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The Customer and the Changing Energy Landscape

Iain Conn, CEO, Centrica

Thank you. It is a pleasure to be here at the British Institute of Energy Economics speaking to you as Chief Executive of Centrica. I have been in this role for nearly one and a half years, after 29 years with BP where I held a variety of positions and where for the last seven years I was Chief Executive of the Downstream business.

Centrica is a diverse international energy company with a strategy built around the customer. I will elaborate on that a little later.

Although I've been in this job a relatively short time, a lot has happened. We have experienced plummeting oil and gas prices and general global economic uncertainty. In our core UK market, there was the General Election and the risk of Government intervention. We now have the impending EU referendum and we are moving towards a conclusion in the CMA enquiry into the functioning of the UK energy market.

But I think it would be unfortunate if we were to allow a fixation with the immediate problems facing our industry to distract us from the underlying trends in the energy market which will be more significant over the longer term. And that's what I want to talk about today.

I would first like to set the current situation in context, touching on the energy mix of the future, and then to describe some of the major changes I see in the way customers are re-shaping the demand function for energy.

So let me start briefly with the **energy mix** and what we have all learned over the last 20 years.

Most forecasters agree that, for the foreseeable future, we will remain heavily reliant on hydrocarbons, which in 2035 are still expected to account for about 80 per cent of global primary energy supply.

Within that 80 per cent figure, all the fossil fuels – coal, oil and gas – will have a roughly equal share of around 26 to 30 per cent each.

The primary energy mix will continue to diversify. And this process of diversification will be strongly influenced by energy policy.

I believe that – starting in 1995 and looking ahead to 2025 - we are experiencing **three distinct phases of energy policy** from Governments around the world.

Three phases of energy policy



Twenty years ago, we were in the **visioning** phase of post-climate change awareness. Following the 1992 Earth Summit in Rio, the priority was to align around a strong, consistent response to global warming, but with limited concrete ways of achieving this.

Over the last ten years or so, we have been in a phase of **experimentation**. Many solutions have been tested and some, such as Europe's Emissions Trading System, were only partially successful.

There have been subsidies for all types of renewable energy. Global renewable capacity has grown by 76% over the past decade, and energy consumption and GDP growth have begun to diverge, as have energy use and CO2 production.

But there have also been unintended consequences in terms of intermittency and cost to the consumer. In the European Union, for example, where decarbonisation has been mandated by policy, average retail energy prices are more than double those in the United States, where equivalent progress on decarbonisation has been driven more by market forces and - in particular - the revolution caused by cheap, abundant natural gas.

However, despite some setbacks, we have learned a huge amount which will benefit us in the coming years. In particular, we are learning that there are **natural and pragmatic pathways** that should be followed to achieve our energy and climate change objectives most effectively, without triggering unintended consequences.

So, over the next ten years, we should be pursuing material and pragmatic action. We have learned enough to know what to do and which pathways to follow.

For **power and heat**, the natural pathway is to focus on energy efficiency; natural gas; nuclear power where it is supported by Governments; and - over time - the steady growth in competitive renewable generation. It is also essential to move away from unabated coal.

Cost-competitive renewables are an essential part of the power and heat solution, and they are becoming more and more competitive. The levelised cost of utility-scale solar PV in countries such as the US has decreased by 16% a year between 2000 and 2015. The cost of onshore wind is now, in some cases, within the same range as new gas generation.

There will be a continued central role for natural gas. Gas, renewables and nuclear are expected to show the fastest growth over the next 20 years as sources of power. Of these, natural gas is likely to play the key material role in the transition to a lower carbon economy for both heat and power. Gas is cleaner than coal, cheaper than nuclear and more reliable than intermittent renewables.

Turning to **transport**, the logical pathway involves: energy efficiency - particularly from smaller, boosted internal combustion engines; hybridisation; some biofuels; and the development of electric vehicles at an average pace which allows for the decarbonisation of electricity production, although some customer segments and markets will adopt at an accelerated pace for reasons of fashion and performance.

Governments clearly have a key role to play in creating the right policy framework to open up these practical pathways and make them easier to pursue. But it is customers, within the framework established by Governments and regulators, who are the real enablers of change, and their behaviour is fundamental to the future energy mix and where and how energy will be used.

Three drivers transforming the energy systems



Looking through the lens of the customer, there are **three key drivers** transforming the energy system and changing how, where and when energy is produced and consumed.

The first is **what customers want and are now able to do**. Customers want affordable energy; they want choice; they want control and the ability to use less energy; and, increasingly, they want lower carbon.

In terms of **affordability**, survey evidence shows that the vast majority of customers in the UK and the United States regard price and affordability as the primary factor influencing their choice of energy supplier.

In terms of **choice** - it has never been greater. In the UK, there are now over 39 energy suppliers and in parts of Texas, customers now have over 400 different electricity products to pick from, with individual suppliers offering over 150 different options to suit customer needs. Price comparison websites are an everyday tool of choice for millions of energy customers.

Next, there's **control and the desire to use less energy**. More customers are acquiring the means to control their energy use proactively and remotely. In the UK, Centrica has the largest installed base of connected thermostats and we are now selling more than 4,000 connected products every week under the HIVE brand. To date, we have sold over 500,000 smart thermostats in the UK and North America. 98 per cent of customers with active heating under the HIVE brand feel more in control of their heating and 60 per cent use HIVE to reduce their energy use and save money.

Customers also want to control their own power generation. In 2015, it was estimated 4m households globally were equipped with domestic solar systems, this is forecast to grow to 25m homes by 2020. In the US residential solar capacity is forecast to nearly double in two years, from 5.4 Gigawatts in 2015 to 10 Gigawatts by 2017.

Finally, **lower carbon**. Environmental awareness has increased across society and is an important factor in purchasing decisions. In the industrial and commercial sector too, we are seeing more customers who want to make a difference to their carbon footprint.

So, the first key driver transforming the energy system is **what customers want and are now able to do**, which is significantly different to only ten years ago.

The second key driver of change is the **availability of technology**. The viability and use of distributed generation and storage technologies by households and businesses is set to grow rapidly. According to some forecasts, 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.

Distributed energy generation is economic today and will become more so. This is particularly true because of "power-by-the-hour" energy pricing.

Electricity storage is also poised to become an established and affordable technology. Lithium-ion battery prices fell by over 50% between 2012 and 2015.

Consumer technologies dominate our global culture. It is estimated that the world will have 50 billion connected devices by 2020. By the same year, there will be 200 million smart electricity meters and 45 million smart gas meters in the European Union alone.

Smart meters and smarter grids will enable the demand-side response technologies which allow consumers to become more actively engaged in reducing and flexing their demand.

So, that's the first two drivers of change: what consumers want and are now able to do; and available technology at the point of use.

The third driver of change is **data and actionable insight**. Smart meters are just one example of the way in which the energy system is becoming more measurable, interconnected and intelligent.

Big data and analytics provide suppliers and customers with the ability to extract meaningful insights from this intelligent system, and change their behaviour, so reducing the amount of energy they consume.

In power generation, for example, the impact on cost effectiveness and optimising performance could be enormous. In a 2015 study, GE estimated that digitising existing power plants could potentially deliver \$50 million in additional value for an existing gas-fired

plant over the life of the asset, and save up to \$230 million over the life of a new-build gas-fired plant.

Customers will also benefit from usable data and insight, through energy usage reports, when combined with demand response programmes and time-of-use pricing. In the US, the concept of “behavioural demand response” has already taken off. Our own North American business, Direct Energy, has already launched a programme which allows customers to earn bill credits for adjusting their consumption during peak weather and demand periods. This uses data to identify critical periods and relay signals back to customers.

So, we have looked at the three drivers transforming the energy landscape – what the customer wants and can do; the availability of technology; and data and usable insight.

Now I’d like to tell you how **Centrica** is responding to these changes; and conclude by talking about some of the global impacts and consequences.

Our purpose is to “provide energy and services to satisfy the changing needs of our customers”.

We have 28 million customer accounts and, in addition to providing them with energy, we are giving them new services and offerings to help them better manage their energy use and other aspects of their lives.

We have a distinctive and leading services capability through our team of 12,000 engineers and technicians on the ground in all our geographies. This is a vital capability for the future because, at the point where physical meets digital, customers must be able to trust people to enter their homes and businesses to install and maintain physical and digital infrastructure.

We are pioneers of the Connected Home and we are continuing to build a strong product and technology capability, with good early success. We have over 800,000 smart meter customers in the UK who now receive our unique smart energy report, ‘my energy’.

In distributed energy and power, Centrica has the expertise to deliver what business customers need, including energy efficiency, flexible generation, and energy management systems.

In the US, we helped the New York Times to realise around \$600,000 a year in additional revenue through participating in demand response programmes using its 12 Megawatts of installed diesel-fired emergency generation capacity.

We plan to invest £1.5 billion of additional resources in distributed energy and power, the connected home and the customer facing activities within energy marketing and trading by 2020. Since we announced our strategy we have purchased two companies for approaching £250m in areas of energy management and optimisation.

Panoramic Power is a leading provider of wireless, device-level management solutions and cloud-based analytics with over 25,000 sensors deployed at 700 sites in over 30 countries.

We have also expanded our route-to-market capability by acquiring the Danish company Neas energy, a leading provider of energy management and optimisation services for decentralised and renewable assets. This has increased our activities across major European energy markets and our capacity under management by over 8.5 Gigawatts.

We will continue to build our capability in all these areas both organically and inorganically, to strengthen our position as a leading 21st century energy company.

So that's a little about what we're doing at Centrica as we respond to these drivers. But the changes in the energy market have consequences for everyone and it's those global impacts which I'd like to finish with.

I see **five major impacts** of change.

The first is that there will be a fundamental shift in **where energy is generated and managed**. This arises from more viable technologies, increased choice and many types of solutions. It will give communities, businesses and individuals more control over their energy use. And it will remove the locational separation between generation and consumption.

We can already see the evidence of this in the projected increase of distributed generation and in the growing number of community energy projects. Less reliance on a centralised grid could improve security of supply as the impact of outages becomes more distributed.

The second impact is that distributed energy has the potential to **accelerate access to energy for millions of people** in developing countries without incurring the large infrastructure costs of building a central grid. There's a parallel here with the telecoms industry. Mobiles have enabled developing countries to become substantially connected without fixed lines.

Access to energy is still a significant issue. Today, the World Bank estimates that 1.1 billion people - 15% of the global population - do not have access to electricity. Distributed generation will enable faster rollout. It takes up to 3 years to build a new gas-fired plant; days to erect a small solar installation.

The third major consequence of the changes in the energy market is a **new competitive landscape** with new value chains, business models and competitors.

We face new challengers in terms of technology, energy supply and generation, energy management and - of course - access to customers. Google has launched a WiFi router which could double as a smart home hub. Amazon has stepped up its efforts in the Connected Home market, partnering with appliance makers such as GE, and Samsung have announced plans to equip their TV's with smart home hubs - connecting all the smart devices within the home.

So at Centrica, we are going head-to-head with the likes of Google, Amazon and Samsung. We continue to deploy new connected home devices, provide innovative data analytics on energy use and develop new technologies.

Earlier this year we launched the "connected boiler" under the "Boiler IQ" brand that uses pioneering remote diagnostics and predictive fault detection to alert customers ahead of a critical fault or failure.

The fourth major impact is that getting from today's energy market to the energy market of the future will involve **huge complexity in the transition**. The system will be turned on its head and we will see the customer become the price setter rather than the price taker.

One important question is whether distributed energy will increase to the point where it will challenge the economics of the central grid and generating system.

We could see distributed systems, historically seen as back-up, becoming more mainstream, while centralised generation and grid systems are forced to fill more of a back-up role. This would be a huge change.

The capacity auctions which are a feature of many developed markets, and the large scale decommissioning of existing capacity, are both indicators which point in this direction. According to some forecasts, more decentralised new capacity will be added globally over the next decade than centralised capacity.

It is important to note, that here in the UK, the development of a Capacity Market mechanism is key for securing the right level of supply at the lowest cost to consumers. The mechanism has been proven to work, in procuring capacity at a competitive price. The challenge, however, is ensuring the procurement of sufficient capacity for the medium to long term. The Government has made important improvements in the mechanism which will hopefully incentivise the development of new capacity whilst securing the longevity and reliability of existing assets.

The fifth and final impact is that - with all this choice and drivers to use less and lower carbon energy and to diversify the energy mix - **energy use and GDP growth will continue to diverge, as will CO2 emissions and energy use.**

All these impacts lead to one over-arching conclusion. There will, inevitably, be winners and losers as we make the transition to the energy market of the future.

Some infrastructure across both central generation and grid capacity will never be fully utilised. In 2014, European utilities mothballed or decommissioned a total of 50 Gigawatts of capacity, 4.5% of total power capacity and 8.3% of thermal plus nuclear capacity. It is difficult to see that trend reversing itself. Much undifferentiated central generation capacity will continue to earn marginal or, at best, cost-of-capital returns.

Some hydrocarbons will be left in the ground. In all these supply sectors, including in exploration and production, the winners will be those with advantaged assets.

So, in summary, I see three main drivers of change in the energy market: What customers want and can do; available technology; data and actionable insight.

That has a number of impacts: in particular a fundamental change to where energy is generated and managed; quicker access to energy for more people who need it; a new competitive landscape; a complex transition; all of which will result in lower energy use per unit GDP and will create winners and losers.

This is a transformational moment for the energy industry, which bears comparison to the revolution we have seen in the communications sector over the past 20 years. It is difficult for Governments to grasp the implications of these changes and challenging for businesses like ours to manage them.

But the real winner will be the consumer, and those of us who can respond to this transformation with new capabilities and imagination.

Thank you.