us. We ensure that all significant initiatives, such as new proposition launches, are underpinned by a robust research and analytics process so that they are fit for purpose and meet customer requirements. We continue to review how we do this and make improvements to ensure we remain customer-centric.

NGOs - In 2016, we held meetings with many of the main environmental NGOs in the UK and North America, in order to better understand their concerns on issues such as climate change and to explore areas where we have common goals and opportunities for collaboration. These meetings form a valuable part of our wider stakeholder engagement programme and inform our thinking on meeting the challenge of climate change. In December 2016, Centrica was approached by Greenpeace regarding donations we have made to the Texas Public Policy Foundation (TPPF) which Greenpeace described as a 'climate denial think tank'. We believe in the need to take material action to reduce the effect of fossil fuels on climate change, that the science around climate change is clear and there is an urgent need for action to shift the energy mix towards a lower carbon future. TPPF is a non-profit research organisation with which we share a number of common positions which include the benefits of a well-structured retail electricity market for consumers. As a research organisation, TPPF cannot by law lobby any government institution and Centrica is clear that we do not make donations to political parties or organisations, nor do we make contributions to any organisation to advocate on a specific position on the environment.

Communities - The communities in which we operate are important to us so we engage community stakeholders to ensure we make a positive and lasting impact. In our E&P and DE&P businesses, project managers and issue specialists engage key stakeholders to ensure each project fully assesses, understands and has plans in place to manage potential impacts which form an essential part of the approval process throughout a project's lifecycle. These engagements include collaboration with environmental NGOs and local interest groups on a range of issues spanning the decommissioning of power stations to the growth of distributed energy and the potential positive impact this could have in keeping carbon emissions and energy costs as low as possible.

We also engage social enterprises through Ignite, the UK's first corporate impact investment fund focused on energy and backed by Centrica. By the end of 2016, we had committed £8m to projects that include growing the green skills of young people not in education employment or training (NEETs) as well as generating renewable solar energy for low income communities which together with our other investments, have benefitted 41,700 people since 2013. Additionally, our £1.2m Community Action Partnership with National Energy Action works alongside local authorities to create individual action plans that equip communities with the tools to use energy more efficiently. Through the partnership, we have reached over 100,000 people including over 9,400 during 2016. We are furthermore helping the next generation understand the importance of using energy more sustainably through our flagship school education programme, Generation Green. Generation Green has helped 14,800 schools benefit from free classroom resources as well as energy efficiency and low carbon technologies that have saved 13,860tCO_{2e} since 2010.

CC2.3f: What processes do you have in place to ensure that all of your direct and indirect activities that influence policy are consistent with your overall climate change strategy [maximum 5000 characters]

To better manage risks and opportunities related to climate change, Centrica actively contributes to the development of public policy by engaging key stakeholders which include government and regulators in the UK, Republic of Ireland, EU, US, Canada and Norway. We ensure our engagements on policy across the business are consistent with our overall approach to climate change and Group strategy by having dedicated policy groups that develop detailed policy positions which are fed into the CEC for review and approval. The CEC therefore has ultimate ownership and sets the company's position on public policy for key issues like climate change.

Regarding the TPPF engagement referenced in CC2.3e, Centrica does not agree with the organisation's views on climate change and have clearly communicated our own views on this issue over a number of years. However, we believe it is better to engage widely on debates around public policy, and our involvement with TPPF gives an opportunity for us to make our views on climate change heard within that organisation. We also engage closely with organisations that are strong promoters of policies that combat climate change, including the Washington-based Advanced Energy Economy.

In 2016 for example, the Energy Efficiency Steering Group met monthly and agreed a comprehensive position on the energy efficiency obligations placed on energy suppliers, while our European Policy Group, which met quarterly, worked to develop positions on issues such as power market design, financial services legislation and data protection. Our Vulnerable Customers Steering Group meets bi-monthly and also discussed routes through which vulnerable customers could access energy efficiency products. The work of these policy groups and any new approaches to public policy were then shared with the CEC.

CC3. Targets & Initiatives

CC3.1: Did you have an emissions reduction or renewable energy consumption or production target that was active (ongoing or reached completion) in the reporting year?

- Absolute target
- Intensity target

CC3.1a: Please provide details of your absolute target

ID	Scope	% of emissions in scope	% reduction from base year	Base year	Base year emissions covered by target (metric tonnes CO ₂ e)	Target year	Is this a science-based target?	Comment [max 2400 characters]
Abs1	Other: Scope 1+2 (location-based) + 3 (business travel)	86	25	2015	60146	2025	Yes, but this target has not been approved as science-based by the Science Based Targets initiative	<p>The target encompasses the internal carbon footprint of British Gas and spans our core property, fleet and travel.</p> <p>To achieve this target, we need to reduce our carbon emissions by an average of 2.5% each year which we consider is appropriate for British Gas' sector. The target was developed as science-based and while we recognise this target does not meet all of the science-based target criteria currently used by CDP, we will continue to engage with the organisation and the Science Based Target Initiative (SBTI), with the aim of standardising this developing area.</p> <p>The majority of our carbon savings will come from reducing our property scope 1 and 2 emissions, delivered through energy efficiency measures, solar, distributed generation and LED installations. We will also target a reduction in scope 1 van emissions alongside savings from rolling-out high efficiency and electric/hybrid company cars.</p>
Abs 2	Other: Scope 1+2 (location-based) + 3 (business travel)	2	20	2015	100145	2025	No, but we are reporting another target which is science-based	<p>The target encompasses the internal carbon footprint of Centrica's core property, fleet and travel globally. It does not cover emissions from Centrica's power generation or oil and gas production, the reporting and management of which are treated separately.</p> <p>The target concentrates on areas where most employees have the greatest ability to influence a decline in emissions. This enables us to drive engagement on carbon reduction and benchmark operational performance against other businesses with similar impacts.</p> <p>Although the percentage of emissions from our internal carbon footprint is immaterial compared to our total footprint, and is therefore not consistent with science-based targets, the management of these impacts are important. This is because the target empowers us to innovate and trial new technologies that aid our ability to provide market-leading products and services for</p>

									<p>customers, while engaging employees on understanding and mitigating environmental impact.</p> <p>The majority of the target's carbon savings will come from reducing our property scope 1 and 2 emissions, delivered through energy efficiency measures, solar, distributed generation and LED installations. We will also target a reduction in scope 1 emissions from our vans and company cars via more efficient or electric/hybrid models.</p>
--	--	--	--	--	--	--	--	--	--

CC3.1b: Please provide details of your intensity target

ID	Scope	% of emissions in scope	% reduction from base year	Metric	Base year	Normalized base year emissions covered by target	Is this a science-based target?	Target year	Comment
Int1	Scope 1	88	54	Metric Tonnes CO2e per megawatt hour (MWh)	2008	0.433	Yes, but this target has not been approved as science-based by the Science Based Targets initiative	2020	<p>We have set a Group equity-based target to reduce the carbon intensity of our centralised power generation by 54% to 0.2tCO2/MWh by 2020.</p> <p>The target has been internally assessed as science-based, using the Sectoral Decarbonisation Approach (SDA) employed by CDP/WRI.</p> <p>The SDA Pathway for Power Generation requires our carbon intensity to fall to 0.24 by 2020, which means that our target will go beyond the required reduction. It does not, however, meet all of the science-based target criteria currently used by CDP. We will therefore continue to review our targets and engage CDP and the SBTi with the aim of encouraging standardisation in this developing area.</p>

CC3.1c: Please also indicate what change in absolute emissions this intensity target reflects

ID	Direction of change anticipated in absolute Scope 1+2 emissions at target completion?	% change anticipated in absolute Scope 1+2 emissions	Direction of change anticipated in absolute Scope 3 emissions at target completion?	% change anticipated in absolute Scope 3 emissions	Comment [max 2400 characters]
Int1	Decrease	54	No change	0	If output was to remain at the same level as 2008 and carbon intensity achieves 0.2tCO ₂ /MWh in 2020, there would be a 54% decrease in our scope 1 emissions. Our generation output is, however, unlikely to be the same in 2020 as in 2008 due to the evolution of our Central Power Generation portfolio and the highly uncertain nature of the power market. Consequently, it is not possible to predict the change in our carbon intensity to an accurate degree.

CC3.1e: For all of your targets, please provide details on the progress made in the reporting year

ID	% complete (time)	% complete (emissions or renewable energy)	Comment [max 2400 characters]
Abs1	10	44	In 2016, we reduced the core internal carbon footprint of British Gas by 11% compared to our 2015 base year. Reductions were achieved across all component areas, most notably in property and commercial fleet.
Abs2	10	40	We cut Centrica's core internal carbon footprint by 8% in 2016 from our 2015 base year. This was predominantly accomplished through a reduction in property and commercial fleet emissions.
Int1	66	100	While we exceeded our equity-based carbon intensity target for Central Power Generation by 30% in 2016, we still anticipate a trajectory towards our 0.2tCO ₂ /MWh target by 2020. This is because over recent years, the power generation market has been atypical and is not considered representative of future generation, with some of our power stations having been placed into temporary preservation. In 2016, we started to see a recovery in the market which triggered an increase in the proportion of gas fired power generation and led to a 17% rise in our carbon intensity compared to 2015.

CC3.2: Do you classify any of your existing goods and/or services as low carbon products or do they enable a third party to avoid GHG emissions?

Yes

CC3.2a: Please provide details of your products and/or services that you classify as low carbon products or that enable a third party to avoid GHG emissions?

Level of aggregation	Description of product/Group of products [max 2400 characters]	Are you reporting low carbon product/s or avoided emissions?	Taxonomy, project or methodology used to classify product/s as low carbon or to calculate avoided emissions	% revenue from low carbon product/s in the reporting year	% R&D in low carbon product/s in the reporting year	Comment [max 2400 characters]
Product	<p>Low carbon power generation</p> <p>The low carbon intensity of our renewable and nuclear power generation helps reduce customers' emissions from electricity emissions (customers' scope 2).</p> <p>In 2016, our power generation carbon intensity rose slightly to 137gCO₂/kWh, but remains on target for a 54% reduction compared to our base year of 433gCO₂/kWh (2008). Of the power we generated in 2016, nearly 65% was generated from renewables and nuclear sources.</p> <p>We also continue to purchase a substantial amount of renewable and lower carbon power. This enabled us to fulfil 67% of our customers' energy needs in the UK from non-fossil fuels in 2015-16, up from 54% the previous year.</p> <p>As a result, the carbon intensity of all power sold to our UK customers in 2015-16 was the cleanest among major UK suppliers at 137gCO₂/kWh, 53% lower than the UK average.</p>	Avoided emissions	Other: The generation and use of low carbon power offsets the use of other power sources and emissions avoided can be calculated using Department for Environment, Food and Rural Affairs (DEFRA) grid average carbon intensity data. Emissions associated with the generation of low carbon power are also accounted for.	-	-	When compared to the UK grid average, 5,584mtCO ₂ e was avoided through our renewable and low carbon power generation in 2016.
Group of Products	<p>Energy efficiency measures</p> <p>Three measures make up the biggest reductions in customer gas use (customers' scope 1 emissions): wall</p>	Avoided emissions	Other: Reduced data Standard Assessment Procedure (RdSAP) methodology, as set in ECO.	-	-	Measures we have installed for customers through ECO during 2013-16, will generate lifetime savings that exceed 20mtCO ₂ e* and have already saved customers an estimated £158m** on energy bills. Of this,

	<p>insulation, loft insulation and energy efficient boilers.</p> <p>We deliver boilers through our established central heating installation business and insulation through a number of delivery channels which include third-party contracts, the UK Government brokerage market and contracts with local authorities.</p> <p>These products alongside glazing, heat pumps and biomass boilers are a core deliverable for the UK Government's mandated Energy Company Obligation (ECO).</p>					<p>200,000tCO₂e* and an estimated £15.6m** in bill savings were delivered in 2016 from products installed that year.</p> <p>In 2016, the Government extended ECO to the end of September 2018 and will be consulting in late 2017 regarding the new phase of the scheme which will run to 2022.</p> <p>ECO savings have been calculated using industry approved software that converts lifetime carbon savings attributable to each measure to kg/CO₂ savings, which is used in banking with Ofgem.</p> <p>* Carbon savings include the following ECO components: Carbon Emission Reduction Obligation (CERO) and the Carbon Saving Community Obligation (CSCO). HHCRO is typically reported to Ofgem in lifetime heating bill savings only, but has been converted into lifetime annual carbon savings achieved to highlight the extent of the emissions saved through ECO.</p> <p>**Estimated bill savings incorporate HHCRO only.</p>
Product	<p>Solar</p> <p>We help customers reduce reliance on fossil fuels by investing in alternative renewable energy sources, such as solar energy (customers' scope 1 and 2) in the UK and North America.</p> <p>In the UK, we offered solar panels to commercial and industrial customers via our DE&P business, helping our large-scale energy users generate and manage their energy more intelligently. In 2016, these installations totalled 7.5MWp.</p>	Avoided emissions	<p>Other: UK: Internal calculation method using average irradiance of 900kWh/kWp and using BRE Standard Assessment Procedure (SAP 2012) CO₂ emissions factor for grid electricity of 0.519 kg/kWh.</p> <p>North America: Carbon savings calculated using average annual productivity per kWh and Environment Protection</p>	-	-	<p>The solar panels we installed in the UK during 2016, saved 2,856tCO₂e and created an estimated saving of £635,000 on energy bills.</p> <p>In North America, the solar panels we delivered in homes and businesses during 2016 saved 23,293tCO₂e and US\$5.2m (£4.0m) in estimated bill savings.</p>

	<p>Following on from Direct Energy's acquisition of residential solar capabilities in 2014, solar has been a key focus for reducing carbon emissions in North America. Despite challenging market conditions in 2016, we completed residential installations that generated 21.7MWp in 2015. Through our partnership with Solar City, we also delivered 11.4MWp of capacity for businesses in 2016.</p>		<p>Agency (EPA) emission factors.</p>			
Product	<p>Smart meters</p> <p>Smart meters can help customers reduce their carbon emissions because they give greater visibility over how much energy is being used and its costs in real-time, empowering customers to take control of their energy and cut consumption. For example, in a sample of our residential customers with smart meters in 2016/17, we found credit customers had reduced their dual fuel consumption by around 3.5% and saved £32 on average per annum across gas (customers' scope 1) and electricity (customers' scope 2).</p> <p>We are leaders in the UK's mandatory smart meter roll-out, having installed 3.9m in homes and businesses since 2009. This represents around 70% of all smart meters delivered in the UK.</p>	<p>Avoided emissions</p>	<p>Other: British Gas methodology approved by the Department for Business, Energy and Industrial Strategy (BEIS), formerly known as the Department of Energy and Climate Change</p>	-	-	<p>Our analysis of smart meter customer consumption uses a methodology approved by BEIS and is based on a sample of more than 100k smart meter customers, comparing consumption before and after smart meter installation with comparable standard meters.</p> <p>Based on the 3.5% consumption reduction, we calculate that the smart meters we installed during 2016 will save customers 87,172tCO₂e per annum.</p>

Group of Products	<p>Connected Home products</p> <p>Our global Connected Home products can reduce energy's impact on the environment by giving customers greater control over their entire home (customers' scope 1 and 2).</p> <p>We have installed over 527,000 Connected Home hubs, enabling customers to control Hive's family of products with just a few taps on the app – from smart thermostats, lights and plugs to smart window, door and motion sensors.</p> <p>We have sold over 360,000 Hive Active Heating smart thermostats, enabling a growing number of customers to manage their energy better by controlling their heating and hot water from wherever they are. For example, based on an analysis into gas usage for customers with Hive Active Heating, we have seen customers save around 2.12% on their energy.</p> <p>Meanwhile in North America, Direct Energy sold 275,000 smart thermostats, enabling customers to save around 11% on heating bills and around 15% on cooling bills.</p>	Avoided emissions	Other: Avoided emissions calculated based on the volume of energy saved and its associated emissions, using recognised global standards	-	-	<p>We conducted an analysis of 27,500 Hive Active Heating customers in 2016. We compared their gas consumption in the 12 months before having Hive Active Heating installed in their home and the 12 months after it was installed, controlling for items such as significant differences in temperature between the two 12 month periods. The analysis showed that customers could save around 2.12% on their consumption, equating to savings of more than 40,000tCO₂e and up to £130 on their energy bills each year, by never having to heat an empty home.</p> <p>Centrica is focused on providing cutting-edge Connected Home products that satisfy the changing needs of our customers. To grow our capabilities in this area, we are investing £500m between 2015-20 in our global Connected Home business.</p>
Group of products	<p>Time-of-use (TOU) and prepaid tariffs</p> <p>Direct Energy continues to offer TOU products that incentivise customers to cut energy demand at peak times. This reduces strain on the grid and the need to turn on additional power stations to meet demand, avoiding associated carbon emissions from power generation (customers' scope 2).</p>	Avoided emissions	Other: North America: Carbon savings calculated using EPA emission factors.	-	-	<p>We calculate that customers with prepayment plans in North America, saved 80,717tCO₂e during 2016.</p>

	<p>Direct Energy customers on the Free Saturdays/Sundays plan are shifting 15% of their energy use each year to the free off-peak day, when generation is typically more efficient.</p> <p>In 2016, we continued to offer a voluntary (opt-in) behavioural demand-response programme called Reduce Your Use Rewards. The programme which had 57,000 customers enrol, enables customers to save 5% on monthly energy bills if they lower usage during weekday afternoon peak hours over the course of a one month period during Texas' hottest month. Reduce Your Use Rewards works in collaboration with ERCOT, the grid operator, which asks consumers and businesses to reduce electricity demand during peak hours.</p> <p>Direct Energy's prepay tariff in Texas has also demonstrated an average reduction in electricity consumption by up to 14%, equating to a reduction in demand of more than 100,000MWhs per year.</p>					
Product	<p>Panoramic Power</p> <p>Our global Panoramic Power offering is a pioneer in providing energy users with energy management solutions, which brings together wireless sensor technology and cloud-based analytics, to give businesses actionable insights into energy use.</p> <p>Users can therefore take a more proactive approach to their consumption, significantly improving energy and operational efficiency.</p>	Avoided emissions	Other: Avoided emissions are calculated on the volume of energy saved and its associated emissions, using recognised global standards.	-	-	Panoramic Power customers save on average 10-20% on energy bills.

	Over 40,000 Panoramic Power sensors have been deployed since 2009, including around 15,000 in 2016-17.					
Product	<p>Combined Heat and Power (CHP) Generators</p> <p>In 2016, we installed 59 CHP units in the UK. We also have equity in and maintain over 700 units operating across the country, with many more in Europe and North America.</p> <p>CHP enables the energy demands of commercial properties to be met in an efficient manner as the units generate electricity while capturing usable heat produced in the process, rather than drawing electricity off the grid which is typically at a higher carbon intensity and involves generated heat being wasted when using more conventional generators and boilers (customers' scope 1 and 2).</p>	Avoided Emissions	Other: Avoided emissions are calculated by the difference between the direct emissions from the CHP units and the emissions associated with the use of electricity and gas required to produce an equivalent amount of energy using the replaced technologies.	-	-	CHP generators cut carbon emissions by an average of around 25% when compared to the grid.
Group of Products	<p>Energy Performance Contracts (EPC) / Optimisation Services</p> <p>We provide bespoke advice and product installations that enhance the energy efficiency and operational control of industrial and commercial sites to reduce carbon emissions (customers' scope 1 and 2) as well as their running costs.</p> <p>Improvements typically involve replacing industrial size boilers with more efficient versions and upgrading to LED lighting.</p>	Avoided emissions	Other: Energy saving calculations vary depending on the technology and are calculated in kWh in the first instance. Financial savings are calculated using rates agreed in each contract and may include a price escalator/degradation. Carbon savings are calculated using agreed carbon rates, usually employing values published by DEFRA at the time of writing the Investment Grade Audit.	-	-	<p>We guarantee customers with a certain level of financial and/or carbon savings over the length of the contracts, which generally span 15 years.</p> <p>In the UK during 2016, our completed EPC contracts created annual savings of 697tCO₂e and an estimated £140,000 on energy bills.</p>

Product	<p>Electric Vehicle charging points</p> <p>We installed 257 electric vehicle charging points in 2016, powering lower carbon transport (customers' scope 1) in the UK.</p> <p>Installations were concentrated in locations where the vehicles would be utilised frequently, such as at commercial properties, motorway service stations and car manufacturers.</p> <p>Overall, we have installed around 11,800 charge points across the UK.</p>	Avoided emissions	Other: Avoided emissions are calculated by comparing the carbon associated with the electricity used to charge a vehicle for a given distance, with the emissions associated with a similar class of petrol or diesel vehicle for the same distance.	-	-	In 2017, our DE&P business will support the expansion of low carbon vehicles following a new £18m electric vehicle scheme with Transport for London.
---------	---	-------------------	--	---	---	--

CC3.3: Did you have emissions reduction initiatives that were active within the reporting year (this can include those in the planning and/or implementation phases)

Yes

CC3.3a: Please identify the total number of projects at each stage of development, and for those in the implementation stages, the estimated CO₂e savings

Stage of development	Number of projects	Total estimated annual CO ₂ e savings in metric tonnes CO ₂ e (only for rows marked *)
Under investigation	1	0
To be implemented*	2	67
Implementation commenced*	27	20762
Implemented*	10	755132
Not to be implemented	1	1318

CC3.3b: For those initiatives implemented in the reporting year, please provide details in the table below

Activity type	Description of activity [max 2400 characters]	Estimated annual CO ₂ e savings (tCO ₂ e)	Scope	Voluntary /Mandatory	Annual monetary savings (£)	Investment required (£)	Pay-back period	Estimated lifetime of the initiative (years)	Comment [max 1500 characters]
Energy efficiency: Building fabric	<p>Energy Company Obligation (ECO)</p> <p>The UK Government introduced ECO in 2013 which requires major energy suppliers to fund the installation of energy efficiency products, such as insulation and boilers, in order to reduce residential energy use and carbon emissions - particularly in fuel poor homes. We expect the Obligation to cost over £1.3bn* and deliver lifetime savings that exceed 20mtCO₂e**.</p> <p>In 2016, we committed £151m* to the scheme and installed more than 119,000 measures. These installations will deliver total lifetime savings of 4mtCO₂e**, equating to an annual saving of over 200,000tCO₂e** in 2016. 2016 installations will save customers an estimated £15.6m*** on their energy bills each year.</p> <p>Since 2013, measures we have installed via ECO will generate lifetime savings of 18.8mtCO₂e**.</p>	200000	Scope 3	Mandatory	15600000	130000000	4-10 years	>30 years	<p>*Costs have been aligned with methodology for reporting to Ofgem and includes administration fees.</p> <p>**Carbon savings include the following ECO components: CERO, CSCO and the Heating Cost Reduction Obligation (HHCRO). HHCRO is typically reported to Ofgem in lifetime heating bill savings only, but has been converted into lifetime annual carbon savings achieved to highlight the extent of the emissions saved through ECO.</p> <p>***Estimated bill savings incorporate HHCRO only.</p>
Low carbon energy installation	<p>Solar products – UK</p> <p>In 2016, we completed 69 installations of solar panels which had a total generation capacity of 7.5MWp for our commercial customers through our DE&P business.</p>	2856	Scope 3	Voluntary	635000	2800000	4-10 years	16-20 years	No further comments.

	<p>Annually, these installations will save 2,856tCO₂e alongside an estimated £635,000 on energy bills.</p> <p>We invested £2.8m in 2008 to acquire Solar Technologies which laid the foundation of our solar offering in the UK.</p>								
Low carbon energy installation	<p>Solar products – North America</p> <p>Solar is an expanding market in North America and Direct Energy's capabilities in this area is giving customers greater choice around how they generate and consume energy, while lowering their environmental impact.</p> <p>Direct Energy added solar power to the range of products offered to our residential customers by acquiring Astrum Solar in 2014 for US\$53m (£33m). While 2016 was a challenging year for the solar market, we completed 2,500 installations totaling 21.7MWp of capacity that will save 20,428tCO₂e and US\$4.7m (£3.6m) on energy bills each year.</p> <p>Meanwhile, we offer business customers solar through our US\$125m (£78m) fund with SolarCity, of which Direct Energy contributed US\$50m (£31m). In partnership with SolarCity during 2016 and based on our 40% equity share, Direct Energy financed and placed in commercial operation 11.4MWp of solar projects, which will generate annual carbon savings of 2,865tCO₂e. We anticipate these installations will save our business customers US\$501,577 (£373,382) per year on their energy bills.</p>	23293	Scope 3	Voluntary	3973382	64000000	4-10 years	21-30 years	No further comments.

	Combined, these installations collectively save 23,293tCO ₂ e annually and US\$5.2m (£4.0m) off energy bills.								
Energy Efficiency: Building Services	<p>Centrica property – LED Lighting and monitoring</p> <p>In pursuit of our internal carbon footprint target, we install energy efficient lighting and monitoring devices at key offices.</p> <p>In the UK, LED lighting was delivered at our head office during 2016. This resulted in a reduction of 128tCO₂e.</p> <p>We also installed Panoramic Power energy sensors in four of our major offices in North America. The sensors enable accurate monitoring of energy consumption and identifies opportunities for energy reduction. This along with office rationalisation and consolidation across our North America portfolio, led to a reduction totaling 113tCO₂e.</p>	241	Scope 2 (location based)	Voluntary	43824	300000	4 – 10 years	16 – 20 years	The majority of the costs relate to LED lighting.
Energy efficiency: Processes	<p>Centrica property - Server room rationalisation</p> <p>In order to reduce unnecessary carbon emissions and running costs, redundant server equipment was removed from several communication rooms in the UK. This has resulted in less energy being consumed for both equipment and room controls, leading to annual savings totaling 115tCO₂e and £28,000.</p>	115	Scope 2 (location based)	Voluntary	28000	0	<1 year	11-15 years	No direct investment required.

Transportation: fleet	<p>Fleet</p> <p>With our fleet emissions forming the largest single component of our internal carbon footprint target, we continued to implement our UK low carbon fleet roadmap in 2016.</p> <p>Carbon savings primarily arose from the installation of telematics which provide GPS data on vehicle status, operating profile and driver behavior, enabling us to target both vehicle and driver efficiencies. We also delivered significant savings through our engine re-mapping programme which has re-mapped over 8,000 engines so far.</p> <p>Overall, our action will reduce fleet emissions by 1,925tCO₂e.</p>	1925	Scope 1	Voluntary	-	-	<1 year	6-10 years	It has not been possible to accurately calculate annual monetary and investment values due to the phased implementation of the programme.
Other: Operational efficiencies	<p>Nuclear equipment reliability programme</p> <p>EDF Energy has substantially improved the operational performance of its nuclear power stations, of which we have had a 20% share since 2009. Increased operational performance has been achieved through a sustained focus on improving equipment reliability and operational excellence across its plants, processes and people.</p> <p>Significant investments have been made to repair and replace unreliable parts while a preventative maintenance programme and world-class standards have been rolled-out to ensure the fleet runs smoothly. EDF have also delivered stronger training, governance and worker practices to ensure their people, partners and supply chain, fully understand and embody their high standards and practices.</p>	433000	Scope 1 Scope 3	Voluntary	-	-	-	-	<p>The methodology compares 2016 actual output to 2016 forecast output and multiplies by the CCGT carbon intensity value (0.349kg/KWh).</p> <p>It is not possible to calculate investment, payback or estimate lifetime of the initiative, due to the phased implementation and complexity of the programme.</p>

	These efforts have delivered an equipment reliability improvement of 6.2TWh in 2016, generating a carbon saving of 2.16mtCO ₂ e. Based on our 20% equity share, this equates to 0.43mtCO ₂ e.								
Energy efficiency: Building services	<p>Power station - LED lighting</p> <p>To support our commitment to reduce our operational footprint, we installed energy efficient LED lighting across several power stations in 2016.</p> <p>Following the replacement of old light fittings with LED units at both Barry power station and South Humber power station in 2015, residual upgrades were made at Humber in 2016. The LED lighting will reduce scope 2 emissions by 172tCO₂e and save £113,000 annually.</p>	172	Scope 2 (location-based)	Voluntary	113000	0	<1 year	11- 15 years	No further comments.
Energy efficiency: Processes	<p>Power station - Degassed conductivity units</p> <p>At our Humber power station in 2016, degassed conductivity units were installed to make the plant run more efficiently.</p> <p>The degassing process removes carbon dioxide from a steam sample that is used to measure purity of the steam produced to run the steam turbine, which forms part of the process to generate electricity. Compared to normal acid conductivity, degassing the sample enables the power station to sync and start quicker when energy generation is needed.</p> <p>We estimate that degassing has accelerated the start-up process by an hour, creating annual carbon and cost savings of 28,530tCO₂e and £3.2m.</p>	28530	Scope 1	Voluntary	3170000	30000	<1 year	11-15 years	No further comments.

Process emissions reductions	<p>Power station – Combining two terminals for receiving and processing gas</p> <p>To ensure the efficient future production and processing of gas at our Barrow Terminal, Centrica undertook an £84m project at Barrow Terminals in 2016. The project involved the construction of a new pipeline between the South and North Morecambe Terminals, allowing all of the gas from the South Morecambe field to be processed through the North Morecambe Terminal.</p> <p>The pipeline will improve the efficiency of gas processing on site, leading to environmental benefits such as significant reductions in carbon dioxide, oxides of nitrogen and carbon monoxide emissions from combustion activities on site.</p> <p>The project has also eliminated the need for the use of hydrochlorofluorocarbons (HCFCs) at the South Morecambe Terminal, which are ozone depleting substances and subject to phase out under the Montreal Protocol.</p>	65000	Scope 1	Voluntary	600000	84000000	11-15 years	11-15 years	No further comments.
------------------------------	---	-------	---------	-----------	--------	----------	-------------	-------------	----------------------

CC3.3c: What methods do you use to drive investment in emissions reduction activities?

Method	Comment [max 2400 characters]
Compliance with regulatory requirements/standards	<p>Mandatory schemes</p> <p>We are required to comply with the Renewables Obligation, ECO, the Carbon Reduction Commitment (CRC), the Energy Efficiency Scheme, the Energy Savings Opportunity Scheme (ESOS) and the EU Emissions Trading System. We have used the platforms provided by the legislation to underpin the strategic shift in our business towards energy and energy services (not just energy supply), alongside energy efficiency.</p>
Other	<p>Corporate strategy</p> <p>Core to our customer-facing business is our strategy to satisfy the changing needs of our customers by giving them the tools to manage their energy in a simpler, smarter and more efficient way. The business model for Centrica Consumer is evolving to</p>

	<p>provide energy supply alongside energy efficient and Connected Home products and services that give customers greater control and insights into their consumption that can reduce energy use, bills and carbon emissions. Likewise, our Centrica Business strategy is giving large-scale energy users such as commercial businesses and hospitals, the ability to take control of their energy and use it more efficiently through our DE&P business. DE&P does this by bringing together flexible and local generation with storage and renewable technologies alongside energy efficient and building management systems. To deliver this new energy future for homes and businesses, we expect to invest £1.2bn in our Connected Home and DE&P businesses during 2015-20.</p>
Dedicated budget for low carbon product R&D	<p>Dedicated budgets for technology and innovation R&D In 2015, we created a new global Connected Home business in which we will invest £500m during 2015-20. This investment will enable us to continue our development of innovative products and services that connect customers with their entire homes and help them better manage their energy. Our Connected Home brand, Hive, was created in 2013 and has a dedicated R&D budget to expand its family of products which currently include smart thermostats, plugs and lights as well as window, door and motion sensors. We also set up Centrica Innovations, a new venture to ensure Centrica identifies opportunities and is aligned to new technology that will benefit our customers. As part of this, we will invest up to £100m between 2017-21 in innovative start-ups, giving us access to technology and entrepreneurial resources that will help us satisfy the changing needs of our customers. We have people scanning key technology hubs around the world, such as in Seattle, Houston, London, Cambridge and Tel Aviv, putting us at the forefront of the latest innovations and integrating learnings within the Group.</p>
Dedicated budget for energy efficiency	<p>Dedicated budgets for low carbon technologies Our UK Home Industry Development team is responsible for fulfilling two key mandatory obligations placed on major UK energy suppliers - that of upgrading our customers to smart meters and delivering energy efficiency improvements under ECO, which help reduce our scope 3 customer emissions. Our budget enables us to deliver energy efficiency obligations on time and in the most cost-effective way in order to minimise the cost per tonne of carbon saved.</p> <p>We have additionally made investments in excess of £10m to expand opportunities in microgeneration through the acquisition of leading companies in the UK which include Solar Technologies in 2008 for solar and Econergy in 2011 for biomass and renewable heat.</p>
Other	<p>Internal carbon emission reduction targets By setting and publishing carbon reduction targets that have executive support, investment in low carbon technologies has been stimulated and the business has focused on initiatives to meet these goals. In 2016, we had a dedicated budget of £600,000 for deploying energy efficiency and low carbon technologies across our UK property portfolio, enabling delivery against our internal carbon footprint target.</p>

Further Information

Note to CC3.3b: Please note that a change in the basis for reporting on carbon savings from nuclear plant life extensions has been agreed with EDF Energy Nuclear Generation for 2017 reporting. This change has resulted in no carbon savings from life extensions to report in 2017, as these are now to be accounted for in the year in which the life extension itself is agreed. No new life extensions were agreed in 2016 resulting in no carbon savings to be reported, leading to a reduction in the total savings from projects implemented in the reporting year when compared to previous years.

Communications

CC4. Communications

CC4.1: Have you published information about your organization's response to climate change and GHG emissions performance for this reporting year in places other than in your CDP response? If so, please attach the publication(s)

Publication	Status	Page/Section reference	Attach the document	Comment [max 2400 characters]
In mainstream reports but have not used the CDSB Framework	Complete	Annual Report 2016: Chief Executive's Statement (p6-9), Focused on Innovation to satisfy the changing needs of our customers case study (p10-11), Pioneering a new energy future case study (p12-13), Focused on cutting energy and carbon emission case study (p14-15), Responsible Business Update (p24-30), Business Reviews (p33-51), Principal Risks and Uncertainties (p56-65).	[TO UPLOAD]	The Annual Report is online and downloadable.
In voluntary communications	Complete	Responsible Business Update 2016 – Entire document including, Reducing carbon emissions (p9-10) and Non-financial key performance measures (p14).	[TO UPLOAD]	The Responsible Business Update communicates Centrica's annual strategic progress on material corporate responsibility issues. The Update forms part of a wider reporting suite which includes the data centre, case studies, blogs and infographics available on the Responsibility section of centrica.com. The document is online and downloadable.

In voluntary communications	Complete	2016 Responsible business data – Environment Tab	[TO UPLOAD]	There are over 100 environmental data points reported annually in our online data centre, which includes a breakdown of our GHG emissions. Disclosure demonstrates our robust and transparent approach to managing and monitoring our environmental impact. The data centre is online and downloadable.
In voluntary communications	Complete	Responsibility communications – Entire document	[TO UPLOAD]	The document contains a series of blogs, case studies, speeches and press releases on climate change related issues spanning GHG emissions, energy efficiency, renewable generation, low carbon products and community engagement. These stories form a core part of our ongoing responsible business reporting, which are also distributed on social media channels to encourage engagement and share progress on environmental issues.
In voluntary communications	Complete	Our Business Principles – Entire document	[TO UPLOAD]	Centrica's guide to sound business practice explains the standards we expect from our people and how to put our principles into practice. As part of this, we state our commitment to protect the environment. The document is online and available for download. Later in 2017, we will replace the Business Principles with a new company-wide Code called, 'Our Code'. It will provide a strong moral compass and bind us together in common pursuit of our strategy, purpose and new set of values.

Risks & Opportunities

CC5. Climate Change Risks

CC5.1: Have you identified any inherent climate change risks that have the potential to generate a substantive change in your business operations, revenue or expenditure? Tick all that apply

- Risks driven by changes in regulation
- Risks driven by changes in physical climate parameters
- Risks driven by changes in other climate-related development

CC5.1a: Please describe your inherent risks that are driven by changes in regulation

Risk driver	Description [max 2400 characters]	Potential impact	Time-frame	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications [max1000 characters]	Management methods [max 1500 characters]	Cost of management [max 1000 characters]
Uncertainty surrounding new regulation	<p>Long term investments</p> <p>It is well-understood by policymakers that businesses plan over a time horizon longer than the political cycle, but long-term policymaking to support these decisions has proven to be difficult in practice. A lack of clarity from Government on decarbonisation policies required to meet climate change commitments, makes investment decisions more difficult.</p> <p>It is important for government to be able to give certainty to businesses undertaking major investment decisions. The National Infrastructure Commission is a good mechanism for this.</p> <p>Government has now closed its long-standing support mechanism for large scale renewable capacity via the Renewables Obligation, leaving the Contract for Difference (CfD) regime as</p>	Other: Increased capital cost and/or reduction in capital availability	>6 years	Direct	About as likely as not	Medium	<p>Government has said two further CfD allocation rounds could take place by 2020, with up to ~£440m could be available across both rounds. There is, however, no detail on intended CfD support beyond 2020.</p> <p>The time horizon on carbon tax is similar and we await longer term clarity from Government in the Autumn 2017 Budget.</p>	<p>We continue to engage with Government and regulators to support a stable investment climate and encourage the provision of long-term investment signals where possible.</p> <p>We believe Ofgem has an important role in not constraining innovation and should focus on delivering predictable regulation and high quality, well-evidenced regulatory decisions.</p> <p>Fiscal policy is one of the most powerful tools for encouraging greater investment in the UK. By providing a stable and competitive tax regime, with targeted incentives for key sectors, the Government can boost investment and help industries grow.</p> <p>Government has committed to setting out its intended control framework for future renewables</p>	<p>Management costs are dependent on the level of activity in any given year. We estimate the total employee costs for management of these uncertainties (including CfD, FiT and Renewables Obligation) to be in the region of £40k per year.</p> <p>These uncertainties impact investment in both conventional and low carbon generation, as renewable deployment and carbon tax rates affect electricity market prices and therefore decisions on new investments and existing asset life extensions.</p>

	<p>the enduring support mechanism for low carbon generation. The Feed-in-Tariff (FiT) regime for small scale renewable capacity is now subject to strict deployment caps, which makes it less accessible to new projects than previously.</p> <p>Near-term clarity on the level of support available through the CfD regime has improved. A CfD allocation round is currently underway, with £290m available to 'less established' technologies, including offshore wind and anaerobic digestion. CfDs will be awarded later in 2017 by competitive auction. However, uncertainty beyond the 2017 auction remains high.</p>							<p>spending. This has the potential to remove uncertainty, subject to sufficient detail being set out.</p> <p>We convey this messaging in consultation responses and industry meetings.</p>	
--	---	--	--	--	--	--	--	---	--

<p>Uncertainty surrounding new regulation</p>	<p>Uncertainty surrounding ECO</p> <p>The current ECO scheme is due to run until the end of September 2018. The UK Government has indicated that it will be extended by a 3.5 year fuel poverty focused obligation running to 2022.</p> <p>Public consultation into the nature of the extension has been delayed until late 2017, meaning that the specifics of the new scheme will not be confirmed until early 2018. As we usually plan ECO delivery 1-2 years in advance, the uncertainty caused by the delayed consultation, could lead to a slowing of delivery or even a hiatus in 2018.</p> <p>Unexpected changes to ECO could also have the effect of increasing bills for our customers.</p> <p>Investment in projects that may be cancelled or changed may have negative financial implications for our business.</p>	<p>Other: Reduced return on investment</p>	<p>1 to 3 years</p>	<p>Direct</p>	<p>About as likely as not</p>	<p>Medium</p>	<p>In 2016, we committed £151m towards ECO and delivered 119,000 energy efficiency measures in the UK.</p>	<p>We manage our in-house heat networks and solar businesses carefully with a balanced mix of recruitment and subcontracting to ensure that as we grow, we have flexibility to respond to any changes in demand.</p> <p>We use a number of delivery channels to mitigate ECO costs. For example in 2016, these included our internal insulation business, third-party contracts and contracts with local authorities. We are increasingly focusing on third party contracts for delivery, in order to more effectively manage cost and delivery risk.</p>	<p>Our direct fixed costs for managing ECO is circa £3.6m per annum.</p>
---	--	--	---------------------	---------------	-------------------------------	---------------	--	---	--

<p>Fuel/Energy taxes and regulations</p>	<p>Delivery of ECO</p> <p>In the UK, there is a risk that we fail to meet our legal obligations under ECO, which requires energy suppliers to improve the insulation of harder-to-treat properties in the domestic sector and to invest resources in reducing heating costs for vulnerable households.</p> <p>In addition to the risk of enforcement action, there is also the reputational damage of not meeting our target as well as the risk that forecasted costs for delivery are exceeded.</p> <p>We are on track to deliver our ECO obligation three months ahead of the next interim deadline of September 2018. This contingency reduces the risk of missing the overall target.</p>	<p>Increased operational cost</p>	<p>Up to 1 year</p>	<p>Direct</p>	<p>Unlikely</p>	<p>High</p>	<p>If we were unable to deliver ECO within the estimated costs there is the risk that the additional cost would increase bills for our customers, making us less competitive. Failure to comply with ECO requirements could risk enforcement action which can lead to fines designed to compensate for consumer detriment. For example in 2014, British Gas agreed to pay £11.1m to help vulnerable customers following failure to deliver the Carbon Emissions Reductions Target (CERT) and Community Energy Saving Programme</p>	<p>We have entered a number of contracts with third parties to deliver ECO, resulting in the installation of more than 119,000 measures in 2016. We work closely with the heating and insulation industry and Government to develop capacity, new technologies and best practice in order to increase cost effectiveness of delivery.</p> <p>In July 2015, after a wide-ranging strategic review, Centrica announced a Group-wide efficiency programme in order to be competitive in a fast-changing energy market. As part of the ongoing implementation of that strategy, British Gas made a reduction of roles including the closure of our loft and cavity wall insulation business, as well as our Construction Services insulation and heating business. These closures do not undermine our ability to deliver ECO cost effectively and our focus for managing our ECO target, now primarily includes third party contracts and the Government brokerage market.</p>	<p>In 2016, we committed £151m towards ECO.</p>
--	---	-----------------------------------	---------------------	---------------	-----------------	-------------	--	---	---

							(CESP), by the 2012 deadline. We completed the shortfall in 2013.		
Uncertainty surrounding new regulation	<p>Changes to regulation promoting distributed energy</p> <p>The changing make-up of the UK energy mix, moving from traditional centralised power stations to the inclusion of solar and wind, demands an increased proportion of more flexible generation and management of energy to cope with the intermittency of renewables and maintain electricity security. The continuing trend for growth in UK distributed generation has meant that there is an increased scrutiny of charging arrangements.</p> <p>Regulatory changes following reviews have the potential to disrupt the economics for flexible power projects and hinder investment. Conversely, it could bring medium term stability to the market if regulatory decisions following the reviews are robust.</p>	Other: Reduced return on investment	1 to 3 years	Direct	Unlikely	High	<p>We are looking to invest up to £700m in Distributed Energy & Power (DE&P) during 2015-20, with a £180m investment programme currently underway in constructing a number of new flexible power plants and a battery storage facility in the UK. Uncertainty over regulation in this area potentially puts this investment at risk.</p> <p>Centrica is supportive of a policy environment that continues to encourage the development of a 'smart power' system which will give large-scale energy users, such as businesses and hospitals, the ability to take control of their energy and use it more intelligently to reduce, generate and manage it themselves.</p> <p>We regularly respond to government consultations on this subject, such as the 2016 Smart Power consultation and undertake thought leadership work which included our joint report with Policy Exchange in 2016. Our DE&P business, which we created in 2015, brings together flexible, local generation with storage and renewable technologies alongside energy efficiency measures and smart building management systems. In 2016, we continued to work with the regulators and</p>	We estimate the total employee costs to be in the region of £200k per year.	

								Government to support a regulatory regime that is predictable, fair and encourages innovation.	
--	--	--	--	--	--	--	--	--	--

<p>Cap and trade schemes</p>	<p>EU Emissions Trading Scheme</p> <p>There is a risk that we fail to meet the requirements of the EU Emissions Trading Scheme (EU ETS), either through failing to secure proper verification of our emissions, or surrendering insufficient emission allowances to match the verified levels.</p> <p>Non-compliance with the EU ETS may lead to financial penalties.</p>	<p>Increased operational cost</p>	<p>Up to 1 year</p>	<p>Direct</p>	<p>Very unlikely</p>	<p>High</p>	<p>There are financial penalties associated with non-compliance with the EU ETS - these are triggered if insufficient allowances are retired in any one year for compliance purposes. For Centrica's assets, we have processes in place to ensure our compliance. However, if for any reason we were not compliant, this could result in a fine of up to €140m (£113m).</p>	<p>We manage this risk by ensuring a close match between our forecast levels of emissions under the system and our holding of valid emissions allowances throughout any year. A large portion of our emissions come from our power stations covered by the system: forecast levels of emissions are determined by expected running patterns, which are in turn dependent on plant availability and relative fuel prices.</p> <p>We secure the necessary carbon allowances to meet any individual power volume sale at the same time as power was sold, to mitigate any risk on exposure to carbon markets. We also have firm procedures for ensuring relevant actions are undertaken in a timely manner to meet verification and retirement deadlines.</p>	<p>Management costs are dependent on the level of activity in any given year – due to the decreasing price of wholesale power this is falling. We estimate the total employee and external costs for carbon-related management including EU ETS and carbon pricing - e.g. UK Carbon Price Floor and carbon analysis - to be in the region of £250k per year.</p>
------------------------------	--	-----------------------------------	---------------------	---------------	----------------------	-------------	---	--	--

Carbon taxes	<p>Carbon pricing</p> <p>The pricing of carbon emissions has a direct impact on the economics of our power stations and the cost of electricity that we purchase from other generators. Due to the competitive nature of wholesale power markets, the price of power includes the full opportunity cost of carbon. The outlook for the total cost of carbon - UK Carbon Price Support plus EU ETS - is uncertain, although the UK Government has confirmed the Carbon Price Support (CPS) rate will be ~£18/t to 2020-21. We have no clarity on UK CPS beyond this date, although we expect a carbon price trajectory to be set out in the Government's Autumn 2017 Budget.</p> <p>As it is unclear what the future cost of carbon will be, there is a risk the price may change. This may impact the relative economics of different forms of generation across Europe. Changes to carbon prices can also lead to changes in asset values and our hedged positions. Our capacity to borrow money may change as lenders consider carbon risk in their lending decisions.</p>	Increased operational cost	3 to 6 years	Direct	More likely than not	Medium	There is no set financial risk that can be calculated surrounding the profitability of our power stations in relation to carbon pricing. This is because we can only forecast the potential cost of regulatory uncertainty around the carbon price regime at the time we set the price of power.	To mitigate the risks around pricing of carbon emissions, we produce our own forecasts of future carbon prices, with strong emphasis on credible high and low scenarios, as well as a 'central' view. We factor the economic costs of carbon into generation dispatch decisions and recover the costs through energy sales arrangements. The exposure of our supply business to carbon prices via electricity prices is recognised and treated as another 'commodity exposure' that needs to be hedged within our commodity risk management procedures.	Management costs are dependent on the level of activity in any given year. We estimate the total employee and external costs for carbon-related management including EU ETS and carbon pricing, such as the UK Carbon Price Floor and carbon analysis, to be in the region of £250k per year.
--------------	---	----------------------------	--------------	--------	----------------------	--------	--	---	---

Emission reporting obligations	<p>Canadian emission reporting obligations for Exploration & Production (E&P) oil and gas assets</p> <p>Centrica reports Criteria Air Contaminants (CAC's) at the federal level as part of the National Pollutant Release Inventory (NPRI), an emission threshold based programme.</p> <p>There are also two provincial regulations that relate to carbon equivalent emissions for upstream oil and gas: Specified Gas Emitters Regulation (SGER) and the Specified Gas Reporting Regulation (SGRR).</p> <p>Provincial offset credits must be purchased for large emitters to offset emissions that do not meet provincial reduction targets. Centrica must purchase offsets annually and due to new legislation, carbon pricing is increasing, meaning there is an increased financial and regulatory burden to comply.</p>	Other: increase in offset credit costs, or regulatory enforcement action	Up to 1 year	Direct	Unlikely	Low	In 2016, CAD\$350k (£194k) was required to purchase carbon credits for carbon compliance purposes. Failure to comply may result in a fine up to CAD\$500k (£278K).	<p>To help mitigate risks, emission reporting and compliance requirements are met through a regular review of all applicable government regulations.</p> <p>We actively liaise with local government bodies to potentially forecast regulatory change. A third party verification process has been built into provincial reporting programmes to provide assurance. Verification is used to test the validity of past data. The independent verifier may provide observations on areas for improvement.</p>	Upstream emission reporting obligations are managed by one full time employee with estimated staff costs of around CAD\$115k (£64k).
Renewable energy regulation	<p>Reduced forecasting accuracy due to embedded renewable generation</p> <p>Expansion in decentralised generation may lead to an increased risk of inaccuracy in our demand forecasting, which in turn may lead to increased operational costs.</p>	Increased operational cost	Up to 1 year	Direct	Likely	Low-medium	Forecasting inaccuracy is extremely important, with cost of error ranging from £6m-£20m a year. The electricity balancing	In recent years, we have developed and implemented a tool to forecast solar generation and the impact this has on demand. This has enabled us to mitigate around £1m of the risk per year. We continue to refine the tool as the installation profile of	We have invested around £40k per year to develop, implement and maintain models to accurately forecast the impacts of solar generation.

	<p>UK Government climate change obligations have resulted in incentives for installed embedded generation, leading to a significant expansion of decentralised generation. The primary technology is solar panels and by the end of 2016, 11.5GW of capacity had been installed in total in the UK, almost doubling capacity in one year.</p> <p>New technologies are driving changes in customer behaviour, which without mitigation would increase costs relating to the reduced accuracy of demand forecasting. Therefore investment in new modelling and data sources is required.</p> <p>Embedded generation volumes are not metered so rather than seeing the generation, we see lower demand. This 'pollution' of demand has made it more difficult to forecast accurately. Future factors linked to climate change obligations and reduction in demand forecasting accuracy are smarter settlement, time-of-use and other forms of decentralised microgeneration such as wind, CHP and fuel cells.</p>					<p>Significant Code Review implemented in November 2015, increased the incentives for counterparties to balance positions and therefore increases the potential cost of forecasting inaccuracy. The phased implementation of the changes to Price Average Reference (PAR), mean a further increase in cost is expected in November 2018.</p>	<p>solar changes across the UK. However, other technologies such as wind and de-centralised generation are likely to follow a similar trajectory and require ongoing investment to mitigate these risks.</p>	
--	--	--	--	--	--	--	--	--

CC5.1b: Please describe your inherent risks that are driven by change in physical climate parameters

Risk driver	Description [max 2400 characters]	Potential impact	Time-frame	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications [max 1000 characters]	Management methods [max 1500 characters]	Cost of management [max 1000 characters]
Other physical climate drivers	<p>Severe weather events The main physical threats from climate change to our assets and operations are from the increased intensity and frequency of severe weather events and other changes to weather patterns.</p> <p>Climate change is leading to increased intensity and frequency of severe weather events, such as prolonged and heavy rainfall in the UK, increasing frequency of extreme wind and wave action as well as greater intensity of hurricanes in America. As a result, our business could be at risk from asset damage and higher insurance premiums. In addition, there are equity and commodity risks if supply of electricity is interrupted.</p> <p>Oil & Gas Production, gas fired power fleet and gas storage</p> <p>Structural damage to onshore or offshore infrastructure could cause a major accident, injury or loss of</p>	Reduction/ disruption in production capacity	Up to 1 year	Direct	Unlikely	Low-medium	<p>Weather-related risks such as flooding can have a significant financial impact on our power stations, especially in the event of a prolonged shutdown. The actual figure would depend on which facility was affected, whether nuclear or gas fired and the condition of the market at the time the power station was switched off. For instance, a shutdown of a nuclear power station due to a severe weather event would cost approximately £1.3m per day</p>	<p>When designing and constructing power stations, we always take into account flood risk. This risk continues to be managed across our power stations.</p> <p>We use tools provided by the Environment Agency (EA), such as flood risk maps, our meteorology teams and business continuity arrangements to identify assets at a higher risk of flooding in extreme circumstances and regularly undertake risk assessments.</p> <p>In E&P we maintain our infrastructure to regulatory requirements and ISO standards, which include the requirement to assess environmental loading which embeds the assessment of impact of climate change into the risk assessment.</p> <p>For nuclear plants, safety case reviews are undertaken regularly as</p>	<p>Management costs for flood and severe weather risk were incorporated into initial build costs and ongoing risk management budgets for our gas fired power stations.</p> <p>Around £13m, or ~£2.6m based on our 20% equity share, was invested before the end of 2014, to improve nuclear power flood defence resilience.</p>

	<p>primary containment, as well as financial loss due to physical damage to assets. It could also lead to cessation of business operations. For example, flooding in 2008 disrupted output at our Brigg power station for a short duration. Coastal flooding is also a risk for all of our coastal-based assets, such as our Morecambe and Easington processing facilities and our Humber power station.</p> <p>Wind</p> <p>In July 2015, Centrica announced its decision to divest our wind farms by the end of 2017. We completed the sale of all our assets early in 2017 when we sold our interest in the Lincs wind farm. We continued to operate Lincs in 2016, during which time physical risks to the wind farm included patterns of high pressure during hot spells and excessively cold periods. Still days also reduced wind speeds while periods where wind speeds reached in excess of 25m/s, affected output as the machines automatically shutdown to protect the turbines.</p>						<p>or £260K based on our 20% equity share.</p>	<p>part of normal business both internally and by the Office for Nuclear Regulation, and through the life extension programme. These look to improve the resilience of nuclear power plants to severe weather events, including factoring in any changes to the likelihood of severe weather events occurring.</p> <p>Flood risk assessments are undertaken for our gas terminals and an adverse weather preparedness plan is in place to manage emergency situations. An adverse weather policy for offshore operations indicates the controls to be implemented in response to specific weather parameters such as high winds.</p>	
Other physical climate drivers	Risks to gas fired power generation fleet	Other: Reduction in production	>6 years	Direct	Exceptionally	Low	Higher temperatures can reduce both efficiency	We have continued to work together with Energy UK on adaptation and resilience issues. By	Management costs vary year on year but can be up to £5K annually.

	<p>The main risk drivers for our gas-fired power generation fleet, include unpredictable and adverse weather conditions, rising sea levels, drought and flooding.</p> <p>Increasingly unpredictable and adverse weather conditions such as warmer summers, may increase pressure on gas supplies while at the same time affecting the efficiency and profitability of our power facilities. The loss of efficiency due to higher ambient temperatures, is slightly more prevalent in air-cooled condensed plants, of which we have two in active service (Barry and Langage). Very low temperatures can also reduce efficiency if we have to deploy anti-icing systems on gas fired stations.</p> <p>Flooding of sites or access routes has been identified as a potential risk from climate change, to our gas fired power stations. However, over the expected life of the assets, the risk remains low.</p> <p>Our gas fired power stations are at risk from drought as they require a reliable source of water for use in their boilers. There is also a risk from tightening regulation and lowering of abstraction licence allowances. However, after assessment in 2011,</p>	capacity/ increased operationa l cost			unlike ly		<p>and output from power stations.</p> <p>From the baseline data used in a 2010 Energy UK paper which assumed a uniform air temperature of 32°C across the UK, Centrica's gas fired fleet would experience a drop of between 5-10% in maximum output. In a worst case flooding scenario, sites would have to be shut down until flood water h receded. In the event of water scarcity and drought affecting our power stations, it may mean an impact of several million pounds. However, the risk of either scenarios is low.</p>	<p>working at Trade Association level it means that a coordinated response for generators can be achieved when interacting with BEIS, DEFRA and EA among others. This is important because the resilience of generation in the UK is based on a number of criteria including geographical spread of assets, the overall capacity margin, different generation technologies and a national distribution system.</p> <p>A project started in 2016 with DEFRA, the EA and National Grid to understand the future risk of low flow/drought conditions on the operation of freshwater power plant, in order to consider how resilient the national grid might be to potential future low flows/droughts.</p> <p>We address flood risk issues as part of our business-as-usual plans for our power stations, including in the aspects and impacts registers. All UK power stations have reviewed their water usage and taken action to reduce the consumption of water.</p>	
--	---	--	--	--	--------------	--	--	---	--

	<p>which was further reviewed in 2015, we concluded that the risks from drought or water shortages as a consequence of climate change and sea level rise was also low during the expected life of the stations.</p> <p>Any new assets that we invest in will take account of the physical climate risks which could affect their design.</p>								
Other physical climate drivers	<p>Supporting vulnerable customers</p> <p>Increased intensity and frequency of extreme weather events due to climate change could impact vulnerable customers disproportionately, leading to increased operational costs to ensure our customers receive the support they need.</p> <p>Our most vulnerable population are registered on an industry Priority Services Register. This Register ensures vulnerable customers receive priority attention for reconnection or resumed supply in the event of a power outage and other services, including an annual free gas safety check in some cases.</p> <p>Our internal policies also ensure that vulnerable</p>	Increased operational cost	>6 years	Indirect (Client)	Unkn own	Low-medium	<p>We have spent around £1.5bn supporting vulnerable people over the last 5 years.</p> <p>Failure to uphold our mandated social obligations to reduce carbon emissions and help vulnerable people save money on their energy bills, can have a financial impact. This was demonstrated in 2014, when British Gas agreed to pay £11.1m to help vulnerable customers</p>	<p>By supporting vulnerable customers through improvements in energy efficiency and other assistance, we can help protect our customers during colder winters.</p> <p>In 2016, we helped 2.1m vulnerable customer households in the UK through a range of initiatives including free debt and payment assistance, free energy efficiency advice and products alongside energy rebates and grants.</p> <p>The energy efficiency measures we have installed as part of ECO will create cumulative bill savings that total an estimated £158m, £78m of which will specifically support vulnerable people.</p>	<p>In 2016, we contributed more than £196m supporting vulnerable people in the UK, North America and Ireland.</p> <p>£151m was invested towards ECO in 2016 and our direct fixed costs for managing the scheme is c.£3.6m a year.</p>

	<p>customers are provided with appropriate products, services and support which enhance access to energy and services. We also invest in the British Gas Energy Trust, an independent charity, which provides customers and non-customers on low incomes with energy advice and grants.</p> <p>We never knowingly disconnect any customers for non-payment.</p>						<p>following failure to deliver the outgoing energy efficiency programmes, the Carbon Emissions Reductions Target (CERT) and Community Energy Saving Programme (CESP), by the 2012 deadline. We did, however, complete the obligation in full the following year.</p>	<p>Since 2004, we have invested £106m through mandatory and voluntary contributions to the British Gas Energy Trust. The Trust has helped over 195,000 people with debt advice and grants for energy and household bills, including over 22,000 people in 2016.</p>	
Other physical climate drivers	<p>Maintaining resilience through unpredictable and extreme weather</p> <p>Unpredictable and extreme weather represents a risk across the Centrica business, ranging from our own ability to maintain critical processes through to managing the potential for increased customer demand.</p> <p>Our ability to maintain critical processes could be adversely impacted by either our employees' ability to travel to their normal place of work safely, or, by localised issues such as flooding or infrastructure issues that could impact individual sites.</p>	Increased operational cost	Up to 1 year	Direct	Unlikely	Low	<p>Weather conditions can affect the number and cost of engineer call-outs and there are financial impacts if our employees are unable to make it to their places of work. To give an indication of the potential scale, using an example other than snow or ice, one UK office was closed for four days due to a</p>	<p>Our UK energy supply and services business has a Winter Contingency Plan to prepare for peak periods, where our businesses work together to ensure sufficient resources are available to cope with periods of high customer demand. British Gas Insurance Limited manages call-out risks by conducting annual or biennial safety and maintenance inspection visits and caps on certain work in high risk areas. We have proactive employee plans to raise awareness of severe weather and encourage preparedness, allowing</p>	<p>We have dedicated members of staff managing resilience, including challenges around unpredictable and extreme weather with associated costs of around £54k for staff and £50k on our WAR contract costs in the UK and North America.</p> <p>Other teams such as Facilities and Security, provide additional assistance which includes site monitoring.</p>

	<p>These same factors which present a challenge for our people often also drive an increase in demand for our power generation within the UK and engineer call-outs within our energy supply and services businesses in the UK and North America, placing additional pressure and safety risks on our workforce.</p> <p>Over recent years we have seen significant fluctuations in temperature and extreme weather, be it snow, ice and flooding in the UK or tropical cyclones in North America, reinforcing the importance of pro-active mitigation to support our customers and maintain critical business processes during disruption.</p> <p>During the sustained period of cold weather in winter 2012-13, British Gas completed record levels of breakdown visits, 11% higher than the winter period of 2011-12. This compares to the winter quarter for 2011, which was the warmest last quarter on record and the number of engineer visits decreased correspondingly.</p> <p>In December 2015, up to 40 Smart Energy Experts worked alongside the Network operator and other suppliers in Carlisle, to check</p>						<p>fire in an adjacent building. This led to costs of around £150k for the back-up site and other impacts on business operations.</p>	<p>employees to work from home where possible. For example, we also have third party contracts in place to provide alternative Work Area Recovery (WAR) capability across the UK and North America to facilitate maintenance of critical processes, should one of our primary sites be impacted by localised issues such as flooding, which closed one of our sites for a week in Winter 2013-14.</p> <p>The majority of our power stations hire 4x4 vehicles to support employees getting to work during adverse weather.</p> <p>We regularly exercise our response capabilities to ensure awareness and effectiveness should the need arise.</p>	
--	--	--	--	--	--	--	---	--	--

	the safety of around 5,000 properties and to restore power.								
Change in temperature extremes	<p>Reduced accuracy of demand forecasting</p> <p>Physical changes related to climate change could reduce the accuracy of being able to forecast demand, creating imbalance.</p> <p>Electricity cannot easily be stored and in the UK, the National Grid matches generation with customer demand for each second of every day. Being able to forecast customer demand accurately is key to making the most efficient decisions. Any mismatch between customer demand and what we have bought is subject to a cost. If electricity suppliers do not buy enough electricity to meet our customers' needs in advance, an extra cost may be incurred based upon the last minute and short balancing actions made by National Grid.</p> <p>Extreme weather can impact customer demand, making it less predictable and variable and thus increasing the mismatch between generation, demand and costs.</p>	Increased operational cost	Up to 1 year	Direct	Unlikely	Medium-high	<p>During an extreme cold spell our peak load could increase by up to 10%, or up to 5% during a heatwave.</p> <p>The potential cost of imbalance can exceed £500k per day, depending on underlying accuracy and prevailing market conditions.</p> <p>In October 2015, the Met Office began naming storms, with 8 named storms affecting the UK in 2016. The average cost of days affected by these storms was around £350k.</p> <p>In 2013, severe winter weather in March-April and the St Jude</p>	<p>We have engaged with the Met Office to ensure that the seasonal and diurnal changes that can be expected as a result of climate change are reflected in the 'seasonal normal' temperatures used in the long-term demand forecasting process.</p> <p>We take regular advice from our meteorologist on weather impacts and use real time system margin information, to optimise our forecast. We also factor in outage reports from network operators in our daily review of our forecast.</p> <p>We are currently in the process of developing our forecasting capabilities to enable more frequent forecasting of demand. We are working towards being able to use weather forecasts refreshed hourly to provide the most up to date demand forecast possible. Previously, we only used four weather updates each day.</p>	The majority of our actions to mitigate the reduced accuracy with which we are able to forecast demand due to climate change, are part of business-as-usual risk mitigation, which is estimated to cost us in excess of £100k per annum.

	<p>2016 was relatively benign in the UK. In 2013, however, two significant weather events, causing significant variance between actual and forecast consumption. These events are expected to become more frequent.</p>						<p>Day Storm, cost over £600k.</p> <p>In North America, the extreme low temperatures experienced in the first part of 2014 caused by the polar vortex, led to additional network system charges estimated at £65m.</p> <p>Overall, North America profitability was down 3% in 2016 compared to 2015 and down 17% on a local currency basis after normalising for the effects of foreign exchange movements. This principally reflected the impact that warm weather in H1 2016 had on consumption.</p>		
--	---	--	--	--	--	--	--	--	--

CC5.1c: Please describe your inherent risks that are driven by changes in other climate-related developments

Risk driver	Description [max 2400 characters]	Potential impact	Time-frame	Direct / Indirect	Likelihood	Magnitude of impact	Estimated financial implications [max 1000 characters]	Management methods [max 1500 characters]	Cost of management [maximum 1000 characters]
Changing consumer behaviour	<p>Falling energy consumption</p> <p>UK energy consumption has been falling since 2005, driven by improved energy efficiency and changing customer behaviour as a result of greater environmental awareness alongside reaction to price changes and economic downturn. By using less of what we sell, this could impact our profitability.</p> <p>Since 2009, British Gas customers have reduced their underlying energy consumption by 6% for gas and 12% for electricity. The 2016 National Energy Efficiency Data-Framework (NEED) report, which studies underlying nation-wide customer consumption patterns and is commissioned by BEIS, shows that installing a new efficient condensing boiler leads to an annual median reduction in gas consumption of 8.3% while cavity wall insulation leads to a saving of 8.4%.</p> <p>Smart technology will also reduce demand for energy. In</p>	Reduced demand for goods/services	Up to 1 year	Direct	Likely	Medium-high	Continuing reduction in gas and electricity consumption will impact Centrica's profits if mitigating actions are not taken.	<p>Our shift in focus towards energy services is helping to reduce our reliance on revenue from energy supply. We are focused on putting our customers in control of their energy and see this as a growth area for our business and a chance to lead the sector in giving customers what they want.</p> <p>We are leading the national roll-out of smart meters in the UK, having installed over 3.9m in homes and businesses by the end of 2016. To further develop our leadership capabilities in cutting-edge products, we acquired AlertMe, an energy management and services company and established a global Connected Home business in 2015.</p> <p>Building on this, we also established a new global DE&P business in 2015, to put customers in control over their energy</p>	<p>We expect to invest £1.2bn in our Connected Homes and DE&P businesses to develop our product service offerings during 2015-20.</p> <p>The installation and maintenance of smart meters will cost British Gas and other leading energy suppliers an estimated £11.5bn.</p> <p>In 2014, we acquired Astrum Solar for US\$53m (£33m) to enter the US residential solar market.</p>

	<p>a 2016 sample of customers with smart meters, we saw dual fuel customers reduce consumption by around 3.5% on average.</p> <p>Long-term UK gas demand will ultimately be driven by industry decisions around generation mix, the impact of Government climate change initiatives and economic growth.</p> <p>The decline in consumption in North America is more gradual than seen in the UK and varies across our chosen markets. This is due to lower wholesale gas prices from indigenous shale reserves, weather variations and market factors.</p>							<p>and reduce their use. And during 2015-16, we added Panoramic Power, ENER-G and Neas Energy to grow our capabilities.</p> <p>In North America, we also completed 2,500 residential solar installations in 2016 with a combined power output of 21.7MWp.</p>	
Other drivers	<p>Risk from new and disruptive technologies</p> <p>The future success of our business depends on our ability to play a leading role in the introduction of new technologies and in implementing the necessary operational and organisational changes, to meet the requirements of new markets.</p> <p>Whilst representing new opportunities, these developments also create threats to our future profitability if we do not implement correctly. Uncertainty over new technologies poses a risk to the development of our energy</p>	Other: Profitability	1 to 3 years	Direct	About as likely as not	Medium	<p>Centrica and other leading energy suppliers will have the responsibility for the installation and maintenance of smart meters in the UK, at an estimated cost of £11.5bn.</p> <p>Smart meters present risks to the business including short-term interoperability issues around the scale of implementation,</p>	<p>We have entered the Connected Home market to provide new services to our customers, while protecting our position in energy supply and services from non-traditional competitors. We are also working to understand technology limitations and how customer segments can better use technology. For example, we are working with UK Power Networks on 'energywise', to facilitate learning on how we can improve engagement with vulnerable and fuel poor customers on energy efficiency and</p>	<p>Our acquisition of AlertMe totalled £65m and we will invest £500m in our Connected Home business during 2015-20.</p> <p>Management costs for smart metering are built into annual operation budgets with an additional capital investment of €4.5m (£3.6m) for a stake in Power Plus Communications (PPC).</p>

	<p>efficiency and other low carbon-related products and services, which we expect to be key components of our downstream profitability. The lack of volume of installs and performance data evidence for new microgeneration technologies, are significant barriers for their introduction as there is no formal process with Government to add new innovation to schemes such the FIT.</p> <p>For smart meters, there is an interoperability risk that if a customer switches supplier, they may lose their smart meter functionality, negating the customer benefit. The introduction of a common infrastructure via the Data and Communications Company (DCC), will eventually mean customers can switch supplier and retain their smart benefits. During 2017, we are undertaking a programme of testing with the DCC and endeavor to commence installs linked to the DCC in the same year. Further technology development is also needed for smart meters to ensure reliable local communications can be established to cater for gas and electricity meters in all building types.</p> <p>From a customer perspective, smart meters are seen as voluntary so low customer</p>						<p>but also offer opportunities such as new smart-enabled products and service offerings.</p>	<p>new smart technologies, to increase take-up of our products while helping them save money and energy. We have continued to build our capabilities in smart technologies with the acquisition of an initial stake in AlertMe, a provider of home energy management services in 2010 and in early 2015, we acquired the whole business. Building on this, we established a global Connected Home business in 2015.</p> <p>We are leading the UK's smart meter roll-out which is an enabler of smart technology and by the end of 2016, we had installed 3.9m meters in homes and businesses. We switched to the latest SMETS-capable meters at the earliest opportunity and are leading the industry in their deployment.</p>	
--	---	--	--	--	--	--	---	--	--

	<p>engagement is a risk and Smart Energy GB have been appointed to drive awareness and consideration across the nation.</p> <p>In the US, there is the risk that regulators could favour one smart meter technology over another, which could constrain the technology available to create new smart-enabled products and services. The US market is already very fragmented, with each state having its own energy rules and policies. Also, lack of utility-wide deployments or access to data, will restrict our pursuit of providing customers with more valuable technology and services. There is also the risk that other non-traditional competitors will begin to offer energy services, directly or through white label relationships with other energy suppliers.</p>								
Other drivers	<p>Low carbon skills shortage</p> <p>In the future, there is a risk that we may lack the necessary skills among our employee base and the wider industry to take advantage of a low carbon economy and meet demand for new technologies, including solar, energy efficiency products and the UK smart grid.</p>	Reduction/ disruption in production capacity	1 to 3 years	Direct	About as likely as not	Low-medium	There is a risk of lost income if demand outstrips supply and a risk of enforcement action, if we are unable to fulfil our ECO commitments which can lead to fines designed to compensate for	<p>We have a diversified approach to managing our significant ECO target which includes managing a nationwide portfolio of third party contracts and use of the Government brokerage market.</p> <p>We are training engineers in low carbon skills and new technologies. In 2016, British Gas invested</p>	<p>In 2016, British Gas invested £35m in training.</p> <p>Our expected £1.2bn investment in our Connected Home and DE&P businesses during 2015-20, will also involve costs relating to the acquisition of skills as we purchase new businesses.</p>

	<p>This would impact our ability to grow our energy services business.</p>						<p>consumer detriment.</p> <p>For example in 2014, British Gas agreed to pay £11.1m to help vulnerable customers following failure to deliver CERT and CESP by the 2012 deadline. We completed the shortfall in 2013, benefiting vulnerable customers with additional savings on energy bills.</p>	<p>£35m to train around 8,000 engineers and 1,200 apprentices to install boilers, smart meters and energy efficiency products, including through our six academies. Direct Energy trained an additional 130 technicians through partnerships with local schools.</p> <p>In 2016, we also established a Technology and Engineering function which acts as a catalyst for innovation by bringing together our technical specialists, scientists and engineers from across the business to provide guidance, insight and support to the business units in planning the right strategies to manage potential future technological disruption, including those that may lead to carbon reduction.</p> <p>Centrica Innovations, a new venture announced in 2017, additionally ensures Centrica identifies opportunities and is aligned to new innovations that benefit customers, including those that can help them gain greater control over their energy. The team is small, agile and outward</p>	
--	--	--	--	--	--	--	--	---	--

								looking, drawing on experience from our own businesses, other companies, start-ups and entrepreneurs.	
Changing consumer behaviour	<p>Increasing expectations on companies on climate change</p> <p>Society's expectations on companies to address climate change are rising and climate change is playing an ever greater role in shaping perceptions of brands and customer purchasing decisions. If we do not demonstrate robust action on climate change to our stakeholders, such as our customers and investors, we risk facing reputational damage.</p> <p>Reputational damage could have a wide range of consequences. It could impact our ability to attract and retain customers, limit our cash-flow from investors, lead to regulatory intervention and hinder our ability to maintain a talented workforce to serve our</p>	Reduced demand for goods/services	Up to 1 year	Direct	Unlikely	Medium	<p>Brand and reputational damage can arise through the perception that energy companies are not proactively supporting or managing climate change issues effectively, however it is difficult to quantify brand risk.</p> <p>Lower levels of trust could impact our reputation as a leading provider of low carbon products and reduce our share in a range of markets, such</p>	<p>We continue to demonstrate leadership on combatting climate change through our focus on empowering customers to reduce their impact via technology, innovation and cultural change. Towards this in the UK, we delivered 119,000 energy efficiency measures via ECO in 2016 and have enabled customers to save 27mtCO₂e through products including insulation, smart meters and solar panels since 2008.</p> <p>We also transparently demonstrate our commitment to safeguarding the environment across our operations. We publish the progress we are making towards</p>	<p>£151m was committed towards ECO in 2016 while our direct fixed costs for managing the scheme is c.£3.6m each year.</p> <p>During 2015-17, British Gas is investing an additional £50m in customer service systems and people capability, enhancing our ability to provide advice and offerings that improve energy management.</p>

	<p>customers. Moreover, our plans to develop innovative energy offerings in response to declining energy demand, are reliant on customer trust in our low carbon credentials and capabilities.</p> <p>While public trust in the energy sector is relatively low, it has improved over the last three years.</p>					<p>as solar where our UK business had an annual revenue of £12.8m in 2016.</p> <p>There has also been a heightened media and political focus on the industry and more direct intervention by the UK Government and regulator. These conditions, together with a competitive market environment, contributed to a 3% fall in UK Home energy customer accounts during 2016 and fed into the 8% operating profit loss for this business area.</p> <p>This provides a sense of the scale of the risk a loss of trust can have for Centrica.</p>	<p>achieving stretching carbon reduction targets each year and we have chosen to generate and sell energy that consistently has one of the lowest carbon intensities among major energy suppliers in the UK.</p> <p>We actively engage key stakeholders on how we are helping transition to a lower carbon future in order to protect our reputation and seek feedback on how we can improve. For example in 2016, we continued to engage the Aiming for A investor coalition and the Institutional Investors Group on Climate Change, to collaborate on addressing risks and opportunities relating to climate change.</p> <p>To reduce reputational risk, we deployed a reputational tracking and monitoring programme in 2016, which has been fully embedded in the business. Working with a market-leading agency, we are now able to monitor corporate reputation and its drivers to identify areas for improvement and focus, which incorporates climate change.</p>	
--	---	--	--	--	--	---	--	--

--	--	--	--	--	--	--	--	--	--

CC6. Climate Change Opportunities

CC6.1: Have you identified any inherent climate change opportunities that have the potential to generate a substantive change in your business operations, revenue or expenditure? Tick all that apply

- Opportunities driven by changes in regulation
- Opportunities driven by changes in other climate-related developments

CC6.1a: Please describe your inherent opportunities that are driven by changes in regulation

Opportunity driver	Description [max 2400 characters]	Potential impact	Time-frame	Direct / Indirect	Likelihood	Magnitude of impact	Estimated financial implications [max 1000]	Management methods [max 1500]	Cost of management [max 1000]
Other regulatory drivers	<p>Support for new technologies</p> <p>Legislation to provide financial support for microgeneration, coupled with a reduction in technology costs, have helped grow a substantial market for distributed energy technologies. Whilst changes to financial support provided over recent years will have a negative impact on some technologies, we believe a significant opportunity remains for distributed energy which is why we are looking to expand activity in this area.</p> <p>The subsidy regime for micro-generation technologies has changed since August 2015. For solar, Feed-in-Tariffs (FITs) have been substantially reduced and withdrawn from the Renewable Obligation Certificates (ROC). However, we still believe there are opportunities for solar, particularly for industrial and commercial customers.</p> <p>The Renewable Heat Incentive (RHI) supports renewable heat technologies, such as biomass heating, for domestic and non-</p>	New products/business services	Up to 1 year	Direct	Likely	High	<p>In 2013, the UK Government revised the timescale to roll-out around 53m smart meters as standard by 2020. Smart meters are helping increase customer satisfaction and retention, demonstrated with 66% of smart credit customers having higher satisfaction with their smart meters than with the standard meter.</p> <p>In the US, there are more than 65m smart meters, projected to reach 90m by 2020. Our smart meter-enabled TOU product, Free Power Saturday/Sunday, has reduced</p>	<p>By the end of 2016, British Gas led the industry on smart meter deployment, having installed 3.9m in homes and businesses which equates to 70% of all smart meters in the UK. Smart meters are key to offering new smart-enabled products and services and in 2015, we acquired AlertMe and created a global Connected Home business in 2016 to enhance our smart-enabled products and services. In 2016-17, we expanded our range of Hive products and the geographies in which we sell them. For example, products now include smart plugs and lights, allowing customers in the UK, Ireland and North America to control usage remotely. In North America using smart meters, we created TOU products and reward customers in Texas who reduce energy use during peak periods.</p>	<p>We have invested in smart metering through a €4.5m (£3.6m) stake in PCC.</p> <p>We also acquired AlertMe in 2015, building on our existing 21% stake which takes the overall purchase price to £65m.</p> <p>Since 2008 we have invested over £10m in acquiring solar, biomass and renewable heat businesses in the UK. Direct Energy has invested US\$250k (£186k) to develop our Free Day time-of-use products, our outgoing Nest partnership & digital projects initiatives.</p> <p>In 2016, we acquired ENER-G for £129m while Neas Energy was acquired for £210m.</p>

	<p>domestic markets. Though the changes proposed are likely to create a contraction in the biomass market due to reductions in the level of subsidy available, there will still be possible renewable heat opportunities.</p> <p>Smart meters provide potential significant commercial opportunities. They can enable the creation of new propositions, increase customer satisfaction and provide opportunities for engagement on energy efficiency services. Findings of the Competition and Markets Authority Review in the UK during 2016, demonstrated support for the smart meter roll-out which could stimulate competition, facilitate greater innovation in smart products and services as well as help address supply and demand side issues. In the US, the introduction of smart meters in certain States have enabled Direct Energy to provide customers with new products. Prepayment plans help customers proactively manage their energy consumption, enabling a 14% reduction in electricity usage on average. Time-of-use (TOU) plans also cut overall demand on the grid at peak periods, reducing the need to turn on additional fossil fuel power plants.</p>					<p>customer attrition by 11% on average.</p> <p>By the end of 2016, 11.5GW of solar had been installed in the UK.</p> <p>While studies projected the market for renewable heat and solar to be worth around £0.5bn and £1bn respectively by 2020, they are likely to be impacted by changes to the RHI and FIT. We expect the RHI to be reviewed in the 2017 Autumn Budget and hope the scope of the scheme will widen the range of low carbon technologies.</p> <p>In 2016, we installed solar panels totalling 7.5MW in the UK and 33.1MWp in the North America.</p>	<p>We also investigate emerging products such as combined heat and power (CHP) systems and battery storage. We aim to test and improve products to reduce costs which increase potential market adoption and carbon savings. Towards this, we acquired ENER-G Cogen, a leading supplier and operator of CHP and Neas Energy, a leader of energy management and revenue optimisation services for decentralised assets.</p> <p>We continue to engage Government on bringing low carbon technologies such as Gas Absorption Heat Pumps (GAHP), hybrids and micro CHP into scope for the RHI alongside an up-front subsidy to enhance residential take-up.</p>	
--	--	--	--	--	--	--	---	--

<p>Air pollution limits</p>	<p>Driving low carbon offerings through Environmental Protection Agency (EPA) carbon pollution standards</p> <p>In the US, the prospect of federal climate legislation has been diluted, with the Government on course to reverse nearly two dozen environmental rules, regulations and other related policies during 2017. The Government has directed the EPA to review or rescind the Clean Power Plan, which will take time and faces lawsuits from environmental groups. As a result, implementation of the Plan has been on hold since February 2016. This has led to commercial opportunities at the state level regarding implementation, having dissipated.</p> <p>However, despite the announcement in 2017 that the US will withdraw from the Paris Accord, a large number of businesses, cities and states have pledged their enduring commitment to comply with the Accord. In doing so, this will create potential commercial opportunities for our products and services in the future.</p>	<p>Increase demand for existing products/services</p>	<p>1 to 3 years</p>	<p>Direct</p>	<p>About as likely as not</p>	<p>Low-medium</p>	<p>The net financial implications of current federal regulatory policies are unclear as the EPA's carbon control rules are not final.</p>	<p>In Texas, Direct Energy leverages smart meters to provide energy efficiency advice and personalised reporting on a weekly basis to customers with smart meters. We also offer TOU products that incentivise consumers to shift usage to off-peak periods, such as Saturday and Sunday which has resulted in a 15% reduction in weekday usage.</p> <p>We bundle our energy with control-based smart tools, such as smart thermostats. Customers with smart thermostats can save around 11% on heating bills and 15% on cooling bills by setting schedules and controlling usage remotely.</p> <p>Our energy efficiency technologies give greater control to customers and we pair them with heating, ventilation and air-conditioning services, such as seasonal tune-ups and maintenance that make it easy for customers to have a more efficient home.</p> <p>Building on our acquisition of Astrum Solar in 2014, Direct</p>	<p>Ongoing costs to develop low carbon and energy efficiency products and services are built into our operational budgets. For instance, it costs over US\$250k (£186k) to develop Direct Energy's Free Day time-of-use products, our outgoing Nest partnership and digital initiatives.</p> <p>In 2014, we acquired Astrum Solar for US\$53m (£33m) to enter the US residential solar market.</p>
-----------------------------	---	---	---------------------	---------------	-------------------------------	-------------------	---	---	--

								Energy Solar completed 2,500 residential solar installations with a combined power output of 21.7MWp.	
Other regulatory drivers	<p>Regulation to promote distributed energy generation</p> <p>We welcome the focus on ensuring appropriate policy and regulation is in place to support innovation and investment in decentralised energy technology.</p> <p>The growth of new decentralised technology will help the UK on its path to a 'smart power' system in the UK as we continue to decarbonise. Using a combination of embedded generation, storage, energy efficiency and demand side response measures, distributed energy has a key role to play in helping the UK balance the key priorities of keeping energy affordable and secure while meeting our carbon reduction commitments.</p> <p>Through Government and regulatory support there are some accessible incentives and subsidies available. These can help encourage decentralised energy and better management of the grid, providing opportunities for our Distributed Energy & Power</p>	Increase d demand for existing products/ service and	1 to 3 years	Direct	Likely	High	<p>In 2016, our DE&P business had an operational revenue of £159m, up from £92m in 2015. The market for Distributed Energy and Power is expected to grow significantly in the future, presenting growth opportunities for Centrica who are well positioned to be a leader in this area. Forecasts state distributed generation, such as solar and small-scale flexible gas turbines, could grow from a 2% global market share in 2014 to 12% in 2030.</p> <p>In the UK, we estimate that distributed</p>	<p>In 2015, we established a new global DE&P business to revolutionise the traditional, centralised way of generating and supplying energy. This gives large-scale energy users such as businesses and hospitals, the ability to take control of their energy and use it more intelligently to reduce, generate and manage it themselves. DE&P is bringing together flexible, local generation with storage and renewable technologies alongside energy efficiency measures and smart building management systems.</p> <p>We have expanded our capabilities through acquisition of Panoramic Power, a provider of device-level energy management solutions, ENER-G, a supplier of CHP solutions and Neas Energy, who provide trading optimisation for customers with decentralised assets.</p>	<p>Centrica expects to invest £700m in growing our DE&P business during 2015-20. This includes our acquisition of ENER-G for £129m and Neas Energy for £210m.</p> <p>In 2015, Centrica also bought Panoramic Power for £39m.</p> <p>We estimate the total employee costs to be in the region of £200k per year for working on regulation to promote distributed generation.</p>

	(DE&P) business, our customers and wider society.					<p>energy solutions could in time save business 10-20% on their energy costs, equating to a £2-4 billion saving.</p> <p>Meanwhile, according to the Department for Business, Energy and Industrial Strategy, the role of Distributed Energy & Power in building smarter energy systems, has the potential to save the UK £8bn a year by 2020.</p> <p>Panoramic Power, a part of our DE&P business, experienced rapid growth in 2016 with H2 2016 sales up 65% compared to H1 2016.</p>	<p>In 2016, Centrica announced a pioneering £19m local energy market trial in Cornwall which will install the latest technologies in 150 homes and businesses and connect them to a virtual marketplace, enabling them to buy and sell their flexible energy. The £19m project is part-funded by the EU Regional Development Fund and will support global decarbonisation and renewable energy in a decentralised model.</p>	
--	---	--	--	--	--	--	--	--

CC6.1c: Please describe your inherent opportunities that are driven by changes in other climate-related developments

Opportunity driver	Description [max 2400 characters]	Potential impact	Time-frame	Direct / Indirect	Likelihood	Magnitude of impact	Estimated financial implications [max1000 characters]	Management methods [max 1500 characters]	Cost of management [max 1000 characters]
Changing consumer behaviour	<p>Consumer behaviour change on energy saving</p> <p>Changing consumer behaviour is an increasing factor in the market for low carbon products and services. Concern about rising energy costs in the UK has focused attention on reducing energy consumption while weather events across the US have raised awareness for consumers and businesses around their energy use and environmental footprint.</p> <p>To this end, our global Connected Home and DE&P businesses are striving to give customers what they want – more control, choice and the ability to lower their energy bills and carbon emissions.</p> <p>In the UK, smart meters and new smart-enabled propositions are influencing consumer behaviour. In our 2016-17 sample of customers with smart meters, we found customers reduced their dual fuel consumption by around 3.5% on average. We expect this figure to rise to around 5% when we measure the impact</p>	Increased demand for existing products/services	1 to 3 years	Direct	More likely than not	High	<p>Our Connected Home gross revenue grew 74% in 2016, reflecting increasing demand for our products. Connected Home is a significant growth area and by 2020, forecasts suggest the world will have 50bn connected devices while smart thermostats will rise rapidly to 60m in North America and 4m in the UK.</p> <p>Our leadership position in the mandated smart meter roll-out, is also helping enhance customer experience and retention, with</p>	<p>In 2015, Centrica reshaped its business to build new capabilities for the future by establishing global Connected Home and DE&P businesses, to deliver cutting-edge products and services that satisfy the changing needs of our customers. This built on our acquisition of AlertMe, the UK-based energy management products and services company. As part of our DE&P business in 2016, we expanded our capabilities by acquiring ENER-G, an established supplier and operator of CHP solutions and Neas Energy, a provider of enhanced energy optimisation for decentralised assets.</p> <p>By the end of 2016, we had installed 3.9m smart meters in the UK through our in-house metering business.</p> <p>In the US, we offer TOU products to incentivise consumers to shift usage</p>	<p>We expect to invest £1.2bn during 2015-20 in our Connected Home and DE&P businesses to develop our product and service offerings for customers.</p> <p>We have made capital investments of €4.5m (£3.6m) for a stake in Power Plus Communications (PPC) and in early 2015, we acquired AlertMe for £65m (including our previous 21% stake).</p> <p>Direct Energy has also already invested over US\$250k (£186k) to develop our Free Day TOU products, our outgoing Nest partnership and digital initiatives.</p> <p>In 2014, we acquired Astrum Solar for US\$53m (£33m) to enter the US</p>

	<p>of additional feedback tools such as apps and as we further develop 'my energy' our interactive online tool which provides smart meter customers with additional insights into their pattern of consumption.</p> <p>In North America, we have created new product offerings by combining energy supply with smart thermostats that provide customers with the ability to control and learn about their energy usage. We also continue to expand the range of smart-enabled products, such as TOU, which improve customer retention while reducing demand on the grid during peak periods.</p> <p>Our Hive family of products is being rolled-out across North America during 2016-17, enabling customers to benefit from a range of products that give greater comfort and control over energy throughout the home.</p> <p>We are capitalising demand for solar in North America through our partnership with SolarCity, which enables us to provide solar electricity directly to commercial and industrial customers. We also acquired Astrum Solar in 2014 and continue to grow our residential solar business as demand increases, leading to</p>					<p>66% of smart credit customers having higher satisfaction than with their standard meter.</p> <p>The residential solar segment in North America is expected to grow 9% in 2017 while the non-residential solar market is predicted to grow 11% per year to 2022.</p> <p>The use of distributed generation and storage technologies is set to grow substantially, with forecasts suggesting that distributed generation could grow from a 2% global market share to 12% during 2014-30. In 2016, our DE&P business had an operational revenue of</p>	<p>to off-peak periods and we bundle our energy with control-based tools including smart thermostats, that enable customers to reduce energy use by around 11% for heating and around 15% for cooling.</p> <p>Direct Energy Solar also completed residential and business solar installations totaling 33.1MWp in 2016.</p> <p>British Gas installed over 120k high efficiency boilers in 2016.</p>	<p>residential solar market. We also agreed to fund up to US\$50m (£31m) as part of the SolarCity deal.</p>
--	--	--	--	--	--	---	---	---

	<p>Direct Energy Solar being ranked 8th nationally for installed megawatts by EnergySage in 2016.</p> <p>Through our DE&P business, we are giving large-scale energy users the opportunity to operate, monitor and optimise their energy like never before.</p>						£159m, up from £92m in 2015.		
Reputation	<p>Differentiating our business through low carbon products and services</p> <p>Having a positive reputation on the low carbon agenda, can differentiate us from our competitors and provide us with the necessary credibility to influence policy-making.</p> <p>Our commitment to microgeneration and smart metering gives us a significant opportunity to differentiate our businesses and tap into growing markets for low carbon products and services.</p> <p>We are dedicated to delivering our obligations that enable consumers to reduce carbon emissions through the Energy Company Obligation (ECO). British Gas also went early in its smart meter roll-out and by the end of 2016, we had installed 3.9m in homes and businesses, giving consumers increased control and insights into their energy.</p>	Increase d demand for existing products/ services	1 to 3 years	Direct	About as likely as not	Low-medium	<p>The potential market for community based schemes is significant, with £151m committed towards ECO in 2016, which includes community based schemes.</p> <p>The residential solar segment in North America is expected to grow 9% in 2017 while the non-residential solar market is predicted to grow 11% year-on-year to 2022.</p> <p>In 2016, Direct Energy Solar completed residential solar</p>	<p>In 2016, we installed more than 119,000 energy efficiency measures in the UK as part of our ECO commitments, generating lifetime savings of 4mtCO2e and reducing heating costs by an estimated £15.6m each year. By delivering ECO through our in-house central heating installation business and third-party contracts amongst other channels, we have been able to develop award-winning regeneration schemes in collaboration with our social housing clients. For instance, our £27m partnership with Southampton City Council is part-funded by ECO and will bring solid wall insulation and other energy efficiency improvements to 1.5k social houses.</p> <p>Our acquisition of AlertMe and investment in PPC are helping us take a leading</p>	<p>Since 2008, we have invested over £10m in acquiring solar, biomass and renewable heat businesses in the UK. Our fixed costs for managing and solar in the UK are approximately £2.5m per annum respectively.</p> <p>In 2014, we acquired Astrum Solar for US\$53m (£33m) to enter the US residential solar market and we continue to offer our residential customers solar panels through Direct Energy Solar. We have also agreed to fund up to US\$50m (£31m) as part of the SolarCity deal.</p>

	<p>We support innovation and best practice across the industry. For example, we are working with UK Power Networks on 'energywise', which aims to facilitate learning on smart for vulnerable and fuel poor customers. 'energywise' is a 3-year smart grid project involving 350 homes in Tower Hamlets.</p> <p>Trials will be conducted to understand the challenges and best approaches to engaging this group of customers, how they can benefit from energy efficiency and participate in demand side response, along with quantifying the network service that these customers could provide. The project is the first smart grid project to focus on the impact of pre-payment smart meters as well as customers living in flats.</p> <p>In North America, we are differentiating our Direct Energy business as the company that helps our customers use less of the product we sell. Our investment in solar and development of demand response, smart thermostats and energy saving products and services, supports the reputation we want to develop as the company that saves customers energy.</p>					<p>installations that totalled 21.7MWp and provided solar energy to business customers through our fund with SolarCity, financing 11.4MWp worth of solar projects.</p>	<p>position in the Connected Home market. At the start of 2017, we had installed over 527,000 Connected Home hubs, giving customers the ability to better manage their energy.</p> <p>Our involvement in 'energywise' puts us at the forefront of learning around smart metering and the technical solutions required to overcome the current limitations with installing smart meters in buildings that are tall, have flats and multiple dwelling units.</p>	
--	---	--	--	--	--	--	--	--

	We see that customers who receive energy efficiency and low carbon products or advice, gain greater control over their energy and are more likely to have a positive perception of the company and experience increased levels of satisfaction.								
Other drivers	<p>Attracting and retaining talent</p> <p>Having a talented workforce is key to building a successful business, capable of delivering a sustainable energy future.</p> <p>By pursuing a leadership position in smart metering, the Connected Home and DE&P, we aim to attract, retain and develop a highly motivated and skilled workforce that enables us to improve credibility in the marketplace and is capable of providing innovative products and services that act as a key differentiator when compared to our competitors.</p> <p>As part of this, our 12,000 engineers and technicians, alongside our Technology and Engineering (T&E) and Centrica Innovations (CI) team, enable us to capitalise on new opportunities brought about by consumer demand or regulation, including those relating to carbon reduction.</p>	Other: Increased productivity	Up to 1 year	Direct	About as likely as not	Medium	<p>With the mandated smart meter roll-out in the UK and the forecasted growth of both the Connected Home and DE&P business areas, we expect the financial implications of attracting and retaining the right people with the right skills to have a medium financial impact.</p>	<p>In 2016, British Gas trained around 8,000 engineers and 1,200 apprentices to install boilers, smart meters and energy efficiency products, including through our six academies. Direct Energy trained an additional 130 technicians through partnerships with local schools.</p> <p>Our T&E function, established in 2016, acts as a catalyst for innovation by bringing together our technical specialists, scientists and engineers from across the business to provide guidance, insight and support to the business units in planning the right strategies to manage potential future technological disruption, including those that may lead to carbon reduction.</p> <p>CI, a new venture announced in 2017, additionally ensures Centrica identifies</p>	<p>British Gas invested £35m in training engineers and apprentices in 2016.</p> <p>Our expected £1.2bn investment in our Connected Home and DE&P businesses during 2015-20, involves the acquisition of skills.</p> <p>Wider investments relating to skills, are embedded as standard in business management spend.</p>

								opportunities and is aligned to new innovations that benefit customers, including those that can help them gain greater control over their energy. The team is small, agile and outward looking, drawing on experience from our own businesses, other companies, start-ups and entrepreneurs.	
Changing consumer behaviour	<p>Growth in electric vehicle services</p> <p>In the UK, a third of all pollutants in city air comes from transport. This has led to a push for vehicles with zero tail pipe emissions, such as electric vehicles (EVs), which are driven by air emission regulations, city air quality strategies and Government incentives relating to tax amongst others.</p> <p>Our British Gas New Connections team have seized the opportunity to facilitate the provision of EVs by making it possible for users to charge the vehicles electric battery via specialised charging points. We have electricians that can install, commission and maintain these charge points in private, public or workplace locations.</p> <p>Workplaces and public sites often do not have sufficient spare electricity capacity to</p>	Increase demand for existing services	1-3 years	Direct	More likely than not	Low	<p>The UK is experiencing an EV boom, demonstrated by vehicle sales reaching a 12-year high and market share expanding to 4.2% in 2017.</p> <p>It is predicted this expansion will continue. Through the Clean Energy Ministerial 30@30 campaign, the UK and US have agreed to ensure at least 30% of new vehicle sales will be EVs by 2030.</p> <p>Analysts also suggest that by 2022, EVs will be cheaper</p>	<p>Since our electric vehicle services businesses was established in 2013, we have installed approximately 40% of the 1k public rapid chargers which are located in high-demand places, such as Welcome Break Service Stations and Westfield Shopping Malls. Around 4k additional charge points have been installed at workplace or retail locations alongside 8.5k chargers in residential homes.</p> <p>We contract our services to site hosts or owner operators of the chargers. As part of this, we survey a site, design the build and quote the customer for the works.</p>	The business is a start-up and remains relatively small. Since 2013, we have invested £5.5m (opex and cost of goods sold).

	<p>host new electric vehicle chargers so a new meter connection is required from the grid to ensure supply. Our New Connections and Metering business is well positioned to undertake these activities.</p> <p>There are additional opportunities within the Electric Vehicle Industry value chain that Centrica could explore, including owning of its own public chargers through which to sell electricity to the end consumer.</p>						<p>than conventional cars on a total cost of ownership basis which will drive the need for rapid expansion of charge points, eventually overtaking petrol stations.</p> <p>We are realising revenues of around £2m annually, with a gross profit margin of 15%. If the business is to expand, additional capital investment would be required.</p>		
--	--	--	--	--	--	--	--	--	--

CC6.1e: Please explain why you do not consider your company to be exposed to inherent opportunities driven by changes in physical climate parameters that have the potential to generate a substantive change in your business operations, revenue or expenditure [maximum 2400 characters]

We have identified the following opportunities associated with the physical impacts of climate change which have the potential to affect our business. These impacts, however, are not considered to generate a substantive change in our business operations although it could create additional growth predominantly in our Connected Home and DE&P businesses, which support our strategy to satisfy the changing needs of our customers alongside the transition to a lower carbon future.

- Long-term changes to weather patterns will create challenges for our customers. While the possibility of milder winters will lead to a reduction in energy demand for heating, warmer summers will create increased demand for cooling during the day and night. This could lead to significant changes in patterns of demand. Our primary opportunity is to play a major role in helping our millions of customers adapt to the effects of climate change. This includes helping our customers manage changing demand patterns through energy management products, such as time-of-use tariffs, smart thermostats and other energy usage management tools.

- The UK Government has stated its commitment to ensuring that society is adapting to the effects of climate change and has identified its role as a coordinator in providing an environment conducive to adaptation. This could provide us with opportunities to expand our whole-house approach and to position ourselves as the preferred supplier, able to meet new requirements in a holistic manner.

- We cannot be specific about other opportunities available to us until the physical impacts of climate change and Government responses become more certain. However, we anticipate that the infrastructure required to adapt to the unavoidable consequences of climate change, in both public and private sectors, will create further opportunities.

Evaluation process and relevance

Meetings occur throughout the year to continually evaluate the Group strategy in relation to the external economic, competitive, regulatory and policy context which includes risks and opportunities relating to climate change. The specific nature of the opportunities provided by the physical changes related to climate change are considered uncertain and therefore low in relative prioritisation compared to other strategic opportunities over our business planning timeframes.

Emissions

CC7. Emissions Methodology

CC7.1: Please provide your base year and base year emissions (Scopes 1 and 2)

Scope	Base year	Base year emissions (metric tonnes CO2e)
Scope 1	Tue 01 Jan 2008 - Wed 31 Dec 2008	10781982
Scope 2 (location-based)	Tue 01 Jan 2008 - Wed 31 Dec 2008	113098
Scope 2 (market-based)	Tue 01 Jan 2008 - Wed 31 Dec 2008	113098

CC7.2: Please give the name of the standard, protocol or methodology you have used to collect activity data and calculate Scope 1 and Scope 2 emissions

The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (Revised Edition)
Other

CC7.2a: If you have selected "Other" in CC7.2 please provide details of the standard, protocol or methodology you have used to collect activity data and calculate Scope 1 and Scope 2 emissions [maximum 5000 characters]

The 'other' category selected refers to the Defra Guidance on How to Measure and Report GHG Emissions; IPIECA Petroleum Industry Guidelines for Reporting GHG Emissions and EU Emissions Trading System (EU ETS).

We subscribe to best practice environmental accounting and disclosure, with the WRI & WBCSD Greenhouse Gas Protocol Initiative being our core GHG guidance document, but with consideration to others for particular components.

The data is submitted through an online data collection system. The submitters are employees/contractors within the Business Units who are identified as having the best access to accurate data for specific indicators. While the submitters are the 'owners' of the data, it is collated and quality assessed centrally at Group level. Where possible, we use independently verified data such as EU ETS emissions.

CC7.3: Please give the source for the global warming potentials you have used

Gas	Reference
CO2	IPCC Fourth Assessment Report (AR4 - 100 year)
N2O	IPCC Fourth Assessment Report (AR4 - 100 year)
CH4	IPCC Fourth Assessment Report (AR4 - 100 year)
HFCs	IPCC Fourth Assessment Report (AR4 - 100 year)
PFCs	IPCC Fourth Assessment Report (AR4 - 100 year)
SF6	IPCC Fourth Assessment Report (AR4 - 100 year)
Other: Chlorodifluoromethane (HCFC-22)	IPCC Fourth Assessment Report (AR4 - 100 year)

CC7.4: Please give the emissions factors you have applied and their origin; alternatively, please attach an Excel spreadsheet with this data at the bottom of the page

[Excel spreadsheet uploaded]

Further Information:

Note for CC7.1: The location-based result has been used as a proxy since a market-based result cannot be calculated.

CC8. Emissions Data

CC8.1: Please select the boundary you are using for your Scope 1 and 2 greenhouse gas inventory

Equity share

CC8.2: Please provide your gross global Scope 1 emissions figures in metric tonnes CO2e

5030801

CC8.3: Please describe your approach to reporting Scope 2 emissions

Scope 2, location-based	Scope 2, market-based	Comment Text field [maximum 2400 characters]
We are reporting a Scope 2, location-based figure	We are reporting a Scope 2, market-based figure	Our default reporting is location-based, however, we also calculate the marked-based figure.

CC8.3a Please provide your gross global Scope 2 emissions figures in metric tonnes CO2e

Scope 2, location-based	Scope 2, market-based (if applicable)	Comment
86292	54211	<p>We purchase power with supplier specific emissions in the Republic of Ireland and the UK.</p> <p>Our main scope 2 emissions relate to assets in the UK, the majority of which, have contracts with British Gas. British Gas has a supplier emission factor that is approximately one third of the DEFRA Grid factor, resulting in a significant reduction in our market based scope 2 emissions.</p> <p>We currently use location-based scope 2 as our default value, but as our systems and processes mature we will look to transfer to the market-based approach.</p>

CC8.4: Are there any sources (e.g. facilities, specific GHGs, activities, geographies, etc.) of Scope 1 and Scope 2 emissions that are within your selected reporting boundary which are not included in your disclosure?

Yes

CC8.4a: Please provide details of the sources of Scope 1 and Scope 2 emissions that are within your selected reporting boundary which are not included in your disclosure

Source	Relevance of Scope 1 emissions from this source	Relevance of location-based Scope 2 emissions from this source	Relevance of market-based Scope 2 emissions from this source (if applicable)	Explain why the source is excluded
Fugitive and venting emissions from non-operated offshore assets. These emissions will include small quantities of natural gas that mainly consists of methane.	Emissions are not relevant	No emissions from this source	No emissions from this source	<p>We do not currently collect fugitive and venting emissions from our UK offshore assets (gas and oil platforms) where we have an equity share, but are not the operator.</p> <p>This approach reflects the difficulty in obtaining this data and the immateriality of the data. We have previously estimated that excluded emissions are 0.1% of Centrica's scope 1 emissions.</p>
Emissions from buildings, vehicles and plant from acquisitions during the initial integration phase.	Emissions excluded due to recent acquisition	Emissions excluded due to recent acquisition	Emissions excluded due to recent acquisition	Consistent with our standard approach, we did not collect the emissions from our 2016 acquisitions (Neas and ENER-G Cogen), until the first full reporting period relevant to the entity. This was less than three months in these instances.

CC8.5: Please estimate the level of uncertainty of the total gross global Scope 1 and 2 emissions figures that you have supplied and specify the sources of uncertainty in your data gathering, handling and calculations

Source	Uncertainty range	Main sources of uncertainty	Please expand on the uncertainty in your data
Scope 1	More than 2% but less than or equal to 5%	Assumptions Metering/ Measurement Constraints	<p>Company car fuel use is mainly calculated based on submission of mileage data and not actual volume used. Vehicle size and fuel type data is averaged and not at individual vehicle level. Fugitive gas from pipes and equipment can only be calculated and not directly measured.</p> <p>Building gas consumption is estimated based on personnel numbers, floor space or historical data, in instances where it is a shared building or actual consumption data is not available.</p> <p>Where last year's EU ETS emission data is unavailable for a non-operated offshore asset, the emissions are based on the previous year's EU ETS emissions.</p>
Scope 2 (location-based)	More than 5% but less than or equal to 10%	Assumptions Metering/ Measurement Constraints	<p>For buildings where the landlord pays the utilities, we calculate electricity use based on the proportion of the building occupied.</p> <p>For some small offices, electricity for buildings have been estimated based on full-time equivalent employee occupancy.</p> <p>Canada gas production power consumption was estimated in 2016.</p>
Scope 2 (market-based)	More than 5% but less than or equal to 10%	Assumptions Metering/ Measurement Constraints	<p>In the UK, we supply power for the vast majority of our offices and facilities. However, there are a few sites where the power supply is managed by the landlord. In these instances, we do not know the supplier and therefore, we have to use the residual factor. This equates to less than 5% of our UK office electricity consumption.</p> <p>For countries where we have negligible power consumption, such as a single shared office, we have not attempted to calculate the market-based value as the impact on our overall emissions is immaterial.</p> <p>As per scope 2 location-based, buildings where the landlord pays the utilities and shared buildings, we typically calculate electricity use based on the proportion of building occupied. For some small offices, electricity for buildings has been estimated based on full-time equivalent employee occupancy.</p>

CC8.6: Please indicate the verification/assurance status that applies to your reported Scope 1 emissions

Third party verification or assurance process in place

CC8.6a: Please provide further details of the verification/assurance undertaken for your Scope 1 emissions, and attach the relevant statements

Verification or assurance cycle in place	Status in the current reporting year	Type of verification or assurance	Attach the statement	Page/ section reference	Relevant standard	Proportion of reported Scope 1 emissions verified (%)
Annual process	Complete	Limited assurance	[UPLOAD - 2016 Assurance Statement]	Pages 1-2	Other: ISAE3000 (Revised)	100
Annual process	Complete	Limited assurance	[UPLOAD - 2016 Basis of Reporting]	Pages 40-44: Total carbon emissions	Other: ISAE3000 (Revised)	100

CC8.7: Please indicate the verification/assurance status that applies to at least one of your reported Scope 2 emissions

Third party verification or assurance process in place

CC8.7a: Please provide further details of the verification/assurance undertaken for your location-based and/or market-based Scope 2 emissions, and attach the relevant statements

Location-based or market-based figure?	Verification or assurance cycle in place	Status in the current reporting year	Type of verification or assurance	Attach the statement	Page/ section reference	Relevant standard	Proportion of reported Scope 2 emissions verified (%)
Location-based	Annual process	Complete	Limited assurance	[UPLOAD: Assurance Statement 2016]	Pages 1-2	Other: ISAE3000 (Revised)	100
Location-based	Annual process	Complete	Limited assurance	[UPLOAD: Basis of Reporting 2016]	Pages 40-44: Total carbon emissions	Other: ISAE3000 (Revised)	100

CC8.8: Please identify if any data points have been verified as part of the third party verification work undertaken, other than the verification of emissions figures reported in CC8.6, CC8.7 and CC14.2

Additional data points verified	Comment
Progress against emissions reduction target	Centrica's Carbon Intensity of Central Power Generation target was also third party assured in 2016. This covers approximately 60% of Centrica's scope 1 emissions.

CC8.9: Are carbon dioxide emissions from biologically sequestered carbon relevant to your organization?

Yes

CC8.9a: Please provide the emissions from biologically sequestered carbon relevant to your organization in metric tonnes CO2

2310

Further Information

Please note Scope 1 and Scope 2 emissions values assured by Deloitte LLP for the 2016 Annual Report have been restated due to availability of improved data. Values previously assured – Scope 1: 5032493 tCO2e, Scope 2: 87216 tCO2e.

CC9. Scope 1 Emissions Breakdown

CC9.1: Do you have Scope 1 emissions sources in more than one country?

Yes

CC9.1a: Please break down your total gross global Scope 1 emissions by country/region

Country/Region	Scope 1 metric tonnes CO2e
United Kingdom	2888239
North America	697707
Ireland	979883
Norway	380422
Netherlands	67691
Rest of world	16859

CC9.2: Please indicate which other Scope 1 emissions breakdowns you are able to provide (tick all that apply)

By activity

CC9.2d: Please break down your total gross global Scope 1 emissions by activity

Activity	Scope 1 emissions (metric tonnes CO2e)
Power generation	3023902
Gas & oil production	1934358
Customer sales and services alongside Corporate Centre	72541

CC10. Scope 2 Emissions Breakdown

CC10.1: Do you have Scope 2 emissions sources in more than one country?

Yes

CC10.1a: Please break down your total gross global Scope 2 emissions and energy consumption by country/region

Country/Region	Scope 2, location-based emissions (metric tonnes CO2e)	Scope 2, market-based emissions (metric tonnes CO2e)	Purchased and consumed electricity, heat, steam or cooling (MWh)	Purchased and consumed low carbon electricity, heat, steam or cooling (MWh)
United Kingdom	59525	27460	144940	0
North America	25252	25252	132650	0
Ireland	1382	1344	3180	0
Rest of world	133	155	320	0

CC10.2: Please indicate which other Scope 2 emissions breakdowns you are able to provide (tick all that apply)

By activity

CC10.2c: Please break down your total gross global Scope 2 emissions by activity

Activity	Scope 2 location-based emissions (metric tonnes CO2e)	Scope 2, market-based emissions (metric tonnes CO2e)
Power generation	27212	13051
Gas and oil production	40430	27911
Customer sales and services and Corporate Centre	18650	13249

CC11. Energy

CC11.1: What percentage of your total operational spend in the reporting year was on energy?

More than 0% but less than or equal to 5%

CC11.2: Please state how much heat, steam, and cooling in MWh your organization has purchased and consumed during the reporting year

Energy type	MWh
Heat	0
Steam	0
Cooling	0

CC11.3: Please state how much fuel in MWh your organization has consumed (for energy purposes) during the reporting year.

21954592

CC11.3a: Please complete the table by breaking down the total "Fuel" figure entered above by fuel type

Fuels	MWh
Natural gas	21433620
Diesel/Gas oil	323942
Motor gasoline	89639
Distillate fuel oil No 2	106790
Wood or wood waste	824
Biodiesels	588

CC11.4: Please provide details of the electricity, heat, steam or cooling amounts that were accounted at a low carbon emission factor in the market-based Scope 2 figure you provided in CC8.3a

Basis for applying a low carbon emission factor	MWh consumed associated with low carbon electricity, heat, steam or cooling	Emissions factor (in units of metric tonnes CO2e per MWh)	Comments
Off-grid energy consumption from an onsite installation or through a direct line to an off-site generator	1173	0	We generated and consumed 1173MWh of power and heat on site, generated by a number of our UK offices using solar thermal and solar PV.

CC11.5: Please report how much electricity you produce in MWh, and how much electricity you consume in MWh

Total electricity consumed (MWh)	Consumed electricity that is purchased (MWh)	Total electricity produced (MWh)	Total renewable electricity produced (MWh)	Consumed renewable electricity that is produced by company (MWh)	Comment
282239	281090	1149	1149	1149	As a power generation company we generate large volumes of power from our centralised power stations. However, this power generation does not align with the intent of the question and has therefore been omitted. The values entered relate to the on-site power generation at our offices. Our offshore platforms have to generate their own power, but this is captured from the perspective of fuel consumption as opposed to power generation.

Further Information

CC11.1: As an international energy and services company, interpreting this question presents challenges. Under one definition, virtually all operational spend may be deemed to have been spent on energy as that is the purpose of our business. However, to provide comparisons with other companies and industries, we have interpreted this as energy used in the running of our business. The figure provided is an approximate figure based on the electricity and heating used at our offices, imported electricity used at our power stations and petrol/diesel costs for our fleet. We have employed an average price across our operations and have not included the costs of natural gas used to generate electricity or the costs of electricity purchased from third party providers for supply to our customers. These are specific to our business as an energy and services company and involve commercially sensitive contracts. We publish the amount of natural gas used and electricity purchased but not the costs.

CC12. Emissions Performance

CC12.1: How do your gross global emissions (Scope 1 and 2 combined) for the reporting year compare to the previous year?

Increased

CC12.1a: Please identify the reasons for any change in your gross global emissions (Scope 1 and 2 combined) and for each of them specify how your emissions compare to the previous year

Reason	Emissions value (percentage)	Direction of change	Please explain and include calculation
Emissions reduction activities	0.70	Decrease	<p>Panoramic energy monitoring devices were installed in four of our major offices in North America to accurately account for energy usage (gas & electricity) in buildings that we operate. This accurate monitoring in turn raises awareness and enables energy reduction opportunities to be identified. This has resulted in a 113tCO₂e reduction $(113/4,392,317)*100 = 0.003\%$ decrease.</p> <p>We re-mapped the engines of our UK commercial Fleet to more closely reflect the UK operating conditions resulting in a 650 tonne saving. Telematics were also introduced into the fleet as a fuel efficiency initiative, which has had a calculated saving of 1,275tCO₂e $(1,275+650)/4,392,317*100 = 0.044\%$ decrease.</p> <p>UK Property emission reduction initiatives in the offices which include LED lighting have resulted in 128tCO₂e saving $(128/4,392,317)*100 = 0.003\%$ decrease.</p> <p>At our Humber power station, degassed conductivity measurement units were installed to make the plant run more efficiently. Degassing the sample enables the power station to sync and start quicker when energy generation is needed. This accelerated start-up saved 28,530tCO₂e $(28,530/4,392,317)*100 = 0.65\%$ decrease.</p> <p>In total, emission reduction projects delivered savings of 30,696tCO₂e in 2016. Our total scope 1 and 2 emissions in the previous year were 4,392,317tCO₂e, therefore achieving a percentage saving of 0.70%: $(30,696/4,392,317)*100 = 0.70\%$ decrease.</p>
Divestment	0.08	Decrease	<p>Airtron Canada was divested in 2016 resulting in a 3,477tCO₂e reduction in emissions $(3,477/4,392,317)*100 = 0.08\%$ decrease.</p>
Acquisitions	2.8	Increase	<p>Two businesses were acquired in 2016 that impacted 2016 scope 1 and 2 emissions. Panoramic Power and Ener-G. Combined, these increased our scope 1 and 2 emissions $(123,196/4,392,317)*100 = 2.8\%$ increase.</p>

Mergers	0.0	No change	N/A
Change in output	14.78	Increase	<p>Favourable market conditions meant that our UK gas fired power stations ran more in 2016 than in 2015, meaning an increase in associated emissions $(520,211/4,392,317)*100 = 11.8\%$ increase.</p> <p>Our Whitegate power station in Ireland had increased generated power output (658GWH increase), resulting in an increase in emissions $(258,026/4,392,317)*100 = 5.9\%$ increase.</p> <p>A shutdown at our gas production terminal for operational reasons resulted in reduced output and hence reduced emissions at the terminal and associated platforms $(141,531/4,392,317)*100 = 3.2\%$ decrease.</p> <p>An increase in our Canadian gas production resulted in a 1.9% increase in emissions $(84,926/4,392,317)*100 = 1.9\%$ increase.</p> <p>A shutdown in our gas storage business, for operational reasons, resulted in a 1.6% reduction in emissions $(72,142/4,392,317)*100 = 1.6\%$ decrease.</p> <p>In total, there was a 649,490tCO₂e emission increase in 2016 due to change in output $(649,490/4,392,317)*100 = 14.78\%$ increase</p>
Change in methodology	0.0	No change	N/A
Change in boundary	0.0	No change	N/A
Change in physical operating conditions	0.0	No change	N/A
Unidentified	0.17	Decrease	The unidentified changes equate to 7400tCO ₂ e $(7,400/4,392,317)*100 = 0.17\%$ decrease.
Other	0.14	Decrease	<p>Changes in operation and operational plant on Norway platforms resulted in increased fuel use, resulting in an increase in emissions $(30,057/4,392,317)*100 = 0.7\%$ increase.</p> <p>Increased efficiency and less forced outages at Bord Gais's Whitegate power station resulted in a reduction in emissions $(36,411/4,392,317)*100 = 0.83\%$ decrease.</p> <p>Combined, these two changes resulted in a 6,354tCO₂e reduction $(6,354/4,392,317)*100 = 0.14\%$ decrease.</p>

CC12.1b: Is your emissions performance calculations in CC12.1 and CC12.1a based on a location-based Scope 2 emissions figure or a market-based Scope 2 emissions figure?

Location-based

CC12.2: Please describe your gross global combined Scope 1 and 2 emissions for the reporting year in metric tonnes CO2e per unit currency total revenue.

Intensity figure	Metric numerator (Gross global combined Scope 1 and 2 emissions)	Metric denominator: Unit total revenue	Scope 2 figure used	% change from previous year	Direction of change from previous year	Reason for change
0.000189	metric tonnes CO2e	27102000000	Location-based	20	Increase	The 2016 financial intensity figure is 0.000189. This is a 20% increase on 2015's intensity of 0.000157 and is a result of our scope 1 and 2 emissions increasing by 16.5%, mainly due to increased UK thermal power generation, while our revenue decreased by 3.1%. The increase in emissions intensity by revenue reflects the improved market conditions for gas fired power stations in the UK.

CC12.3: Please provide an additional intensity (normalized) metric that is appropriate to your business operations

Intensity figure	Metric numerator (Gross global combined Scope 1 and 2 emissions)	Metric denominator	Metric denominator: Unit total	Scope 2 figure used	% change from previous year	Direction of change from previous year	Reason for change
0.145	metric tonnes CO2e	megawatt hour (MWh)	21075000	Location-based	21	Increase	Centrica has set a 2020 target of 0.200tCO2/MWh (200gCO2/KWh) for power generation from our global assets, based on equity share. (Note: this target is based on ETS CO2 emissions (or equivalent) and not Total scope 1 and 2 emissions, however Total scope 1 and 2 emissions of the generating assets have been used here). In 2016, our Total Carbon Emission power generation carbon intensity was 0.145tCO2e/MWh (145gCO2e/KWh); a 21% increase from our 2015 intensity (0.119tCO2e/MWh).

							<p>This increase has been driven by an increase in thermal power generation from our UK and Ireland fleet of gas fired power stations. The increase in output is mainly as a result of improving market conditions for gas fired power stations.</p> <p>This increase in intensity has been predicted, and we are still on track to meet our 2020 target.</p>
--	--	--	--	--	--	--	---

CC13. Emissions Trading

CC13.1: Do you participate in any emissions trading schemes?

Yes

CC13.1a: Please complete the following table for each of the emission trading schemes in which you participate

Scheme name	Period for which data is supplied	Allowances allocated	Allowances purchased	Verified emissions in metric tonnes CO2e	Details of ownership
European Union ETS	01 Jan 2016 - 31 Dec 2016	776243	26244525	3446078	Facilities we own and operate
Alberta Emissions Trading Regulation	01 Jan 2016 - 31 Dec 2016	0	17597	139459	Facilities we own and operate

CC13.1b: What is your strategy for complying with the schemes in which you participate or anticipate participating? [maximum 5000 characters)

EU Emissions Trading System (EU ETS)

The cost of carbon has become an important factor in all investment decisions taken by Centrica in the power and gas markets. We actively use all available methods to manage our exposure to the risk of rising carbon costs through abatement and emissions trading. Centrica has been actively trading in the EU Emissions Trading market for over ten years and has also been active in the international carbon credit market. We aim to meet the cost of our carbon emissions in the most economic manner for our customers and shareholders. Centrica believes that flexibility is important to help installations manage their carbon exposure. We are constantly looking to manage our carbon position using both abatement and carbon credits. Using the trading markets enables us to effectively manage

cost exposures arising with regards to carbon pricing through the EU ETS. We also have in place robust procedures to ensure verification of our emissions and subsequent surrender of sufficient emissions allowances is carried out in line with the scheme requirements.

Alberta Greenhouse Gas Reduction Program

We have been active in the Alberta Greenhouse Gas Reduction Program since acquiring the Wildcat Hills Gas Plant in 2010. Emission reporting and compliance requirements are met through a regular review of all applicable government regulations. Professional consulting services are also employed to make recommendations for future events or procedures such as the design of an information or control system. A third party verification process has been built into the GHG reduction programme to provide assurance. Verification is also used to test past data and the independent verifier may provide observations on areas for improvement Allowances are surrendered in line with the scheme requirements for our verified emissions.

CC13.2: Has your organization originated any project-based carbon credits or purchased any within the reporting period?

No

Further Information

CC13.1a, EU ETS: For completeness, the allowances, purchases and verified emissions under EU ETS – UK for Centrica Storage Limited (CSL) have been included in the response in 13.1a in addition to those from our power generation and gas and oil exploration and production businesses.

CC14. Scope 3 Emissions

CC14.1: Please account for your organization's Scope 3 emissions, disclosing and explaining any exclusions

Sources of Scope 3 emissions	Evaluation status	Metric tonnes CO2e	Emissions calculation methodology [max 2400 characters]	Percentage of emissions calculated using data obtained from suppliers or value chain suppliers	Explanation [maximum 2400 characters]
Purchased goods and services	Relevant, calculated	1433473	Emissions are calculated using European spend data	0	The Purchased Goods and Services emissions have been calculated to be approx. 1% of our scope 3 emissions, using the online Quantis Scope 3 Evaluator tool. The tool calculates the emissions associated with scope 3 categories using spend data and category types.
Capital goods	Not relevant, explanation provided	0	N/A	0	Centrica did not undertake any significant capital projects in 2016.

Fuel-and-energy-related activities (not included in Scope 1 or 2)	Relevant, calculated	71238135	<p>This relates to power purchased for resale to customers, but excludes traded power.</p> <p>The activity data is power sold (MWh) and the associated carbon is based on site specific emissions where we have site specific contracts and one year Grid Rolling Averages for electricity purchased on the open market in the UK. In North America, the carbon emissions are calculated using national emission factors. Together, this totalled 65,285,999tCO₂e.</p> <p>Additionally, the Transmission and Distribution (T&D) losses equate to 4,676,570tCO₂e.</p> <p>Note: Where relevant, the scope 2 location-based approach has been used.</p> <p>Lastly the scope 3 emissions associated with our power and fuel consumption are calculated based on our scope 1 and 2 emissions. These equate to 1,275,566tCO₂e.</p>	0	<p>Centrica does not generate all the power that our customers require and hence, we purchase power from third parties and resell it to our customers. This is one of our main sources of scope 3 emissions and therefore very relevant to the company.</p> <p>The T&D losses are from both the power we resell and the power we consume at our own assets.</p> <p>The scope 3 fuel and energy related activities emissions associated with our scope 1 and 2 are also estimated using the Quantis Scope 3 Evaluator tool.</p> <p>In total, these equate to 49% of our scope 3 emissions.</p>
Upstream transportation and distribution	Not relevant, calculated	24251	<p>These emissions are from our offshore support providers, including supply and safety ships. The emissions are calculated by multiplying the fuel use activity data by DEFRA emission factors.</p>	0	<p>These emissions currently equate to 0.02% of our scope 3 emissions and therefore are not relevant in terms of magnitude. Our influence over the emissions is limited and they are not deemed an area that exposes us to risk.</p>
Waste generated in operations	Not relevant, calculated	23961	<p>Emissions from waste have been calculated from our spend on European waste services.</p>	0	<p>Carbon emissions associated with waste in our supply chain are not considered relevant from a materiality perspective, relative to other scope 3 emissions. However, they have been calculated using the Quantis Scope 3 Evaluator tool based on spend.</p>

Business travel	Relevant, calculated	15563	Business travel emissions include those arising from business flight and rail use, employees using their own vehicles for business purposes and helicopter flights for personnel to offshore assets. The flights (10,530tCO ₂ e) and rail (355tCO ₂ e) are calculated based on journey distance provided by our travel provider, multiplied by DEFRA emission factors. Emissions from employees using their own vehicles for business purposes (1671tCO ₂ e) are based on expense claims, using a generic emission factor for car mileage. Helicopter flights (3,006tCO ₂ e) are based on fuel consumption multiplied by DEFRA emission factors.	0	While this is only a small component of our scope 3 emissions (0.01%), it is an area that we can partly influence. Rail and flights are therefore part of our internal carbon footprint target.
Employee commuting	Not relevant, calculated	20400	Calculated using Quantis Scope 3 Evaluator tool.	0	This is an immaterial (0.01%) component of our scope 3 emissions and we have limited ability to influence the emissions. However, emissions have been calculated using the Quantis Scope 3 Evaluator tool.
Upstream leased assets	Not relevant, calculated	0	N/A	0	Our reporting approach includes upstream leased assets in our scope 1 and 2 emissions. Therefore, this field is not relevant.
Downstream transportation and distribution	Not relevant, explanation provided	9350	Calculated using Quantis Scope 3 Evaluator tool.	0	The vast majority of our emissions associated with the transportation and distribution of our products are included within the following source of scope 3 emissions: Fuel-and-energy-related activities (not included in scope 1 or 2). This is because these emissions relate to T&D losses from power and gas distribution. However using the Quantis tool, some relevant emissions were calculated based on our European spend profile.

Processing of sold products	Not relevant, explanation provided	0	N/A	0	As Centrica's primary products are electricity and gas that are used as end products, the emissions from the processing of sold intermediate products is not relevant.
Use of sold products	Relevant, calculated	72306968	Emissions are calculated based on the quantity of gas sold to residential and business customers (energy units), multiplied by the emission factor for natural gas. This totals 65,707,787tCO ₂ e. Crude oil production emission calculations are based on the CDP scope 3 Oil and Gas Guidance generic conversion and emission factors. This results in 7,525,000tCO ₂ e.	0	This is a relevant component of our scope 3 emissions in respect to its size (50% of our scope 3) and is relevant to the sector.
End of life treatment of sold products	Not relevant, explanation provided	0	N/A	0	We sell negligible volumes of product relative to the quantity of gas, electricity and services that we supply. These emissions are therefore not relevant.
Downstream leased assets	Not relevant, explanation provided	0	N/A	0	Centrica only leases a few properties. The emissions have been estimated based on typical consumption values. The emissions were calculated to be immaterial at approximately 0.00004% (2015). They, do not expose the organisation to risk and hence, are not considered relevant.
Franchises	Not relevant, explanation provided	0	NA	0	Centrica operates Franchises in the UK and North America, including the Dyno Franchise. We do not track franchisee carbon emissions, however these calculated emissions equate to less than 0.001% of our scope 3 (2015).
Investments	Not relevant, explanation provided	0	N/A	0	Centrica is not a financial organisation.

Other (upstream)	Not evaluated	0	N/A	0	N/A
Other (downstream)	Not evaluated	0	N/A	0	N/A

CC14.2: Please indicate the verification/assurance status that applies to your reported Scope 3 emissions

Third party verification or assurance process in place

CC14.2a: Please provide further details of the verification/assurance undertaken, and attach the relevant statements

Verification or assurance cycle in place	Status in the current reporting year	Type of verification or assurance	Attach the statement	Page/section reference	Relevant standard	Proportion of reported Scope 3 emissions verified (%)
Triennial process	Complete	Limited assurance	[UPLOAD: Centrica Assurance Statement 2016]	Pages 1-2	Other: ISAE3000 (Revised)	90%
Triennial process	Complete	Limited assurance	[UPLOAD: Centrica Basis of Reporting 2016]	Pages 50-52: Product Indirect Emissions	Other: ISAE3000 (Revised)	90%

CC14.3: Are you able to compare your Scope 3 emissions for the reporting year with those for the previous year for any sources?

Yes

CC14.3a: Please identify the reasons for any change in your Scope 3 emissions and for each of them specify how your emissions compare to the previous year

Sources of Scope 3 emissions	Reason for change	Emissions value (%)	Direction of change	Comment
Purchased goods and services	Change in methodology	22	Decrease	The 2015 value is based on detailed analysis undertaken by a specialist third party in 2014 and then pro-rated for 2016, while the 2016 emissions have been calculated using the Quantis Scope 3 Evaluator tool using 2016 spend. The two methodologies have different assumption data behind them making them difficult to compare.

Fuel- and energy-related activities (not included in Scopes 1 or 2)	Change in output	2	Decrease	There was a slight decrease in the power sold (1%) and the T&D losses have decreased (9%) as a result of activity data and of changes in emission factors.
Upstream Transportation and Distribution	Change in output	26	Increase	In 2016, there was an increase in shipping activity associated with our offshore interests which includes well drilling, platforms and wind farms. The ships are used for support the transfer of goods and surveys. The shipping activity reflects the offshore activity occurring in a particular year.
Business travel	Change in output	6	Decrease	Business travel has decreased in all activity areas including rail, flights, helicopter travel and employees using their own vehicles for business purposes (grey fleet). The most noticeable reductions were in grey fleet (31%) and rail travel emissions (19%).
Use of sold products	Change in physical operating conditions	6	Decrease	Centrica sold less gas to our customers resulting in a reduction of associated emissions (6.4%). Weather has a strong influence on the volume of gas our customers require. Oil production was down in 2016 (5.4%), resulting in lower emissions associated with its use.
Use of sold products	Emissions reduction activities	0.32	Decrease	Part of the reason for selling less gas to our customers can be attributed to the low carbon products and services we have provided to them, such as installing insulation in our customer's homes.

CC14.4: Do you engage with any of the elements of your value chain on GHG emissions and climate change strategies? (Tick all that apply)

- Yes, our suppliers
- Yes, our customers

CC14.4a: Please give details of methods of engagement, your strategy for prioritizing engagements and measures of success
[maximum 5000 characters]

We collaborate with our suppliers to better manage environmental, social and economic impacts which include GHG emissions, as well as supporting our customers reduce their emissions.

i Strategy for Prioritisation

Our strategy for supplier engagement is based on the potential supply chain risks and opportunities (R&O). Therefore while we undertake generic supply chain management strategies, we mainly focus on the suppliers who can have the greatest influence on our R&O:

1. Minimum expectations are set for all suppliers through supplier contracts
2. Potentially higher risk suppliers are assessed to identify their sustainability risk
3. Where necessary, suppliers receive an additional audit to inspect operations
4. Solutions are offered to customers to reduce their carbon emissions and raise awareness on energy reduction strategies

ii Methods of Engagement

1. Engagement with suppliers starts with us being clear that we expect them to uphold our Business Principles, which include a commitment to protect the environment. We also include sustainability clauses in supplier contracts and if underperformance is identified, we work with those suppliers on a remediation plan. Our supplier management programme also enables us to monitor performance through regular meetings with suppliers. Additionally, through our recent partnership with the Supply Chain Sustainability School, we are now able to collaborate with 45 partner companies to create new resources and create best practice approaches to efficiently manage new and emerging issues, including various environmental issues such as carbon management.
2. We have a supply chain risk management process that includes a supplier self-assessment tool. This requires higher risk suppliers (based on sector, country and spend) to report on issues that include their carbon risk and management approach. The tool enables us to understand associated R&O and where a supplier has scored inadequately, we work with them to develop an improvement plan.
3. If we identify a high risk supplier through the self-assessment tool or through another avenue, we can conduct an audit to better understand and manage risks. This can result in effective engagement where other approaches have been unsuccessful.
4. By supporting customers to lower their energy consumption, we can reduce the biggest source of carbon emissions related to our business, while lowering our customers' bills. We do this by making their homes more energy efficient by installing low carbon products such as solar panels and providing technology like smart meters, time-of-use plans and personalised smart energy reports to help them better understand and manage their energy use.

iii Measuring Success

Success in our supply chain is measured in the following ways: Ensuring that all our suppliers agree to and understand the sustainability clauses in supplier contracts; effective identification of potential high risk suppliers and managing that risk; seeing progressive improvement in supplier understanding and management of carbon, measured through periodic assessment. For example, during 2016, 73 potentially higher risk suppliers completed a self-assessment questionnaire. Of those assessed, no suppliers were deemed high risk and nine received a medium risk rating. The majority of the latter are now developing and implementing corrective action plans.

Success for our customers is to enable them to be smarter with their energy consumption which can reduce their carbon footprint and energy bills. This can be measured through monitoring installation of low carbon products and services, calculating theoretical customer carbon savings and actual energy and carbon saving studies. Increased customer awareness of how they can reduce and control energy use is also a sign of success that can be demonstrated through customer surveys. During 2016, we installed energy efficiency measures in the UK which will achieve approximately 245,970 of annual savings over their lifetime. We calculate that since 2008, we have helped our UK customers save over 27mtCO₂e. We are leading the roll-out of smart meters, having installed 3.9m in UK homes and business by the end of 2016. Our Hive Active Heating device also allows customers to control and set preferences for heating using mobile devices. As a result, 88% of Hive users with smart thermostats feel more in control over their heating by being able to actively reduce unnecessary energy use. Research shows Hive Active Heating has helped save our customers an average of 2.12% on their energy.

CC14.4b: To give a sense of scale of this engagement, please give the number of suppliers with whom you are engaging and the proportion of your total spend that they represent

Type of engagement	Number of suppliers	% of total spend (direct and indirect)	Impact of engagement
Compliance	99	19	<p>We engage our suppliers through our supply chain risk management process which includes a supplier self-assessment tool. This is based on a risk profile approach using criteria around country, sector and spend rather than focusing purely on our spend profile. 99 suppliers in our portfolio had a valid sustainability assessment score in 2016. Their related spend, as a percentage of our total spend, excludes transport and distribution costs. Where a supplier is deemed to have inadequate performance, we work with them to develop an improvement plan, in order to drive improvement in their sustainability performance. In 2016, the average supplier sustainability risk score was 57 (low risk), an improvement on our 2015 score of 54 (low risk). The score is also better than the multi-industry average of 42 (medium risk).</p>

Sign off

CC15. Sign off

CC15.1: Please provide the following information for the person that has signed off (approved) the CDP climate change response

Name	Job title	Corresponding job category
Grant Dawson	Group General Counsel & Company Secretary	Board/Executive board

Module: Electric utilities

EU0.1: Please enter the dates for the periods for which you will be providing data. The years given as column headings in subsequent tables correspond to the "year ending" dates selected below. It is requested that you report emissions for: (i) the current reporting year; (ii) one other year of historical data (i.e. before the current reporting year); and, (iii) one year of forecasted data (beyond 2021 if possible).

Year ending	Start date	End date
2016	01 Jan 2016	31 Dec 2016
2015	01 Jan 2015	31 Dec 2015
2021	01 Jan 2021	31 Dec 2021

Further Information

Please note that 2021 figures are indicative only and represent publicly known developments. All other figures are assumed to stay the same as 2016 and do not recognise other future changes in the generation portfolio.

EU1.1: In each column, please give a total figure for all the countries for which you will be providing data for the "year ending" periods that you selected in answer to EU0.1

Year ending	Nameplate capacity (MW)	Production (GWh)	Absolute emissions (metric tonnes CO ₂ e)	Emission intensity (metric tonnes CO ₂ e/MWh)
2016	5318	21077	2885488	0.137
2015	5937	18359	2143664	0.117
2021	5048	20537	2885488	0.141

Further Information

The 2016 generation increased as a result of stronger market conditions for gas-fired power generation. 2021 figures are indicative only and are based on 2016 asset portfolio unless a future change is known and the information is publicly available.

Page: EU2. Individual Country Profiles – Canada

Further Information

It is not applicable for Centrica to complete the Canada section.

Page: EU2. Individual Country Profiles - Ireland

EU2.1: Please select the energy sources/fuels that you use to generate electricity in this country

CCGT

EU2.1d

CCGT

Please complete the following table for the "year ending" periods that you selected in answer to EU0.1

Year ending	Nameplate capacity (MW)	Production (GWh)	Absolute emissions (metric tonnes CO2e)	Emissions intensity (metric tonnes CO2e/MWh)
2016	440	2584	976871	0.378
2015	440	1926	755256	0.392
2021	440	2584	976871	0.378

EU2.1k

Total thermal including solid biomass

Please complete for the "year ending" periods that you selected in answer to EU0.1

Year ending	Nameplate capacity (MW)	Production (GWh)	Absolute emissions (metric tonnes CO2e)	Emissions intensity (metric tonnes CO2e/MWh)
2016	440	2584	976871	0.378
2015	440	1926	755256	0.392
2021	440	2584	976871	0.378

EU2.1l

Total figures for this country

Please enter total figures for this country for the "year ending" periods that you selected in answer to EU0.1

Year ending	Nameplate capacity (MW)	Production (GWh)	Absolute emissions (metric tonnes in CO2e)	Emissions intensity (metric tonnes CO2e/MWh)
2016	440	2584	976871	0.378
2015	440	1926	755256	0.392
2021	440	2584	976871	0.378

Further Information

In the Republic of Ireland, Centrica has one CCGT power station; therefore the 'CCGT', 'Total Thermal' and 'Total Figures for this country' are the same.

Page: EU2. Individual Country Profiles – Netherlands

Further Information

It is not applicable for Centrica to complete the Netherlands section.

Page: EU2. Individual Country Profiles - Norway

Further Information

It is not applicable for Centrica to complete the Netherlands section.

Page: EU2. Individual Country Profiles - Trinidad and Tobago

Further Information

It is not applicable for Centrica to complete the Netherlands section.

Page: EU2. Individual Country Profiles - United Kingdom

EU2.1

Please select the energy sources/fuels that you use to generate electricity in this country

CCGT
Nuclear
Other renewables

EU2.1d

CCGT

Please complete the following table for the "year ending" periods that you selected in answer to EU0.1

Year ending	Nameplate capacity (MW)	Production (GWh)	Absolute emissions (metric tonnes CO2e)	Emissions intensity (metric tonnes CO2e/MWh)
2016	2824	4922	1901169	0.386
2015	3475	3429	1381474	0.403
2021	2824	4922	1901169	0.386

EU2.1e

Nuclear

Please complete the following table for the "year ending" periods that you selected in answer to EU0.1

Year ending	Nameplate capacity (MW)	Production (GWh)
2016	1784	13031
2015	1777	12126
2021	1784	13031

EU2.1h

Other renewables

Please complete the following table for the "year ending" periods that you selected in answer to EU0.1

Year ending	Nameplate capacity (MW)	Production (GWh)
2016	270	540
2015	245	878
2021	0	0

EU2.1k**Total thermal including solid biomass**

Please complete for the "year ending" periods that you selected in answer to EU0.1

Year ending	Nameplate capacity (MW)	Production (GWh)	Absolute emissions (metric tonnes CO2e)	Emissions intensity (metric tonnes CO2e/MWh)
2016	2824	4922	1901169	0.386
2015	3475	3429	1381474	0.403
2021	2824	4922	1901169	0.386

EU2.1l**Total figures for this country**

Please enter total figures for this country for the "year ending" periods that you selected in answer to EU0.1

Year ending	Nameplate capacity (MW)	Production (GWh)	Absolute emissions (metric tonnes in CO2e)	Emissions intensity (metric tonnes CO2e/MWh)
2016	4878	18493	1908617	0.103
2015	5497	16433	1388408	0.084
2021	4608	17953	1908617	0.106

Further Information

2021 figures are indicative only and are based on 2016 values unless a change has occurred to our generation portfolio and the information is publicly available.

EU2.1d: Some of our gas fuelled power station generation is through open cycle generation, however all our UK power stations are CCGT design and hence they have all been included in the above values. Please note there is a small quantity of carbon emissions as a result of nuclear power generation, but no opportunity to include in the table. The 2016 carbon emissions from nuclear were 7,448tCO2e.

EU2.1e: The nuclear name plate capacity has been aligned to our 'Reference Unit Power' figures. The production numbers are aligned to those shared with EDF. A production value is not available for 2021, as such; the most recent reporting year value has been used.

EU2.1L: The table includes the minor carbon emissions resulting from the nuclear generation, as well as the CCGT generation.

Further Information

It is not applicable for Centrica to complete the USA section

Page: EU3. Renewable Electricity Sourcing Regulations

EU3.1: In certain countries, e.g. Italy, the UK, the USA, electricity suppliers are required by regulation to incorporate a certain amount of renewable electricity in their energy mix. Is your organization subject to such regulatory requirements?

Yes

EU3.1a: Please provide the scheme name, the regulatory obligation in terms of the percentage of renewable electricity sourced (both current and future obligations) and give your position in relation to meeting the required percentages

Scheme name	Current % obligation	Future % obligation	Date of future obligation	Position in relation to meeting obligations
UK - Renewables Obligation	34.8	40.9	2018	The date of the future obligation is April 2017 – March 2018. Our position in relation to meeting our obligations will be formalised during October 2017 but Centrica remain fully compliant with the requirements of the Renewable Obligation.
Other: Renewable Portfolio Standards (Various)				Our obligations vary from state to state across the US.

Page: EU4. Renewable Electricity Development

EU4.1: Please give the contribution of renewable electricity to your organization's EBITDA (Earnings Before Interest, Tax, Depreciation and Amortization) in the current reporting year in either monetary terms or as a percentage

Please give:	Monetary figure	%	Comment
Renewable electricity's contribution to EBITDA		1.6	The achieved power price (including ROCs) for renewables in 2016 was £116/MWh. The total generation for which we received revenue was 539GWh. This resulted in renewables contributing 1.6% of total Centrica EBITDA.

EU4.2: Please give the projected contribution of renewable electricity to your organization's EBITDA at a given point in the future in either monetary terms or as a percentage

Please give:	Monetary figure	%	Year ending	Comment
Renewable electricity's contribution to EBITDA	0	0	2020	Centrica's strategy is to exit being an operator and owner of wind generation and therefore, renewable electricity's contribution to EBITDA will be nil in the long term. We will instead be an enabler of other operator's wind power, by securing wind energy through a limited number of Power Purchase Agreements.

EU4.3: Please give the capital expenditure (capex) planned for the development of renewable electricity capacity in monetary terms and as a percentage of total capex planned for power generation in the current capex plan

Please give:	Monetary figure	%	End year of capex plan	Comment
Capex planned for renewable electricity development	0	0		Centrica's strategy is to stop being an operator and owner of wind generation and hence capital expenditure in the long term will be nil.