National Grid

UK Investor Teach-In

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National Grid

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Questions From

Various Unidentified Analysts

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Ajay Patel, Goldman Sachs

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Chris Laybutt, JP Morgan

Analyst, Bloomberg Intelligence

Nick Ashworth, Morgan Stanley

Introduction

Aarti Singhal, Director of Investor Relations
Good morning everyone and welcome to our latest Teach-In on our UK business. As always safety comes first, there are no planned fire alarm tests this morning, so if you hear an alarm you need to leave this room and gather downstairs in reception.

As you can see behind me we have a full agenda this morning, we will start with presentations by John and Nicola which will be in this room here. And after Nicola's presentation we're going to split into three groups. You may have noticed there is a coloured sticker on your badge, the reds will remain in this room and for the blues and greens we'll move into separate breakout rooms. At the end of Nicola's presentation my team will direct you on the room you need to go to.

And after the breakout sessions, there will be the opportunity to take a look at some of our key projects and initiatives. We've got members of the wider UK team here, so do please take the time to meet with them and learn about these projects. And then after that we will come back to this room for Q&A with John and Nicola.

And finally before I hand you over to John, please do take note of the cautionary statement that's in your packs. And with that I'd like to you have over to our CEO, John Pettigrew. Thank you.

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John Pettigrew, Chief Executive
Thanks Aarti. So thank you Aarti and good morning everyone. It's great to see so many of you here today. Our aim today, as it was when we did the New York Seminar last September, is to ensure that the market has a strong understanding of our portfolio, it's attractive long term prospects and our strategy for future growth.

So the focus of today's event is firstly to provide you with a detailed understanding of our UK Transmission business. Secondly, to show you have we're evolving the organisation to succeed in a dynamic environment. Thirdly, to show the range of opportunities we see creating value for our customers and our shareholders in the future. And finally, today's event also gives you the opportunity to meet the UK leadership team and to ask them any questions you may have.

So before I hand over to Nicola let me provide some context. So in the UK we have a strong business with high quality transmission assets, representing 50% of the Group's asset base. And the UK remains at the heart of our investment proposition, continuing to deliver growth and cash returns for our shareholders.

As you can see in this chart over the RIIO-T1 period the UK contribute significant profit and 4% annual asset growth, driven by capex and an inflation index RAV. And this consistent contribution supports our balance sheet strength.

We also share resources and experiences from both sides of the Atlantic to drive efficiency and deliver shareholder value. As you know the US is currently experiencing high asset growth, which is mainly being driven by the investment required to upgrade our aging networks. We're sharing resources and learnings from our UK experience across many areas, for example in procurement as well as delivering the larger more complex projects.

And conversely our extensive US experience and stakeholder engagement is already contributing to our strategy for RIIO-T2 which you'll hear more about today.

So National Grid was listed here in 1995 and I am extremely proud of our delivery track record in the UK since then. Across both Electricity and Gas Transmission we have invested almost £14bn in our networks over the last decade.

Looking at Electricity Transmission the big step up in invest in TPCR4 was driven by a combination of increased asset health investment as well as connecting new sources of generation. And this has been sustained through RIIO-T1.

This significant level of investment has delivered clear benefits. First, world class reliability, we have been able to deliver a safe, world class service consistently achieving near 100% reliability. Second, cost effectiveness for customers. We have been able to offset the full impact of this increased investment through operational efficiencies, so that today it represents just 3% of the household bill, ensuring the affordability of our service. And third, growth in yield for our investors. This investment has resulted in higher growth levels in our UK RAV and higher returns for our investors.

And not to forget that this is has all been achieved in the context of a transforming energy mix. Which takes me to the critical role that National Grid has played in enabling the UK's transition to a clean energy over the last ten years.

We have connected clean sources of power generation and as a result today the UK is a world leader in the adoption of low carbon energy, with renewables accounting for around 35% of installed generation. To give you one example we have connected over 9 gigawatts of onshore and offshore wind during the last eight years. And to put that into context that's enough energy to power over 7 million homes for a year.

And when you compare the UK to other countries in the G8, you can see that we're a leader in the pace of decarbonisation of the energy sector. This is a significant shift and what's also equally significant is that we've delivered this whilst ensuring the network reliability, safety and day to day balancing have all continued unaffected.

So turning now to the future and how we're going to strengthen our business for long term success in this dynamic environment. As I have consistently said, there are four clear drivers for National Grid to achieve this. Firstly and overarching everything that we do is putting our customers first. And we need to do this whilst optimising our performance to maximise efficiency, seeking out growth opportunities in a disciplined way and evolving the business for the future.

And you will see this morning Nicola and her team are reflecting this focus right across the UK business.

The needs of our existing customers in the UK are changing. And every day we are interacting with new types of customers with different priorities and different expectations. Energy affordability and reliability remain key for the whole industry, particularly in a changing environment. We are absolutely committed to ensure our investments are in the best interest of all consumers and that they're delivered in the most efficient way.

So in a moment you'll hear from Nicola who will tell you about how she's transforming the UK business by maximising performance under RIIO-T1. She'll tell you about the preparations that are well underway for RIIO-T2, where the core principles of RIIO-T1 have been maintained.

You'll hear about new opportunities, new ways of doing things and the actions we're taking to lead the industry. The team will set out how we much continue to challenge ourselves to do more for our customers, to think differently, be that digitising our asset management process, using new technologies, or entering into new partnerships.

So Nicola joined us just over two years ago and she has made great strides in progressing the UK business. She is supported by a highly experienced team and I know today that they are eager to share their plans and how they intend to succeed in this dynamic environment with a more efficient organisation, driven by a customer led strategy

So as Aarti said there is a lot to get through this morning, but I do hope you find it really helpful and with that I'll hand you over to Nicola.

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UK Introduction

Nicola Shaw, Executive Director, UK
Thank you John and good morning to everyone. I am delighted to be here today to talk about the UK business, which enables everyone in the UK to have access to gas and electricity. That sense of purpose, of fulfilling a critical societal need was one of the things that attracted me to National Grid about two and a half years ago as John said.

We're proud to ensure that our national energy system operate efficiently, whilst continuing to be a great example of British engineering success.

As with all National Grid meetings, I'm going to address safety first, just as Aarti did. As you know safety underpins everything we do, our safety record over the last five years during RIIO has been very strong, world class performance with combined injury frequency rate of 0.1.

We are constantly looking to improve though, through mandating minimum standards, with visible safety leadership and sharing best practice. For example we have improved our training management and records and local control for immediate work, those things - could you just do that? Things that come up during the working day where people need to stop, focus and ensure they think about the inherent risk in the work before they do the task.

This year, we have also given a lot of thought to public safety, reviewing the way we think about this, how we manage different facilities and landowner communications.

We'll focus now though on the first of our long term drivers that John spoke about, putting our customers first. As John said the environment around us is changing very rapidly. The consumers' cost of energy remains an important point of debate in the UK's political circles; it's something we take very seriously.

National Grid recognises that we need to deliver beyond our obligations. During the first five years of RIIO we have given over £1bn of savings and value to customers, through outperformance under RIIO-T1, voluntary deferral of allowances and £150m for our Warm Homes Fund from the sale of Gas Distribution. That money is being used to benefit some of that almost four million homes in the UK classed as fuel poor.

And we've maintained nearly 100% reliability and enabled the energy transition for only 3% of the average consumer bill, that's less than 10p a day.

So as I say our customers are our focus, we haven't previously measured direct customer feedback so we've implemented the net promotor score, or NPS, and our customers are seeing improvements in our transparency and our responsiveness. We plan to publish those NPS figures in the future.

We are also running more customer immersion events with our employees to get direct feedback from our customers, so they can understand the good and the bad that the customers see. Understanding our customers better allows us to anticipate their needs and work with them to supply solutions. For example, we have significant improved the speed of the new connections that customers get in electricity, reducing time taken by 30%, as well as providing solutions for new types of customers.

Pivot Power is an example of one of those, developing fast electric vehicle charging points using battery storage at strategic sites across the country, next to many of our substations. These types of new customers could present attractive future growth opportunities. In a change from the past we now provide the land they need for their equipment and advice on their planning applications, as well as the traditional network connection.

The chart here shows the increase in new connection requests over the past year, with three quarters of these from what we class as new customers, on top of the changing demands of our core.

As well as focusing on efficient delivery for customers, we're proactively thinking about the evolving UK energy scene. We're politically agnostic and will continue to engage directly with the Government, with opposition parties and other stakeholders, such as environmental and other pressures groups. Our objectives are to enable the country to remain a leader in the energy transition, to address any concerns they've got, and also to update them on what's going on in the industry.

We also engage with the wider industry through our Annual Future Energy Scenarios, this year reflecting the view of 430 different organisations.

Building on that stakeholder approach we have also created two independently chaired stakeholder panels to inform our plans for RIIO-T2. These groups involve consumer representatives, environmental groups, our customers and others to give us a wide range of views. Chris Bennett our Director of Regulation will give you more detail about these emerging views later. And it won't surprise you that consumers are telling us that remaining affordable and reliable, ultra reliable, are key.

But the really interesting feedback is they want us to take a leadership role, thinking about the future to ensure that we don't disrupt their lives. They want us to think about how they'll charge the electric vehicles, how they'll heat their homes in the future and so on.

So the industry is evolving at pace and the challenge and scale of change is huge. That means there are a range of opportunities too, different possible future outcomes and we need to manage our networks accordingly.

The number of organisations participating in the capacity market along has increased from 60 to 350 in the last four years, just an example of that pace of change.

Future Energy Scenarios gives us a unique and robust insight into the future. And as part of that we consider four different scenarios, each of which covers different levels and types of demand and generation through to 2050. Don't worry; I won't go through each of the four scenarios in detail. But as you can see at a high level we present them across two main dimensions, the speed of decarbonisation and the level of decentralisation.

The speed of decarbonisation access is driven by policy, economics and consumers attitudes, while the level of decentralisation access shows how close the production and management of energy is to the end consumer. Roisin Quinn, our Head of System Operator Strategy will take you through and will talk about, at the trade stalls later, the detail of that work.

In all scenarios though, you'll see an increase in generation capacity, driven by the increasing level of intermittent, mainly renewable, sources of generation on the network. However, only two scenarios, Community Renewables and Two Degrees meets the UK's 2050 carbon reduction target.

We do not make a prediction across the four scenarios, but I'm going to focus on Community Renewables now, as you can see it's the most stretching on both dimensions. It sees up to 65% renewable generation, with total installed capacity of 260 gigawatts, two and a half times the current level. Even in this scenario transmission networks have a critical role to play, maintaining system reliability and being the most efficient way of moving energy around the country.

We see electricity demand growing significantly, driven by the electrification of transport and home heating, peaking at around 83 gigawatts, versus the current peak of 51. The peak is likely to need managing, smart charging, vehicle to grid options and other innovations.

These maps show the potential picture in 2040 where net oversupply is shown as green and net undersupply as red. The deeper the colours the larger the excess. In particular the Winter 2040 view shows the impact of old coal plant retirements, offset by additional interconnector capacity in the Southeast.

But the important point here is that in the most decentralised scenario you can see the need to move large amounts of electricity from one region to another, from excess solar generation in the South to the North in the summer and Scottish onshore wind generation from the North to the South in the winter. And the transmission network is the most efficient way to do that.

Gas also plays an important role, a vital role in meeting the UK's climate targets as it contains three times as much energy as electricity. It's a very important fuel for the foreseeable future; it will remain the dominant fuel for heating for at least the next 20

years. We also see it providing flexibility for both heat and generation, helping to complement renewables.

There are many options for how we could move to zero carbon in home heating in the future and there is currently no agreed path. We are however working really closely with government and other market participants, as well as developing technology to help shape the public policy decisions that will be required.

As you can see the sources of gas have changed significantly over the last 20 years and will continue to change in the next 20, creating opportunities for our network. The flows of change with gas from the North Sea being replaced with LNG and Continental sources. Looking forward to 2040 that will have changed further, more LNG and further flows from Europe.

This changing patterns of supply is what drives investment for the futures, enabling improved resilience and reliability. It emphasises again the important of the transmission network in moving gas around the country as efficiently as possible.

So what does it all mean for National Grid? This slide illustrates the various opportunities across both electricity and gas transmission. Our opportunities are wide ranging, from reinforcing our network to cope with additional offshore wind, to new nuclear and interconnectors to get the capacity in the Southeast. Or they might come from moving distributed generation that's directly connected to our networks to where the demand is; or specific opportunities that I've mentioned already, such as electric vehicles.

In the last six months alone several countries have made series commitments to the mass uptake of electric vehicles. Our Future Energy Scenarios see the potential for over 38 million in the UK by 2050. That is too big an opportunity to ignore.

We have submitted proposals to Government to build large capacity connections at 50 key locations. This significantly reduces range anxiety, which is the third most often cited reason for not buying and electricity vehicle. The other two are the cost and choice of model, both of which will be resolved in the next few years by the automotive industry.

David Wright, our Director of Electricity Transmission will talk more about this later this morning. It could be between a £500m and £1bn of investment.

But it's not just EVs; we're changing our proposition and working with new types of customers such as airports, ports and stations that may not previously have considered a connection to the transmission system.

In our Gas Transmission business need to ensure we can respond to the changing flows and to connect new CCGTs, these, we believe, will still play a crucial role in providing base load, even in a world with significant intermittent renewables.

We also need further investment to meet our environmental standards.

So what are we doing to make sure that we're well positioned to capitalise on these opportunities as we are readying ourselves for RIIO-T2? First and foremost, as I've said, we're changing to respond to our customers. You can see we're already changing in

many areas and I'll focus on how we're moving to a leaner organisation and embracing new technologies shortly.

Before that though it's worth reflecting on what we've done to maximise our performance over RIIO-T1 and our outlook for the future.

I'll show you a video in a moment showing just a few of the major projects and achievements over the last five years. We don't often talk to you about these projects, but I think they are key to understanding our strong delivery capability, not just the big projects, but the smaller ones too. These together, with operations and systems maintenance are protecting future asset health.

You've come to expect quiet efficiency from us, I know, but they require technical expertise, collaboration and good commercial management. I'm very proud to say they are all key competencies of National Grid.

In particular we're constructing our first new transmission overhead line in over 20 years between Canterbury and Richborough, enabling the Nemo interconnector - connection to Belgium and it will go live early next year. I was in Kent with the team last month, the challenges are really obvious, not least we and our contractors are working on over 60 sites simultaneously.

On the gas side for example, during T1 we have installed catalytic converters on our Aylesbury compressor stacks and a new electric compressor drive St Fergus, both to reduce emissions. So here's the video.

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Video Played

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Nicola Shaw, Executive Director, UK
Turning now though to our financial performance, as John highlighted we've seen strong performance over the last five years. We have seen steady compound average asset growth of 4.2% for our regulated asset value, with £6.6bn invest in our networks.

The last five years of RIIO have driven many changes in how we manage our networks. Higher efficiency and innovation solutions have been developed, enabling us to consistently outperform our allowances by 200 to 300 basis points and as a result have shared over £540m of savings with our customers.

We expect this strong financial performance to continue through to 2021 with annual investment in our transmission businesses of around £1.3bn, as well as consistent returns.

Let's move to regulation, my previous regulatory experience allows me to see Ofgem's positions clearly and to adapt further their agenda as well as ours. We continue to present to Ofgem what we think is in the best interest of our customers, of consumers and the business in the long term. Ofgem is making sure that the regulation it introduces is for the benefit of consumers, while allowing companies to make a fair return.

We have almost daily interactions with them at many levels across our organisations. Although we're likely to have different opinions on certain issues we have a constructive relationship and will continue to find enough common ground to benefit more stakeholders.

Excluding T2, which I'll discuss shortly there are three key areas of regulation where we're currently in discussion with Ofgem, Hinkley Seabank, the RIIO-T1 reopeners and the legal separation of the Electricity Systems Operator. So I'll take each in turn.

First on Hinkley, to remind you, this is the first nuclear power station to be built in the UK for over 20 years and one which, under the terms of our licence we're obliged to connect, it will cost about £650m over seven years to 2025. It's not a significant proportion of Group annual capex of over £4bn, but it is important that we get a fair and sustainable outcome for delivering a complex project.

As you know we expressed disappointment with Ofgem's decision on this in late July, which concluded on three potential models for the project, selecting a competition proxy model. As a reminder the three models are the existing framework under RIIO-T1, called Strategic Wider Works, or the competition proxy model, which is Ofgem's simulated view of full competition, or a special purpose vehicle model, on which Ofgem are currently consulting further.

We have continued to make our case on why the competition proxy, doesn't, in our view, give the best value for consumers over the long term. This is due to the likely impact on overall cost of capital for networks as a result of this intervention.

We will decide on our next steps when Ofgem finalise their licence modification decision, we expect that by early 2019. Ofgem has reiterated that its decision should be no read across to RIIO-T2.

Secondly, in August Ofgem announced their initial view on the last of the RIIO-T1 reopeners. This covered funding for physical and cyber security, meeting the European Emission's Directive targets and funding for Feeder 9, the gas transmission pipeline under the River Humber. We expect the final decisions on these reopeners before the end of this month.

Finally, we're making really good progress with the legal separation of the Electricity System Operator. We will be ready for a new legal entity, a board and governance structure, as well as new systems by the 1st of April. And I am confident that we will deliver on time. You already know that it's a small part of the UK business, hence we're not covering it in detail today.

The major topic of discussion with Ofgem however is RIIO-T2. We're pleased with the decision on the framework consultation to maintain the core principles of RIIO regulation, specifically reaffirming that incentives remain a part of RIIO-T2. We are also pleased that Ofgem has strengthened the importance of customers and other stakeholders earlier in the process.

It's a big difference to the RIIO-T1 process, but something we've got experience with in our US business, indeed it's something I'm well accustomed to from previous roles and we all understand the importance of customer advocacy.

There is a long way to go before we reach the final proposals in late 2020, Chris Bennett and Alan Foster, our UK CFO, will take you through more detail later.

It's important to recognise the whole package, not just the headline return or cost of equity, making sure there's an appropriate balance between cash and returns when the final proposal is revealed.

So, so far this morning you've seen the context of the market we operate and the opportunities that that provides. We've demonstrated the increased customer focus in the business and have explained what we've already delivered in this control period and to some brief thoughts about RIIO-T2.

But to be ready to grasp all those opportunities we need to do more now. So we've refocused the business and simplified the organisation to be more agile, to speed up decision making and to be more responsive to our customers. It's customer led efficiency.

To do this we've also listened to our customers. Our plan allows us to continue to deliver our commitments in this price control, but also makes National Grid a better place to work because we ensure that all roles are focused on things which customers, and stakeholders need. It's all about ensuring we remain fit for the energy system of the future and for RIIO-T2.

As I look to the future with digitalisation there is an increasing opportunity to enhance the customer experience and be more efficient. We are already using artificial intelligence in solar and demand forecasting in the electricity system operator. That's both sped up the process, as well as reduced cost.

We have digitised some of our back office too, introducing robots in several of the business services functions. In the last five months we've saved over 3,000 hours from the robots, including one in field force procurement, it enabled significant increases in orders fulfilled without needing temporary staff, whilst also improving our customer experience and our employee experience. More projects in the pipeline should lead to further time and cost efficiencies.

In Gas Transmission we've been developing 4D digital modelling and GRAID our award winning pipeline inspection robot was tested under full network pressure this year. Those two innovations should save customers around £65m.

Electricity Transmission, our new Line Scout technology will reduce costs, as well as removing risks faced when working at height when we inspect live overhead lines. David Wright and Tony Green, our Head of Network Engineering for Gas Transmission will tell you more about these innovations and others.

In the medium to long term we've developed some very ambitious concepts. One is using further remote network monitoring for all of our sites, with assets being maintained or replaced at the optimal time, avoiding failures. We're working through what this means and drawing on best practice, both in our sector and others.

So let me summarise the topics that I've covered. Our industry is in the middle of a once in a generation change, with renewable and decentralised generation increasing rapidly, creating opportunities for us. We're also seeing new technologies, such as

electric vehicles starting to be adopted and this is against a backdrop of significant focus on consumer energy bills.

I firmly believe the opportunities I have described and that you'll see over the course of the morning will enable us to continue to deliver strong financial performance over the long term, as well as world class safety, excellent reliability performance that people expect from us.

We have made great progress over the last five years. I'm really excited about what we can achieve in the next five and beyond, as we bring energy to life for our customers, our shareholders and all stakeholders.

Finally, just before we move on to the breakout sessions I wanted to introduce my fantastic team delivering all of our priorities, including the RIIO-T2 submissions, the new organisational structure, the cultural change required to deliver all that we do.

You'll hear from David, from Chris and from Alan during the breakout sessions shortly. Unfortunately Phil Sheppard is unable to be with us today because of illness, but I'm very grateful that Tony Green is deputising. Together with Fintan Slye who leads our System Operator, and my other senior colleagues we have a highly experienced team, committed to delivering for the benefit of our customers, of our shareholders and all stakeholders.

So we're going to now have the breakout sessions and trade stalls and then we'll regroup here for Q&A with John and me later. Thank you.

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Operating World Class Networks

David Wright, Director, UK Electricity Transmission and Group Chief Electrical Engineer
Well good morning everybody. I'm David Wright and I'm our Director of Electricity Transmission and our Group Chief Electrical Engineer. And I'm delighted to be here this morning to present our UK Electrical Transmission business to you.

I'm incredibly excited to be leading this business when we're seeing such rapid changes; not only in the way electricity is generated but also in the way it is delivered and used. This morning I'm going to talk about investments that we're making in our transmission network as well as potentially growth areas.

But first let me remind ourselves about the Electricity Transmission network that we own and operate in the UK. Electricity is critical to every UK citizen and it underpins the UK economy. At National Grid we're at the heart of the energy industry where we own and operate the largest transmission network in the UK.

As Nicola said earlier we have a relentless focus on safety in everything we do, with our employees, customers and the public. Our network is extensive, 7,200 kilometres of overhead lines and almost 1,600 kilometres of underground cable, 346 substations and a network reliability of nearly 100% which is world class.

And I am really proud of our safety performance and that network reliability. We can only deliver this by having the right people in our organisation. I have industry leading

engineers and asset managers in my team who continue to innovate and find new ways to drive customer value and drive business performance. Our success to date is testament to the outstanding commitment, skills and experience of all of our employees.

Electricity Transmission is a significant part of National Grid Group, with a regulated asset value of £13bn, 39% of the regulated asset base. This has grown ever year throughout RIIO-T1 reflecting our ongoing commitment to investment in asset health and customer connections.

We've embraced the RIIO framework to lower our operating costs by driving down we've already delivered £440m of savings for customers in Electricity Transmission in this price control period alone.

Ultimately we deliver a safe and reliable network for just £26 of the average electricity bill each year.

Delivering a safe and reliable transmission network is fundamental to our business and it's something we are just never going to compromise on. We continue to invest around £1bn in our business every year equating to £5.6bn over the first five years of the RIIO-T1 period, this investment has three primary drivers. Firstly, network reliability through investing in our asset health; secondly, resilience to protect against the emerging risks like cyber; and thirdly, connecting customers.

Looking at each of these in turn. The transmission network today was largely established in the 1960s so replacing aging infrastructure has been a key priority and this will continue to be as we move forward into the RIIO-T2 period and beyond.

This investment ensures we maintain an appropriate level of network risk, a key output under the RIIO-T1 framework while maintaining a reliability of electricity supply.

Separately we've been investing to protect our underlying network resilience; so far this has focussed on physical security where we've invested to strengthen the level of our most critical sites as agreed with government and with Ofgem.

As we move forward investment to reduce our exposure to the evolving cyber threat will also be critical from a network resilience perspective. It will be particularly important to embrace the opportunities that increased use of digital will bring to our business helping us further increase our efficiency and reducing cost for customers.

Customers drive the majority of the remaining investment where we reinforce existing infrastructure to accommodate our customer base. As decarbonisation comes to the fore new customers are applying to connect to our network. As John mentioned earlier we've already connected 9 gigawatts of wind to the transmission network, new build nuclear and interconnection will also require further connection, so will new customer types which I will touch upon later.

Now I've already spoken about asset health drivers by which I mean needing to replace assets to maintain the overall network reliability. We have a world class approach to this ensuring we optimise the asset interventions that we make. We deliver high volumes of asset replacement year on year through the RIIO-T1 period, with last year our highest year to date.

For example our protection replacement, rather than replacing the whole protection cabinet and their complex wiring we've re-engineered things to replace the microprocessors and the computing, creating a new standard interface to the existing wiring. In other words we're replacing the critical components but at significantly less cost and time.

As delivered volumes have increased we've also innovated and had a relentless focus on how we drive efficiency into our capital programme. As an engineer myself I'm proud of the large complex engineering problems that we solve and the infrastructure that we deliver all while keeping the lights on.

For example the London Power Tunnels, a £1bn project to rewire the North of the Capital spread over seven years; we're now in the early stages of developing the second phase of that project in the South of the Capital.

The new overhead line between Richborough and Canterbury for the new 1 gigawatt interconnector Nemo Link between the UK and Belgium. The Western Link project, the Offshore HVDC Link between Scotland and North Wales, this will provide additional network capacity, transferring power mainly renewables from where they're generated to where they're consumed.

Finally, our visual impact provision projects where we'll be burying sections of overhead line in ears of outstanding natural beauty. We've had a positive minded to response from Ofgem that will allow £160m to spend on our first project in Dorset. This is a great success for the team and will be well received in the local community.

I'm also passionate about the role that digital plays in our future business delivering more efficiently than we have ever before. As we look forward to the future and exploit data more effectively, we're now able to apply an advanced risk based approach to asset management.

We're in the process of developing advanced analytics from risk data allowing us to optimise our asset interventions within a range of different constraints. We already use state of the art condition monitoring techniques as part of our business as usual practice. And this is just one of the ways that analytics and data can improve the efficiency of our core business.

Building on this in the remaining part of the presentation I will now explain how we're evolving our business to increase efficiency, to drive innovation, attract new customers and look at the new opportunity of electrical vehicles.

Over the last few years we've been running a transmission programme on how we drive totex efficiencies into our business. We're constantly working on new ways to reduce costs both in our operating model and in our capital programme, challenging our traditional approach to engineering projects. And I want to focus here on three work streams from our capital transformation programme.

Firstly, Lean Asset Design, where we challenge the existing approach to standards and engineering design. For example overhauling our civils specifications to reduce concrete volume by 5 to 10%. Secondly, Design to Value, where we optimise solutions, deliver more quickly and at lower cost where we will save £12m by a combination of uprating conductor sections and adjusting the line tension on other sections to enable greater transfer capacity just as one example.

And finally, reducing the cost of construction through global procurement and delivery on the ground in executing projects. For example we've been using time lapse video, reviews on a number of different projects like circuit breaking replacement to identify non-value adding time and inefficiencies. And this has reduced project durations from six weeks to five weeks with a corresponding saving in cost.

Through all of this work we've informed and identified potential of savings enabling us to continue to outperform in the second half of RIIO-T1 and delivering value for customers.

But I think this really comes to life in totality with another example, in this case the refurbishment of our Wimbledon substation in the heart of London where land is absolutely at a premium.

This project embodies all three Capex transformation work streams; here we've used 3D modelling to ensure we absolutely optimise the site design. The majority of the savings were from efficient site layout and the project was delivered for £39m less than was originally expected. But on top of that we've also reduced our carbon footprint by 23%, an excellent achievement showing the value of our driver for greater efficiency.

Having a culture of innovation embedded in our organisation is critical to ensure that we continuously become safer, reducing our environmental impact and improving the efficiency of our operations. The combination of engineering knowledge and skills together with creative thinking is what we need to innovate and delivery customer and stakeholder value.

Our focus to date has primarily been on the process innovation and enhancing our approach to asset management. For example by having systems and technology that enables remote monitoring we can identify network issues more quickly and stop the need for engineers visiting site.

We're introducing Line Scout, a robot which moves down overhead lines with cameras to assess condition and make minor repairs. We're planning to use the new innovative T-pylons shorter than existing pylons to improve visual impact. We're reducing undergrounding costs using new technology through a transformational innovation partnership. We want to significantly reduce the cost of undergrounding transmission capacity as this is what our stakeholders want.

And finally we're exploring opportunities to use a zero carbon insulation gas in electrical equipment, reducing the UK carbon footprint. We were the first utility worldwide to use a low emission insulating gas at 400,000 volts in our trial project at Sellindge in Kent.

But innovation is more than just technology and this is where creative thinking is so important. By thinking differently we can deliver new business opportunities, for example the work that we've done to design a strategic electric vehicle or EV charging network across England and Wales, something I'll go into in more detail shortly.

Before that though I'd like to touch on one of our most high profile innovation projects, our Deeside Innovation Centre, it's the first of its kind in Europe. And this is National Grid's flexibility, high voltage test substation allowing new assets to be tested off the grid, 24 hours a days, seven days a week. Today you can find out more about the Innovation Centre at our trade stall where my colleague, Ursula Bryan, will explain the value it brings both to National Grid and the UK Transmission network.

Looking forward we see a significant number of new customer opportunities outside of our traditional customer base and we are proactively targeting them. Our analysis has shown potentially growth in that medium sized generation market and an emerging demand side market as manufacturing and industrial companies require higher demand connections for decarbonisation of their business.

These will provide growth opportunities including; high voltage connections in ports for ships that run off diesel generators today when docked, helping to decarbonise their operations; direct connections for data centres with large power load requirements. And airports or businesses looking for larger loads with a more reliable connection than a distribution operator could generally offer.

The nature of our network means that we can offer a different, more flexible service than other players and our approach is paying off. Nicola earlier mentioned Pivot Power who we're working with on battery storage connections and colocation with fast charging points for EV's. They've applied for a number of 50 megawatt battery connections across our network and have signed their first eight connection agreements.

This though is only the beginning, as the chart shows so far this year we've processed more customer applications than in the last three years combined. And while I recognise these are typically medium sized connections, it also shows the impact our new approach is having. We are absolutely determined that our business will take advantage of this opportunity and through our business proposition we will absolutely ensure that this happens.

To bring everything together let me touch on the work that we're doing on electric vehicles. The growth in EV's will impact overall system demand requiring further investment and reinforcement of grid infrastructure. We believe, and stakeholders agree, that a comprehensive network of ultrafast, fast charging points, supported by an appropriate transmission network infrastructure will be vital for EV development in the UK.

So we've designed and proposed a fast charging network to cover 99% of the strategic road network in England and Wales. And we hope to deliver this by 2030 if a mandate was in place to do so. It comprises reinforced charging points at 54 motorway service stations where motorists would be able to charge their car in the time it takes to buy a cup of coffee, 50 times faster than conventional domestic charging.

We have benchmarked ourselves against distribution costs and have found that we can offer a design that is not only competitive but truly innovative. And it would address one of the key barriers to EV development range anxiety, as the majority of people would be no more than 50 miles from a fast charging station.

This charging network is a potentially £0.5bn to £1bn investment opportunity for National Grid. Electricity Transmission is key to enabling the future development of the EV industry. And it is a clear opportunity for our UK business.

We also have an EV trade stall today where my colleague Graeme Cooper will be able to tell you more about this initiative and our discussions with Government and Ofgem.

As you'll see we are a long term business delivering shareholder value. We've been consistently investing in RIIO-T1 to ensure that we have a reliable transmission network with an efficient business.

Looking forward the trends we've seen around decarbonisation, decentralisation and digitisation, the three Ds, will only continue. These trends are enabling our core transmission network which will continue to be critical in moving power from region to region. We are essential to the low carbon agenda, operating a network that supports nuclear, offshore wind, and interconnection. We continue to drive efficiency in our business operations and deliver an innovation strategy to improve customer and stakeholder value.

Customer demands are changing and we're developing our proposition to meet these demands and grow our business. And rapid EV growth requires a nationwide charging network to support it and we are uniquely placed to deliver this.

Above all we have a strong team with the experience to deliver electricity reliably, affordably and safely. We're constantly striving to be more efficient ensuring we're fit for RIIO-T2 and beyond. And let's remember we're in the middle of an energy revolution. I am confident that we have a strong business that will continue to succeed in the longer term. Thank you.

I'm now happy to take any questions you may have.

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Questions and Answers

Deepa Venkateswaran, Bernstein
On your EV charging the investment that you mentioned, is that just the grid reinforcement or does that include you building the charging stations and who will build the charging stations?

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David Wright, Director UK Electricity Transmission and Group Chief Electrical Engineer
Okay so the investment that I was talking about, when you think about the electric vehicle network there's sort of three levels of investment we think about. One is you know the broader network capacity if you will as the demand increases across the whole of the network. There's then the connection to the charging stations if you will and then the charging stations themselves.

The opportunity that we see at the motorway service stations is that middle category; it's the electrical connection to the charging stations. Who actually builds the charging stations themselves, I think that's more of a competitive play that could be a variety of different individual businesses. So that's how we see that evolving in the three different modes of future investment that will be required.

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Question

Thank you just following on from the EV question as well, there's two. Talking to some of the European players as well in distribution side, I'm just trying to work out what exactly is the advantages of actually connecting EV and chargers to the transmission network directly versus the distribution networks?

And secondly in your discussions with the regulator what is the risk that EV charging activities fall outside of the regulatory asset base and become open to competitors?

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David Wright, Director UK Electricity Transmission and Group Chief Electrical Engineer
Okay two good questions. So first of all as you're increasing the speed of charging a vehicle you need to transfer more amounts of power in a short space of time and that generally means you need to connect to a high voltage network.

And one of the principles that we believe in which is quite important is rather than just you know putting a couple of charging stations in say a motorway service station and slowly building it out over the next decade. If you need to do an infrastructure you really want to build it for the end state and when we look at the end state of the size of the capacity that we need. And the number of vehicles you'd be needing to charge in parallel when you're looking passed 2030 and towards 2040 it needs high energy connections.

Now in some instances where the motorway service station is closer to the distribution system than the transmission system it may be more economic to connect to the distribution system. And we will do what is the least cost solution overall for the end consumer as you would expect.

But in a lot of cases you know that extra demand that you would need is typically 30 megawatts. we expect per motorway service station charging area, will need a transmission level connection and we've come up with an innovative design way of doing it which is really competitive on cost.

And your second point around would they go into the regulated asset base? Well, I think as I said in my presentation there is broad agreement now that there is a need for an ultrafast charging network across the motorway network and really to address range anxiety. We saw that referenced in the Government's own publication Road to Zero, but also in the National Infrastructure Commission's report as well.

And in all of our conversations I think the need is recognised but what is currently being debated is what is the right commercial model and in particular who should pay. And we do see that as a RAV based solution, whether that be being billed to energy customers today or whether that be funded through a different approach from central government but we are looking at a RAV based model.

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Dominic Nash, Macquarie
Hi, two questions please. The first one is do you think in the round the overall capex per annum in the next review, in RIIO 2 is going to be higher or lower than you think the current review will be and when do you think we'll start to see the step change up in the capex with the network?

And coming back to this EV thing, are they going to separate investments or do you think you could see it all rounded up into a single strategic wider work type project and therefore at risk of competitive tender?

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David Wright, Director UK Electricity Transmission and Group Chief Electrical Engineer
So first of all let's talk about the overall capex plan. So as I said in my presentation that for the next two to three years in the remaining years of T1, we expect to be investing in average £1bn in our network.

And as we are starting now, as you saw Nicola's slide earlier, to think very much around the RIIO-T2 period and building our plans moving forward. We're very much focused on a stakeholder led approach and what we want to do is put in our investment and business plans moving forward exactly what our stakeholders and customers need moving forward. So it's hard to be exact at this moment about what the future growth of T2 will be.

But if you think and look at the underlying components of what is likely to be in that investment plan, you know we're going to continue to need to invest in the long term asset health both in the RIIO-T2 period and beyond. It's an aging network that was traditionally built in the 1960s.

We've then got the need to continue to connect the existing customer base, those large scale generators, the new nuclear interconnector projects and others that come along.

When we look forward we're seeing an increasing need for resilience on the Electricity Transmission network, and I think that will be a third substantial component of those future plans. Principally because you know electricity is critical to everything that we all use everyday today and underpins the UK economy. But that level of criticality only gets even greater moving forward with the electrification of rail, of transport and also potentially heat moving forward.

And then there's that growth base in new customers as well which is another further investment opportunity, not only EV's, but storage connections, open cycle gas turbines, and businesses who are looking to decarbonise their networks.

So there's a number of different components that could feed into that RIIO-T2 investment plan but I truly want a stakeholder led business. I think when you're in the middle of an energy transformation you should be led absolutely by your customers.

Your second question about electric vehicles and would that be seen as a single global investment rather than a number. The competition framework that Ofgem is currently consulting on talks about three criteria for what would be a potential investment open to competition moving forward, new, separable and large, more than £100m individual investment.

And certainly when we look at you know a future EV charging network we think that's distributed, it's 54 sites across the whole transmission system. So you know we don't believe that that would be a separable and it's a series of smaller investments rather

than one big investment. But the whole competition regime is obviously up to discussion at the moment.

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Question
Hi there. When you argue for a 60% increase in the peak demand for electricity transmission in your Community Renewable scenario, do you make the assumption that EVs are charged on demand or smart charged? And also what are the underlying assumptions for battery or storage penetration in the UK?

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David Wright, Director UK Electricity Transmission and Group Chief Electrical Engineer
Okay so we don't make a single prediction first of all through the Future Energy Scenario's work that my colleague at the front here Ro Quinn leads. But we look at four different scenarios, four different potential outcomes for the future as Nicola described on her slide earlier.

One of those four scenarios which is the one that Nicola spoke about, Community Renewables, is the most aggressive from a decentralisation perspective. And in that scenario we also see the largest growth in connected generation going up to potentially 268 gigawatts compared with 103 gigawatts today.

Now in all four scenarios we see peak demand growth with the move to electrification of heat but also the electrification of transport and vehicles.

Now in those scenarios we're absolutely assuming a significant amount of smart charging goes on at the domestic level which would spread out that increase in demand. But overall when you're moving from a world today where we've got just over 400,000 of electric vehicles in the UK, to a world where you've got potentially 36 million of them, there will still be some charging that happens at peak even in that scenario.

But the time it will take if you will for that to progress, particularly the peak demand increase, means that I don't foresee a shortage of energy in the UK as the demand goes up over the timescale out to now to beyond 2040.

Are we nearly out of time I think, so maybe one last question?

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Ajay Patel, Goldman Sachs
Just one question, in those four scenarios or if you could give us an idea of a range even, what kind of growth in volumes are you expecting on the transmission grid versus the distribution? And how does that, just in terms of reality, how does the investment vary according to one extreme category to another just to give me a sort of sense of what changes?

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David Wright, Director UK Electricity Transmission and Group Chief Electrical Engineer

Okay so both that and remember I didn't answer the gentleman's question about battery and storage earlier. But there's a lot of detail that Ro will be able to give you at the trade stall later. But just to sort of answer your question, the four scenarios have a range in that most aggressive scenario for decarbonisation and decentralisation that I spoke about before which is one of the more stretching scenarios. Up to 65% of the generation in that scenario could be connected either beyond the meter or at distribution. But even with that 65% you still see a significant growth in installed generation on the transmission system.

But more than that, as Nicola bought out in her presentation, you see these large inter regional power flows happening at different times. So if you've got a very decentralised scenario and I don't know everybody in South Wales has got rooftop solar and the sun is shining then there's going to be a large need to export power on a stable transmission network. And the degree of that varies in all of the four scenarios but we'll be able to go into more detail on that on the trade stall.

Thank you very much. So you stay here and I will move to one of the other breakouts and one of my colleges will come and present the next session to you. Thank you very much indeed.

Applause

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Operating World Class Networks

Antony Green, Head of Network Engineering, UK Gas Transmission
Good morning ladies and gents. I'm Tony Green and as Nicola has already mentioned I'm standing in for Phil Sheppard today.

I joined National Grid earlier this year as Head of Network Engineering in the UK Gas Transmission business. I'm also President Elect and Trustee of the Institution of Gas Engineers and Managers and in May next year I become President of the institution.

I'm really excited about our business opportunities and in this presentation I'm going to remind you about the importance of our network, the role of gas, and how we're adapting our business to support a low carbon future.

The Gas Transmission system plays a vital role, both in the secure transportation of gas and the facilitation of the competitive gas market. Across the UK, National Grid owns 7,500 kilometres of high pressure gas pipelines. Transporting gas safely and efficiently from terminals and storage facilities to exit points.

At the exit points the gas is either transferred to the eight distribution networks for onward transport to domestic and industrial customers, or it's transferred directly to customers including storage sites, power stations, large industrial customers and the interconnectors.

Safety is our top priority. Our employee and contractor lost time injury frequency rate has been 0.1 over RIIO-T1, consistent with world class safety performance. This is evidence of our continued total commitment to ensuring no one is harmed as a result of our operations.

We also operate a highly reliable transmission network, consistently reporting nearly 100% annual reliability. This is equivalent to less than 30 minutes below agreed service levels per year on our network.

Not only are we dedicated to operating the Gas Transmission network safely and reliably, but we're also committed to delivering it cost effectively on behalf of consumers. We do this for just £9 of the average UK dual fuel bill.

Our regulated asset value is £6bn, up 4.5% on the previous year, representing 18% of the Group.

Today gas plays an important role in meeting UK energy demand. The gas networks deliver nearly three times the energy compared to the Electricity Transmission network and they connect over 60,000 new customers to the network each year. Gas continues to be the primary source of energy for heating homes and offices in the UK. It provides a reliable source of power for industrial and commercial customers and generates around 40% of annual electricity through CCGTs. This at a lower total cost than other sources of generation.

Over the last 18 years we've seen a major transition, moving from self-sufficiency, to an increased diversity of supply. Imports make up nearly 60% of gas supply in the UK, compared to just 2% 18 years ago. The network previously operated on a North to South basis, where gas from the North Sea was shipped down to cities in the South. With increased importation we're now seeing gas coming from a variety of sources. These include Norway and through the European interconnectors, with the Bacton terminal in the East and in the LNG terminals in the South playing a more important role.

Looking forward we expect a similar change over the next 20 to 30 years as gas volumes from UK fields continue to decline. In three out of our four future energy scenarios, imported gas will continue to increase, raising to over 85% by 2040 on the most extreme case.

There are likely to be more pronounced winter peaks and more supply diversity will be required to meet system needs.

Our assets were largely built in the 1970s and early '80s and are coming to the end of their design life. So we've got many projects underway to extend their life while maintaining operational and safety performance.

Over RIIO-T1 we've invested £520m in maintaining asset health, nearly 50% of our capex spend. Asset health investment is prioritised according to condition, performance and criticality. We aim to deliver efficient solutions by considering appropriate interventions, including refurbishment versus replacement, enabling us to work within a challenging set of allowances.

This commitment is reflected in the operational ROE where we've overspent against our totex allowences in recent years to ensure the continued reliability and integrity of the network. This has been offset by consistently strong incentive performance and legacy returns. And as Nicola has already mentioned, will benefit from our cost efficient programme over the remainder of RIIO-T1 and into T2.

We have also improved the quality of data we hold on our assets, meaning we're better placed to evidence the required level of spend in the next price control. We have

adopted a campaign approach for asset health to ensure efficient delivery, bundling maintenance work by geographical area and making better use of available system outages and minimising costs.

One of our largest ongoing campaign projects is the above ground installation or AGI renovation campaign. A £150m, six year programme working across 70 sites and 1,500 assets on the network. At its peak the campaign will employ 250 staff to carry out activities such as valve and actuator replacement and valve enhancements. The campaign is now in its second year, having already addressed 340 assets across 48 sites.

As Nicola mentioned, we put the customer at the heart of everything that we do, which has enabled us to consistently outperform against customer satisfaction targets set by Ofgem. The market is increasingly using the flexibility of gas to support decarbonisation. Going forward for us to support these changes we will need to challenge ourselves to be more and more innovative.

We need to evolve the experience for the increasing number of customer projects that we have in development. So far over RIIO-T1 we have completed six customer connections, but we've seen a significant uplift to the 23 we now have underway.

We are very close to concluding our Customer Low Cost Connections project, which could reduce connection costs to the national transmission system by half and cut the time involved from three years to less than one. To achieve these goals we've developed a range of standardised connection designs, a new online customer connections portal and new commercial processes to reduce the barriers for customers wanting to connect.

When the project concludes next month and the improvements become business as usual our network will be easier to access for both traditional demand customers such as power stations, as well as supply customers such as the smaller distributed generators of gas.

We're engaging regularly with all of our customers to ensure that we're closely monitoring those things that matter most to them. It's early days but we're already receiving positive feedback from our customers, such as Centrica and BioCow who can now consider new business opportunities with our gas transmission network.

Turning now to innovation, I'm really proud that we have an innovation culture where bright ideas are consistently transformed into projects delivering real and measurable improvements for the business. Innovation is at the heart of the RIIO framework, enabling new ways of working. So far we've built a portfolio of over 130 projects and invested more than £29m.

This includes two projects that were awarded a total of £11m as part of Ofgem's Network Innovation competition.

Of the 10% of projects externally assessed today, we've realised £4 in value for every £1 invested, equating to approximately £9m of benefits to the customer. As we continue to track performance across the projects we expect the return to grow and we are targeting an increase from 4 to 1 to 6 to 1.

Some 39 projects were live this year and we have made really exciting progress on many of them, delivering both financial and environmental benefits for gas customers. Let's have a look at just two of these.

Digital modelling is a move away from the traditional 2D CAD drawings into more easily visualised 3D representations of an assets physical and functional characteristics. With the addition of time as a dimension we now have a 4D model, or a digital twin of the asset in the ground. We then use these models to improve the way we manage the asset lifecycle, delivering substantial cost savings throughout the design, the build and the ongoing management of the construction project.

For example, use of this approach at out Bacton terminal means we've produced detailed designs for disconnecting various pipe infrastructure, building replacements offsite and then transporting them to site to be connected. We have saved £647,000 using the model on just this one occasion.

To date the project has generated £4.6m in cost efficiencies, with the potential for up to 20% over any assets' lifetime.

During the break I'll be showcasing our multi award winning robotic pipe inspection device called GRAID. The robot can inspect previously unreachable parts of our high pressure gas network under live conditions and gather extensive data that we can feed into our digital models.

The combination of the robot and advanced analytics will help us minimise unnecessary excavations and premature replacement of assets. We expect savings of over £60m over the next 20 years and a 2,000 tonne reduction in carbon emissions per annum.

Our ambition for the future is to continue to develop a dynamic portfolio of innovative projects. And we're committed to sharing best practice across the industry to deliver a safe, reliable, affordable and efficient network that benefits gas consumers across the UK.

In early 2018 we embarked on a two year transformation programme an indication of our commitment to continuous improvement and staying at the forefront of asset management. Having already achieved ISO 550001 accreditation we're continuing to drive additional asset value by finding a better way of working, one of National Grid's core values.

The programme has reviewed our end to end approach to asset management and identified three key themes. Firstly, asset strategy and planning, focusing on enhancing our data and analytics capabilities, such as our new asset investment prioritisation tools.

Secondly, efficient project delivery, which will review our procurement and contracting principles, including our policies and procedures to ensure that they're fit for purpose and we're not gold plating.

And finally, modernising our operation, which will drive additional improvements in planning and scheduling work through a move to more risk based inspection and a higher coordination of site activities using multi-skilled staff.

We've recently concluded the high level design and have now moved into the delivery phase of the project, adopting an agile delivery approach. The programme is broken

down into ten week increments, each with five two weeks sprints. It's an ambitious schedule, but one that will deliver benefits and improvements to the business.

The purpose of our long term investment programme is simple, to deliver a network fit for the future, minimise the effect on customer bills and maintain the safety and reliability of our network. As I have previously mentioned maintaining the health of our assets represents nearly 50% of our capex spend for the business. And we must continue to invest to maintain operational and safety performance.

We own 24 compressor stations with 70 individual compressor units which are used to move gas around the network. 17 units are affected by the European Industrial Emissions Directive, or IED. As a result we won't be able to operate them beyond 2023 without impacting our network capability.

One of these sites was Aylesbury where our team has just completed one of its biggest structural engineering projects of recent years. We applied innovative technology to a large compressor unit and drastically reduced the amount of carbon monoxide emitted. Having initially thought we'd have to replace the entire compressor unit we have proposed at technology called static catalyst abatement. Rather than replacing the full unit, both exhaust stacks could be replaced instead with inbuilt catalysts which strip out the excess carbon monoxide.

So Aylesbury has become our first IED compliant unit and delivered savings of around £53m against our original allowances. We anticipate an overall reduction in carbon monoxide of more than 2,000 tonnes over the 20 years design life of the new system.

Before our next regulatory period we have been developing an investment plan for each of our remaining non-compliant units, ensuring we continue to provide the required level of network capability at an acceptable cost.

The purpose of the physical and cybersecurity programme is to safeguard the UK's energy supply by protecting our critical gas infrastructure from harm, making sure we continue to connect people to the energy that they need every day.

Practically speaking this means using high tech cameras, lighting, enhanced fences, communication systems and access control for our physical sites and providing enhanced protection for our IT networks and in particular our control systems to reduce the threat from cyber-attacks. The need for an increased level of investment is supported by Government's plans for hardening security at key sites on our network.

As published in our 2018 Future of Gas report, we see gas playing an important role in supporting the transition to a low carbon economy. And as a gas sector, we are being encouraged to develop a clear, well-articulated pathway to decarbonisation. I'd now like to share with you some of our thoughts on this and the opportunities it presents for our network.

Firstly, coal plants are being decommissioned and replaced with nuclear, renewables and gas, as well as emerging battery storage. Gas usage patterns are likely to change as they will provide flexibility for both heat and generation, complementing the increasing level of intermittent renewables. As a cost effective and agile alterative gas networks are likely to require further investment to accommodate the changing gas flows and more pronounced winter peaks.

Secondly, there is an opportunity to start decarbonising heavier commercial vehicles today. These vehicles don't lend themselves to electrification; biogas, natural gas and hydrogen are far more attractive options. The transition requires investment in gas fuelling stations with few public ones currently available in the UK.

But heat decarbonisation is arguably one of the biggest challenges facing UK energy over the next 30 years. Over 80% of homes in the UK use gas for heat and few alternative low cost, low carbon solutions are available. We've begun researching what we believe is the least disruptive way to enable this transition, the use of the existing gas network to deliver hydrogen instead of methane. The scope to invest in a more flexible UK gas grid, capable of flowing pure hydrogen, natural gas and blends of gas.

The Future Energy Scenarios published this year show gas is continuing to provide more energy than electricity in three of our four scenarios out to 2050 and it remains the dominant form of heating well into the 2030s. This view has been supported by several energy players, Norwegian company Equinor recently submitted over £700m worth of investment plans for developing their Troll oil and gas field, extending its life to 2060. This came shortly before Shell reaffirmed the future importance of it's Bacton gas terminal with a £300m investment.

We believe that there will be a need for gas long into the future as the energy system develops to experience higher intermittent generation the flexibility and resilience of our gas network will support the transition to a low cost, low carbon future.

Gas is, and will continue to be, the default energy source when the wind isn't blowing or the sun isn't shining. Thank you for your attention and I'd be happy to take any questions you may have.

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Questions and Answers

Question
Thank you for taking my question, I was just thinking your colleagues gave us an idea of where the electricity demand can go in different scenarios, especially in one particularly scenario where we have high decarbonisation and high decentralisation. I was wondering if you can give us an idea of where gas demand and peak gas demand could go in those scenarios, especially again the most aggressive? Thank you.

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Antony Green, Head of Network Engineering, UK Gas Transmission
Okay, in most scenarios we actually see gas declining in use, that's largely down to energy efficiency and also the diversification into electrification and so on. What's really interesting though is gas actually becomes more important because as I - my closing words were when the sun isn't shining and the wind isn't blowing you rely on gas. So the criticality of gas actually really kicks in and it becomes very, very, important at that point.

So our expectation in the future is that we will actually see lower gas demands overall, but we will see increased winter peaks. So when we really need it that gas network has to provide the resilience that the UK energy network really needs. So we will be there as the back-up effectively overall.

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Deepa Venkateswaran, Bernstein
Thank you, so two questions, one is in RIIO-T1 Electricity Transmission has really outperformed around totex, whereas gas hasn't and you've overinvested, could you explain why that's the case and how do you see T2, is this going to be remedied?

And secondly on the T1 reopener, I believe that Ofgem thinks that you shouldn't have invested in Feeder 9, could you talk about what could be the potential implications when they close the consultation and is there any risk of disallowance from the RAV? Thank you.

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Antony Green, Head of Network Engineering, UK Gas Transmission
Okay thanks for the question. You're absolutely right we have been overinvesting in the asset health and that's for safety and criticality of those assets. that is a conscious decision that we've made. So there is an overspend there.

Going into RIIO-T2 it's too early to answer that question; the reason is we are currently working up a number of scenarios that we are going to share with our stakeholders. And we will identify to our stakeholders what are the risks and what are the consequences of different levels of investments on asset health going forward. So we're going to take onboard the feedback from our stakeholders and we will feed that into the investment plans going forward.

With respect to the T1 reopeners, Feeder 9 is absolutely a critical asset to us. The current situation is that we have responded and we've been working with Ofgem over recent weeks, following their initial position and we expect the answers at the end of next week. So we're very close to knowing what will happen on Feeder 9.

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Question
Hi there, looking at your sources of gas as we go through to 2040 that chart there and I think your UK Continental shelf is down to 2% or so. What are your views sort of on the role of fracking in contributing to the UK gas mix and is that going to be something that you're going to have to put in your scenarios, or do you think it's a non-starter?

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Antony Green, Head of Network Engineering, UK Gas Transmission
Ooh, that's a good question. I think it comes down to how acceptable is that for GB as a whole. Obviously we've seen elsewhere in the world that fracking is well used, it's a well-developed technology, it could be utilised.

It's not really for us to say it's down to government to define the policy as to whether that will become an available energy source for us. Certainly at that point we'll take that policy onboard and deal with it at that time. So it has potential certainly, but we need Government to come forward with policy on that.

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Question
Would it be positive to you, a fracking policy, or do you think it would detrimental to your sort of long term asset growth?

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Antony Green, Head of Network Engineering, UK Gas Transmission
To our asset growth - too early to say really, I don't think we've done the assessment on the impact of shale on our NTS.

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Question
Thank you. At the end of the presentation you touched a little bit on hydrogen and said you were working on some projects and thinking about what that could be in the medium term. Could you just elaborate a little bit on what you're doing and thoughts around it?

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Antony Green, Head of Network Engineering, UK Gas Transmission
Absolutely. Hydrogen has got huge potential overall, but we've got to understand the actual impacts of hydrogen on the existing gas network and whether we would actually need new or additional assets in order to take hydrogen onto the network.

So the current research work that we've embarked up is to look at the impact of hydrogen on the National Grid transmission assets and that's from supply right the way down to the distribution point. There are other organisations also doing this, there is a number of TSOs across Europe also looking at this environment and we're in constant contact with them. So we're looking to actually share that research between us, because we're not the only ones trying to look at this.

And just this week I heard that Gasunie in the Netherlands are about to start running their first converted transmission pipeline. So it's quite exciting, that's the first one I've heard of anywhere in the world, it's going live very shortly, it's an existing transmission pipeline, they've swapped the valves out to be more hydrogen resistant and they will be running a feed to a fertiliser plant, with a high hydrogen content.

So it's really interesting to see another TSO that is going down their route, they're confident that it's possible and they've done the research to prove that the network is capable of doing that. So we're in an exciting space. We've got to prove it for ourselves and that's where we are now.

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Question
My question was on a similar subject actually, but just in terms of renewable hydrogen now, how much can you - how much hydrogen can you introduce into the gas mix - presumably there are some safety constraints on that or standards which may or may not be under review, but where are we at the moment?

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Antony Green, Head of Network Engineering, UK Gas Transmission
Right, the current position is we can put virtually no hydrogen into the network at all. The Gas Safety Management Regulations prevent that at the current time. There is however a review underway, all the gas networks are involved in that. and we are looking to increase the quantity, so it will be a blend that is allowed into the gas network initially.

If you're talking about 100% hydrogen, that's going to need a completely separate set of standards and regulations. IGEM, the organisation that I represent will be taking ownership of that for the UK and they will be developing a set of standards for the UK for pure hydrogen. So we need legislation to change for the Gas Safety Management Regulations to accommodate a blend and that's in progress. And then separate legislation for the pure hydrogen standards for the UK. So the industry is working on it is I guess the nub of the answer there.

Any further questions?

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Question
Going back to what Deepa said, what are the risks that Ofgem will say, okay we don't need all this extra investment that you think is necessary to preserve the, you know, the security and whatnot. I mean since you've already overinvested in the T1, and you're not fully getting paid for it, why did you decide to do that in T1 and what will change in T2?

And a similar question on these compressor stations, you've saved £53m or so, using this clever technique, can Ofgem use that as a new benchmark in T2, so your outperformance could be less, or not? Thank you.

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Antony Green, Head of Network Engineering, UK Gas Transmission
Yeah the overinvestment in T1, as I said earlier it comes down to asset health. Our first priority is safety; we cannot have a safety event on the Gas Transmission network. You'll have seen in the press what happened in the US only a couple of weeks ago, it's tragic when you have an event on a gas network. So our first and foremost priority is maintaining safety on the network and we've got to do that. So I won't apologise for overinvesting on those gas assets in that sense.

Going forward, going into RIIO-T2, as I said in my talk we have been gathering a lot more additional data on our assets so that we can have a far more comprehensive conversation around the condition of the assets, to develop really a well-justified plan. So we will be sharing all of that information with Ofgem as we go into the price control review.

With respect to the compressors, the static catalytic abatement that we applied at Aylesbury is one tool in the arsenal of meeting the environmental standards. We can look at other methodologies as well. We have a variety of compressors that we could make use of. So we've used the technology once and we've proven it there, we may use other techniques, so it's just one of the tools in the arsenal. So it's too early to say is

that the new benchmark because it's one of a number of things that we would make use of.

Okay, any further questions? I'm getting a signal from the back, thank you very much

Applause

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Regulation and Finance

Chris Bennett, Director, UK Regulation
Good morning. I'm Chris Bennett, the Director of UK Regulation. Nicola updated you on T1 so I'm going to focus on my presentation on RIIO-T2. I'll give you an overview of the progress that we've made to date and then the next steps, before handing over to Alan Foster who is our UK CFO who will take you through the financials.

So the RIIO-T2 process started just over a year ago and will conclude in early 2021. So whilst we're still at an early stage we've been heavily engaged with Ofgem and our customers and stakeholders over the last year, particularly to agree the objectives and the principles upon which the RIIO-T2 framework will be based.

So I'll take you through the progress that we've made to date and then look at the next steps in the process.

I'm pleased to say the RIIO framework decision document that was published at the end of July reflects what we've been advocating. It provides a solid foundation as we move into the sector specific consultation phase later this year.

We're pleased that Ofgem have confirmed that the fundamental principles of RIIO-T1, namely incentives, innovation and an output based regulation, will continue to underpin RIIO-T2. We're also pleased that Ofgem confirmed that the overarching objective for RIIO-T2 is that we should develop and maintain a reliable, safe and secure network that is flexible in supporting the transition to a low carbon future.

We support other decisions that were made in the July framework decision documents. For example we believe the change in the length of the price control from eight years to five years better reflects the relatively fast pace of change in the industry. We were pleased with the removal of the option to cap returns, as well as the removal of the option to purely pass through debt costs. These decisions support the fundamental principle of incentivising companies to be as efficient as possible, both in their operations and how they finance the business.

Finally the framework document confirmed a move from retail price indexation to consumer price indexation including housing, or CPIH, and an enhanced stakeholder engagement process, both of which I'll cover shortly.

So getting to this point has involved extensive engagement with Ofgem and a wide range of stakeholders. We start by really understanding the priorities of consumers which, as you won't be surprised to hear, are reliability and affordability. But we also know that they want energy companies - they want to know that energy companies are earning a fair level of return.

So we then engaged with Ofgem to find solutions that deliver what consumers want. Our engagement with Ofgem is based on an open and continuous dialogue at all levels in our respective organisations. This includes chair to chair meetings, all the way down to individual teams either proposing or responding to detailed areas of regulatory policy. In all of our interactions we focus on policies that are in the interests of consumers and stakeholders, and we ensure it's supported by strong, objective evidence.

A good example of where we've engaged with Ofgem and government is the System Operator outcome where we were able to agree a solution that retained the System Operator within National Grid. Importantly this avoided the risk of disruption to the market whilst minimising the cost to consumers.

Let me now talk about why engagement with wider stakeholders and outline why a stakeholder led approach to RIIO-T2 is important and what we are doing differently this time.

So historically price controls have mainly been the remit of Ofgem and network companies, but for RIIO-T2 we've been at the forefront of defining a new approach involving much wider stakeholder engagement. I'm really proud that we were the first network to set up an independent stakeholder group covering our Electricity and Gas Transmission businesses which will be chaired by Trisha McCauley OBE. Trisha has over 20 years' experience as a senior executive in UK consumer organisations with a wealth of experience at Board level in public, private and voluntary sectors. We've also set up a separate independent stakeholder group for our electricity System Operator business that will be chaired by Charlotte Morgan.

So the membership of the Transmission stakeholder group includes a representation from a number of different businesses and organisations. So it includes the likes of Centrica, the Major Energy Users' Council, Oil and Gas UK, Robin Hood Energy, the Green Alliance and the Association of Decentralised Energy, so a breadth of stakeholders. The purpose of the group is to challenge and review our business plans. Our vision is that the group will be an advocate of our plans in advance of Ofgem making an initial determination in July 2020.

In addition to engagement with the stakeholder group we're also engaging with organisations such as Citizens Advice who reflect the voice of the consumer, and key policymakers such as BEIS. This is crucial in ensuring that the RIIO framework enables the policies that will be required for a decarbonised future.

So let's now look at some important areas of debate ahead of the sector specific framework document. So I want to start with inflation indexation.

Ofgem has determined that it is in consumers' interests to change the measure of inflation from RPI to CPIH which is more widely used by statisticians. We're supportive of this change as we believe that it better reflects the inflationary pressures that consumers are exposed to, as recognised by government and other institutions.

Inflation protection is a key feature of UK regulation. The RIIO financial model is based on real returns and inflation is recovered through an annual uplift to the RAV and returned over the life of the assets. This enables the regulator to balance the long term cost of energy between current and future consumers. So although a move from RPI to CPIH is expected to be NPV neutral, the transition has important implications for the overall financial package. For example a change to CPIH will be supportive of our credit

metrics as it increases the level of cash returns in the near term. And Alan will cover this more later.

There's two other key elements of the price control, cost of equity and fair returns, which will be reviewed in detail in the coming months. And I want to cover both of those now.

So in relation to cost of equity Ofgem has stated their intended cost of equity range for RIIO-2 is 3% to 5% based on the market conditions in March of this year. We're still at a very early stage of consultation on the appropriate cost of capital for RIIO-T2, but we've made it clear in our responses that we do not believe the current range is consistent with the risks associated with our Transmission businesses.

Given there are still two and a half years until RIIO-T2 starts we do support Ofgem's decision not to try and lock down the specific figures yet. For example, when you consider the risk free rate, the current cost of equity range includes a real risk free rate of minus 0.6% to minus 1.75%. This input could well change in a rising rate environment.

With respect to the other components of the cost of equity calculation, Ofgem are consulting on changes to the calculation of asset betas. In our view these changes are inconsistent with historic precedent and observed FTSE data for National Grid that continues to point towards levels of asset betas similar to those used in RIIO-T1.

As with the other issues I've discussed our approach on this would be to proactively engage with Ofgem and stakeholders to make our arguments, supported by strong evidence.

Moving now to incentivisation and fair returns. Networks are given a base return to manage risks best held by them, and there's a set of broad symmetrical financial incentives which seek to align network and consumer interests. As Nicola mentioned earlier the introduction of totex incentives in RIIO-T1 has led to significant benefits to consumers and shareholders.

We do however recognise that the legitimacy of these returns earned by networks is important to both Ofgem and consumers. We've therefore proposed the introduction of variable sharing factors which effectively share a greater proportion of outperformance with consumers when the level of outperformance achieved by networks increases, but importantly it maintains the incentives for networks to be as efficient as possible. This is common in US regulation so we're very familiar with it and we've seen it work well in our US businesses.

Finally I just want to give you a view of the T2 timeline and the key next steps. The sector specific consultation is expected in December. This will focus on the frameworks for Electricity Transmission and Gas Transmission separately, and will begin to bring more definition around outputs and incentives, uncertainty mechanisms and the financial framework around cost of capital and financeability.

From a stakeholder perspective we're in the co-creation phase of building our plans which continues through early 2019. Our stakeholder group has already met twice and will continue to meet every two months throughout the next year. We're on track to publish a draft view of our business plans in Q1 2019 before we submit our final plan to Ofgem in quarter four 2019. Our stakeholder group will publish a report alongside our

submission to Ofgem which will provide a useful additional lens for Ofgem in assessing our business plans.

Ahead of Ofgem publishing its initial determination they may hold open hearings to further discuss and debate elements of the submission. We are fully supportive of this. The initial determination is then expected in July 2020, with the final determination in December of that year.

So to summarise, the July framework decision sets a solid foundation and we've been proactively engaging Ofgem to develop a RIIO-T2 framework that is in the best interests of consumers and shareholders.

I will now hand over to Alan who will take you through the financials.

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Alan Foster, UK CFO
Thanks Chris and good morning everyone. I will briefly cover a financial overview, describe how we are thinking about financeability for RIIO-T2 and provide guidance for the remainder of T1.

As Nicola described earlier our performance has been strong. We've delivered 200 to 300 basis points of outperformance on average over the first five years of RIIO, and our UK RAV at March 2018 stood at £19bn. Our ROE performance has been generated through the creation of totex efficiencies and the delivery of incentives linked to our outputs. But of course the totex performance we've delivered is shared. So over the same period we've created £540m of savings for our customers.

Asset growth of 4.2% per annum was driven by capital investment of £6.6bn as well as the RPI uplift which we receive under the UK regulatory model. As you know there have been short term differences between our IFRS performance and the consistent level of our regulatory returns performance during RIIO-T1. As we look ahead to RIIO-T2 we'll discuss with Ofgem how the alignment of IFRS and regulatory performance can be improved.

Before I talk about the financeability of RIIO-T2, for context I'd like to spend a few moments to explain the four main building blocks of our revenue and RAV. If I can draw your attention to the revenue bar on the left. Firstly each year we recover a portion of the RAV through regulatory depreciation.

Secondly we recover our totex costs which as you know includes opex and capex through fast and slow money. In Electricity Transmission for example 15% of totex is recovered as fast money through revenues, with the remainder added to RAV as slow money.

Thirdly we are remunerated for incentive performance which is received through both revenue and RAV.

Fourthly each year we earn a real return on the outstanding RAV balance. This is received through our revenues. Inflation is recovered through the annual inflationary uplift to our RAV.

So the level of revenue and RAV growth is dependent on a number of factors including asset lives, the way inflation is recovered and the split of fast and slow money.

Turning now to RIIO-T2. Clearly a cost of equity that appropriately balances risk and return is very important. Chris has already outlined how we are engaging with Ofgem and stakeholders to ensure a fair outcome. Overall we need a total financial package that can fund the necessary investment as well as fairly remunerating shareholders.

Cost of equity is one element of the total financial package. In this section I want to bring to life how different elements can impact the balance between asset growth and cash return. For the sake of simplicity I've not reflected any impacts from tax, and assume £10bn of RAV, £1bn of totex allowance and 40% equity gearing.

Starting with return on equity. In my simplified scenario the equity base is £4bn. The impact from a 100 basis points change in the ROE would therefore be £40m on revenue.

Turning now to the transition to CPIH which is expected to be NPV neutral. On average CPIH is around 1% lower than RPI. In practical terms this means the change to CPIH will lead to a higher real return and cash flow through faster recovery of the RAV. If we assume a 50:50 transition to CPIH this would imply a 50 basis points increase to the cash return from the £10bn of RAV, a revenue increase of £50m.

Finally fast money which is the revenues received to fund the operations of the business. A 5% increase in the amount of totex received as fast money would increase revenues and cash flows by £50m, with a corresponding reduction in the amount of slow money which is added to the RAV.

So these three examples show how the many moving parts of the total financial package can deliver a financeable RIIO-T2 outcome. We'll be focused on ensuring the outcome balances the needs of consumers, investors and other stakeholders.

Although Ofgem have set out they'll be tougher on returns, they've also been clear well performing companies will still outperform the base return. There will be winners and losers but we've a strong track record of delivery and outperformance driven by our relentless focus on efficiency, innovation and our ability to leverage new technologies. This sets a good foundation to build on in T2.

Outperformance can come from innovative totex savings and our output incentives. But ultimately they result from delivering for our customers and stakeholders. So as we work with our customers and stakeholders to develop our business plans we will identify new incentives to drive the outcomes they are looking for. Whilst we are still early in the process these are likely to include whole system outcomes such as facilitating the decarbonisation of the network.

I'd like to close by briefly looking at the outlook for our financial performance. As we have previously guided we expect to continue to outperform by 200 to 300 basis points for the remainder of the RIIO-T1 period. The recent trend of higher performance in Electricity Transmission and lower performance for Gas Transmission will continue, principally due to the level of asset health spend required in Gas Transmission relative to the allowances. Investment of £1.3bn is expected in each of the last two years of RIIO, generating 4% to 5% of annual asset growth assuming 3% RPI.

So to summarise, we continue to expect good regulatory performance over the remainder of RIIO-T1. It is still early days in the RIIO-T2 process and we feel we've set a good foundation and are well placed to realise opportunities in the T2 period.

And with that Chris and I would welcome any questions that you have.

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Questions and Answers

Analyst, Societe Generale
Question on RIIO-1 and actually not adjustments for the remaining of RIIO-1 and actually the first two years of RIIO-2 still applying to RIIO-1, if you can maybe give us a little bit of guidance how it will be created and what will actually impact the mod adjustments, what potential levels can we expect in the next four years or so? Thank you.

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Alan Foster, UK CFO
I think in terms of mod adjustments really we're only able to forecast for the remainder of the RIIO-T1 period, and in that respect we're maintaining our guidance that with Electricity Transmission the mod adjustments will continue around the level we've seen this year, so around 300 million for the remainder of T1. For Gas Transmission we see the level of mod adjustment being lower in the next two years as we've had a larger mod related to the Avonmouth pipeline this year, but we'll update that guidance as we finalise our understanding the re-openers. And in terms of thinking ahead to T2 we'll really need to understand more of the plans and mechanisms to be able to forecast that far ahead.

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Jenny Ping, Citi
Chris you outlined and indicated in your presentation that the cost of equity is still very early stages yet. Am I right in saying that you're sort of alluding to the preference of a cost of equity indexation as a methodology? What do you see as the benefits and downfalls if we were to move to that?

And then a separate question on cost of debt. What conversations have you had with Ofgem on the remaining options for the cost of debt?

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Chris Bennett, Director, UK Regulation
So on cost of equity our position on indexation at the moment is aligned with Ofgem. We think it's an interesting concept and we've said in our responses to the consultation that we are keen to continue to work with Ofgem to look at it as an option. Obviously below the headline which bits are suitable to indexation, things like risk free rates verses asset betas and the like, so the level below there's some debate about how you would actually do it but our position has been we think it's a valid option to consider as we go into the next stage of the process, and we'll continue to work with Ofgem and other stakeholders on developing it as a model. And then look at it through the lens of will it

be good for consumers, will it be good for shareholders. So it's in the yes it should be further consulted as we go through the next stage of the consultation.

On cost of debt we were, as I said in my speech, we were pleased that the cost of debt pass through was ruled out. We thought that sent all the wrong incentive properties. So that one being ruled out we thought was good. Again we are open minded in terms of the conversations. At the moment we're saying we think the trailing average that we've had in RIIO-T1 is a sensible mechanism, but we think there is merit in going for a 20 year trailing average rather than ten years.

But yeah I think the main message on cost of equity and cost of debt is early stage of the process. I'd expect on the financial parameters and cost of equity the next six to nine months is when we'll probably enter into starting to narrow down the options. There's still quite a lot of options on the table on the back of the July document.

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Fraser McLaren, Bank of America Merrill Lynch
Just a question about the inflation indexation benchmark change. Could you speak a little bit about the implications for your index debt please? And do you worry that the implied cash boost will in some way be neutralised through an adjustment of the fast money in order to alleviate any upward pressure on bills?

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Alan Foster, UK CFO
Shall I take? In terms of the CPI indexation of debt I think we do understand that it's a relatively immature and small market currently for CPI indexed debt, but we do expect that to evolve and mature over the next two and a half years, particularly with the developments that's taking place in the water industry. So it's something that we are quite confident about that that will evolve and mature in the time that's available.

In terms of the fact that the cash returns will be boosted through the transition to CPIH, I think as I said really we will be looking at the financial package as an overall outcome but it's very important that all of the individual elements are set on their merits, and we certainly feel that it's very important that we make the arguments that Chris was describing around the cost of equity. So we'll obviously be looking at it as a package but that doesn't give any reason for any individual outcome on any of the individual priorities.

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Question
When it comes to the concept of balancing performance incentives in RIIO-2 are you of the view that Electricity Transmission will be considered as a category on its own or will performance there be compared to that in Electricity Distribution and maybe even Gas? This is question number one.

Question number two; in terms of the concept of introducing flexibility in RIIO-2 are you of the view that even at the beginning of the regulatory period that you will have certainty around the capex levels you will be allowed to spend over the entity of the five year period?

And then the last question is what's your view on the role of non-wires alternatives under RIIO-2?

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Chris Bennett, Director, UK Regulation
Okay so the answer to the first question, the sector specific consultation will be Electricity Transmission and Gas Transmission. So Gas Transmission is just purely us, electricity transmission will be us and the Scottish companies. So remember the RIIO-T2 deal is an April 2021 date, and Electricity Distribution is not until 2023. So sector specific is Electricity Transmission, not with Electricity Distribution.

In terms of flexibility it's probably not that well understood how well the uncertainty mechanisms have worked in RIIO-T1. So you have your asset related spend which you can forecast in advance, it relates to reliability. So you can have a fair degree of certainty over that bit of the plan. But the RIIO-T1 deal has then had revenue drivers that reflect the revenues depending on what generation connects. So actually in RIIO-T1 because some of the outputs have fallen away the allowances have adjusted and adjusted very well. So the RIIO-T1 framework sets a good framework for our uncertainty mechanism should deal with externalities and flex allowances as outputs change.

In terms of no wire solutions we are very supportive of output based regulation so not input based. So define what the output is you're trying to achieve and then it should be down to the business to decide whether the best solution is an asset solution or a non-asset solution. So I see that as a fundamental part of having an output based regulation is you leave it to the companies to decide what's the lowest cost to achieve the outcome rather than prescribe certain engineering solutions.

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Dominic Nash, Macquarie
Two questions please. The first one to Chris. You say you don't think the 3% to 5% real range is reflective of the risks of a Transmission company. Would you mind letting us know what you think your range would be?

And secondly one for Alan on the IFRIC or IFRS accounting versus regulatory accounting. Sort of two sort of sections here. So firstly what would you like to see changed on the accounting? And what sort of timeframe will it be to get something through the IAS board on that one?

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Chris Bennett, Director, UK Regulation
So I'll answer the first one in terms of the 3% to 5% range. Referred a bit to what I said in the presentation. So I am very conscious of it's two and a half years away from RIIO-T2 and therefore as I mentioned there's lots of elements of that underpin the cost of equity range that could still change within that period. So the risk free rate being one.

In terms of equity betas we believe - and asset betas more importantly, when you look at historic price controls there's always been a bit of a hierarchy between the risks that water companies face versus electricity companies and Electricity Transmission in particular. So we're keen to enter into the debate with Ofgem around really

understanding asset betas and what are the risks that we face versus other companies around the large scale of the capital programme, the complexity of the capital programme, the uncertainty mechanisms that were mentioned earlier. So yeah the position on the cost of equity at the moment is we're just about to go into this phase of having the proper conversation around it, but we think many of the parameters have not changed massively from the RIIO-T1 deal.

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Dominic Nash, Macquarie
So what would the number be if you actually put those in?

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Chris Bennett, Director, UK Regulation
I'm not going to give you a number. It's too early to say in terms of the number, we've got to go through the process, understand the risks, see how the market changes over the next two and a half years.

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Alan Foster, UK CFO
In respect of aligning IFRS and regulatory performance our focus is actually in changing and improving the application of the regulatory framework rather than changing the accounting standards. In respect of the changes to the regulatory framework that we'd be looking to improve, it really amounts to setting the base revenues that are related to those things with more certainty, having better and more accurate forecasting of the outputs, and then also looking at the fast and slow money rates and trying to align those more closely with the operating costs. So we think with those refinements there's the opportunity of getting much closer alignment of the performance in the regulatory and the IFRS accounts.

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Dominic Nash, Macquarie
So the annual iteration sort of random number generator is something you'd like to see the back of?

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Alan Foster, UK CFO
We'd like to see that become clearer and more transparent for people to forecast the performance and see the alignment, so improving that is an objective.

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Facilitator
We'll have to leave it there in terms of the questions unfortunately but we can make our way out down to the breakout sessions we've got.

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Break (and Trade Stalls)

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Questions and Answers

Nicola Shaw, Executive Director, UK
Hello everybody, thank you. And I hope you've enjoyed the morning. We were just going to hand straight to questions. We hope you've got the full impression of what we were trying to talk to you about, the importance of our customers, our shareholders and our stakeholders and how we're looking at the exciting opportunities for the business now and in the future.

So over to you for questions.

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Mark Freshney, Credit Suisse
Competition proxy / competitive tendering by Ofgem, the returns are clearly sub WACC; it doesn't look particularly a project in its current form that's consistent with the way that National Grid finances its business. Ofgem has come out with its final decision, can you run through what your options are and whether you can reach an outcome with Ofgem without going to the CMA which would - or for judicial review which would potentially be a very drastic option?

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John Pettigrew, Chief Executive
Thanks Mark. Why don't I just reiterate what our concerns are which we've been very public about. And then I can hand over to Nicola and she can talk about process.

So in terms of CPM I think we've been very clear that there are a number of concerns we have with it. Firstly it's not what was envisaged when we entered into RIIO-T1. You know when we entered into RIIO-T1 we knew that there was a choice between strategic wider works and competition. Proxy competition isn't either of those things so that's very inconsistent with where we were with RIIO-T1.

Secondly it came together very quickly and I think I mentioned this in May, and therefore we do have some concerns about where the consumer benefits are in terms of the proxy approach.

And then thirdly, and it really links more directly to Hinkley itself, is the issue around the risk reward balance. And again we've expressed some concerns around that. So those are the three issues.

In terms of the engagement we've had with Ofgem we were very clear upfront with Ofgem that we had some concerns, that was important to us. We have a constructive relationship as you hear today so we've been very clear and very transparent with Ofgem in terms of our thoughts on this, and we've also talked to them about making sure that the discussions on CPM weren't in any way polluting the discussions that we were having with RIIO-T2. And I think that's been demonstrated over the last six months, so actually a lot of things that we've talked to Ofgem we've saw in the consultation and that relationship remains constructive as we move forward.

In terms of the process on CPM I'm going to ask Nicola to just take us through that.

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Nicola Shaw, Executive Director, UK
So in July Ofgem issued their document talking about what they were thinking about in relation to the CPM model and Hinkley. And we wrote to them afterwards and asked for a bit more detail on what that process would look like and they've updated everyone now which is that we expect consultation on the licence kit changes that they want to make for the competition proxy model over the next few months and then specifically on Hinkley thereafter. And we expect that process to play out over the back months of this year, and then well into the early part of 2019. So when we get to a decision on whether we want to appeal or do anything about it that will be at the point of making a decision on the licence and that's likely to be in early 2019.

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Fraser McLaren, Bank of America Merrill Lynch
You've highlighted an increase in the number of connection requests in both networks. Now there's a bit of déjà vu here given that a number of years ago your expectations about a transforming network then and more connections led you to raise equity to fund what you saw as a big increase in growth. And of course a lot of that didn't happen in the end. So two questions. One, how do you think about the quantum of investment required in the various scenarios relative to your actual balance sheet capacity, especially if US investment remains elevated?

And two, with the benefit of hindsight do you think that most of the changes that you're seeing will actually take longer than expected and in the near term investment will stay at these levels that we're seeing just now?

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John Pettigrew, Chief Executive
Okay so in terms of quantum investment I think for the remaining part of RIIO-T1 I think we've been very clear; our expectations are that we'll see similar levels of investment that we've seen in the first five years, so £1.3bn per annum.

As we move into RIIO-T2 you first and foremost we need to engage with our stakeholders and customers to really understand what they want from us as a Transmission business. And Chris this morning has gone through in a lot of detail about that process to make sure that whatever the outputs are that we're delivering they are consistent with the needs of our customers and stakeholders.

What we can see as we look forward is a number of investment drivers, both in the Gas side and the Electricity side that will drive investment going forward, whether it's asset health, new generation and that's the traditional generation such as CCGTs, we'll see more offshore wind but we're also seeing investments to reflect the fact that the networks are operating in a different way again, in Nicola's presentation this morning you saw that. So we see a number of investment drivers.

But the interesting thing I think and probably something that was a little bit of a surprise to us is that we're also seeing a demand from smaller customers wanting to connect to the network. So Pivot Power is an example of that. So the connections that we're

seeing are a mixture of traditional and a mixture of new types of customer wanting different types of service from Transmission. So over the next 18 months we'll have a much clearer view of the level of investment that we expect to see in the UK. What we do see is a significant number of investment drivers that we'll work with our stakeholders on.

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Nicola Shaw, Executive Director, UK
Which allows me to pick up the second question very smoothly I think because you asked about hindsight and I think what we said is these are smaller, quite varied customers. David talked about having in the 70s of application requests and signing up Pivot Power for example for eight projects. So we don't necessarily say there's a direct correlation between requests and signing up, we know that, but they're smaller projects, they're not big ones.

One of the things that it's worth sort of thinking about in the round is when we connect there is a direct agreement for the connection process and if it's an individual connection they pay for the cost of that particular connection. There's then a consideration of wider investment in the network to reinforce it and that would be part of the wider discussion on T2 and in other places. So the notion of connection is actually very good for us. How long it takes to play out is I think a question in the round.

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Chris Laybutt, JP Morgan
Just one question on you mentioned Nicola that the core principles of RIIO-1 have been retained but there is an element now of anchoring and relative returns, particularly on your incentives which is a concern for investors. Do you see that as a material change in the nature of the regulatory framework? And can you give us an update on what's happening at the moment and your interactions with Ofgem and any insights would be useful?

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Nicola Shaw, Executive Director, UK
So when I was talking about the core principles I think I was thinking of three principal things. The first is asset management and the focus on managing our assets in the round. And I hope you enjoyed the breakout sessions, in particular the conversation you had with Ursula who is our asset management expert, because she's thinking about that in a very comprehensive way of how do we optimise over a number of assets in a complex network which is used in a very complex way, as is Tony for Gas. So I think that asset management principle is fundamental to the way we think about RIIO.

The second part of it is the sharing with customers during the control period which has been a really successful part of the RIIO framework. It's allowed customers and shareholders to do well out of our innovations, and that remains fundamental to RIIO going forward.

And then just the notion of having incentives, finding different ways and encouraging us financially to find different ways to do things better. Those three things are what I was talking about when I was talking about the fundamentals of RIIO because I think they are intrinsic to the framework they're talking about.

What does that mean for the conversations we're having now? I think they - Chris has talked to each in the breakout sessions about the level of conversation. I think it's very frank actually I've been really impressed by Ofgem's willingness to lay out the range of questions that they have and they want us to engage with. The dialogue has been really strong. We set out with this focus on customers and stakeholders and that we've worked really actively with them to play through how that's going to work. They have a customer and stakeholder panel; we have a customer and stakeholder panel, as do the Distribution businesses and the other Transmissions businesses. And how that picture came together was in itself a challenge and one that needed discussion. And at its heart I think that is a solid foundation for where we'll go in T2. The fundamentals of where they get to of course will take the next couple of years to play through.

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John Pettigrew, Chief Executive
The only thing I'd add to that is so I think in the last consultation with Ofgem they narrowed down the options for incentivisation. There are some that they've withdrawn which we were very pleased about, there are some there we still want to have a dialogue with Ofgem that we don't think quite work for a Transmission company, and there are some thing that we think really do work for a Transmission company to really incentivise us to do them for customers. So that will be partly ongoing dialogue as we move into the sector specific incentivisation consultation documents at the end of the year.

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Dominic Nash, Macquarie
Two questions please. Firstly you've given us a whole bunch of - you've qualified a whole number of drivers for future investment if we go to RIIO-2. Is it possible to give us an indication of what you think the proportion of those that could be part of strategic wider works and open to competition, and whether or not you'd be interested in bidding for wider works in other people's areas?

And then secondly, whilst you're looking at that sort of vein, are a lot of the trends you're identifying positively benefits lower voltage networks, particularly equity distribution. You obviously own a lot in the US as well. Is that an area that you would consider exploring in more detail in getting involved in the lower voltage electricity distribution areas within the UK?

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Nicola Shaw, Executive Director, UK
So I'll take the first part of the question and John will follow up with the second. Your question about drivers, so we have been explicit, we think asset health is a major driver for both networks. And that clearly doesn't fit the new separable large part of the what would go to competition. So I see asset health as remaining a very important part.

I think protection of the network in all sorts of ways, so we talked about cyber, we've talked about physical security, all of those things are inherent to the network, they are not new and separable and large. So those are a predominant feature of the things that wouldn't go to competition. And we've talked to you before about the model so John will take the second part of the question.

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John Pettigrew, Chief Executive
I think if I understood the question Dominic I think what we're seeing is that there's increasing interest from smaller players wanting to connect to the Transmission system and we are actively and absolutely keen to be able to see if we can serve their needs. So that generally is still connecting to Transmission system but at loads that perhaps traditionally have gone to the Distribution companies. That's partly because I think we're seeing different types of customers, so some are wanting to connect storage, some are looking to do EVs at the fleet level, and when they're looking at the economics and when we look at what we've done to streamline our processes we're finding that we are competitive.

So that will be an opportunity for us in the UK and we will continue to pursue that.

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Dominic Nash, Macquarie
And I think as a follow on - I mean the question was more the point on strategically if an asset came available that was of the low voltage distribution is this something that National Grid would be interested in as it fits all the themes that you're talking about?

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John Pettigrew, Chief Executive
Well look at the moment we're very comfortable with the portfolio and the businesses we have within it. So I've always said with regards to M&A which I think is the question you're asking, which is we are not reliant on doing M&A for the growth of our business. So we've got very strong growth in the US and good growth in the UK. Of course come with the size of the National Grid we'd always look at an opportunity if we believe that it's got value for our shareholders and our customers. But you know that's the position is our focus is always on driving the performance and the organic growth of the business.

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Question
Touching on a question that was asked earlier about your balance sheet capacity, how should we think about leverage going into the next regulatory framework and are you implementing the investments that you've talked about?

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John Pettigrew, Chief Executive
So in terms of the balance sheet why don't I ask Andy Agg who's with us today? Andy is our interim CFO so why doesn't Andy answer that question.

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Andy Agg, Interim CFO
Thanks John and good morning everybody. Yes so in terms of where we are on the balance sheet we've talked previously and again at yearend around our 5% to 7% asset growth being our sustainable feature in terms of the balance sheet as we look forward.

We closed last year just under 65% geared, again that's in the normal range that we look to work with.

As we look forward we guided then to higher growth in the US - we looked at higher growth in the US as you've just described. So I think as we look forward that contributes to us being at the top end of the 5% to 7% range. And as we mentioned at yearend we therefore look in terms of the scrip, which has been that flexible financing tool that we've used previously, that we wouldn't be looking to buy back the scrip for the next couple of years as we're at or above the top end of that 7%.

So that's all the things that we look at as we think about the balance sheet going forward. And as we've heard the growth drivers here in the UK with the sort of 4% we see as our ongoing growth rate here in the UK through to the end of RIIO. Those two things combined, plus our interconnector investments that we've talked about, the interconnectors that we have in train today plus going forward, those things all combined, and we're comfortable therefore with the balance sheet with the use of the scrip as a flexible financing tool, keep up in the right place.

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Deepa Venkateswaran, Bernstein
So I had a question on the capex for the current period and the next period. You've stressed that quite a lot of it is asset health. Can you quantify what was the date of the T1 capex asset health? And is there any reason to think that it shouldn't be consistent in the next period, at least in terms of absolute levels? But you did mention that your networks were built in the '60s and you have been doing for the last eight years quite a lot, so I'm just wondering is there any of that replacement programme slowing or is there much to go?

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John Pettigrew, Chief Executive
So in terms of Electricity Transmission I think it's been relatively consistent for many years in terms of the need for I call it maintenance capex. So we don't really see that changing as we go forward over T1 and into T2, so it will continue to be an investment driver at similar levels to what we've seen in the past I think.

In terms of Gas Transmission and I sat in on the discussion this morning, you know we've quite clearly invested more in asset health than the allowances that Ofgem gave us in RIIO-T1. That was a deliberate move. It was a deliberate move because we felt it was necessary in order to maintain the reliability and the safety of the network.

We're in a much better place I think with Gas Transmission in terms of being able to provide Ofgem with evidence and data as to the levels of asset health investment that's going to be needed in RIIO-T2, so I would expect to see slightly higher investment in RIIO-T2 for Gas Transmission, supported by our stakeholders and the regulator as we go through the RIIO-T2 process.

And that's because it was built in the '70s, a lot of those assets are coming towards the end of their life. We've got good information on the health of those assets, and also I think there's a lot less uncertainty around Gas Transmission in terms of the future than there was perhaps in 2012, because as you hear today there's a very clear long term

future for Gas Transmission, and I think that will help Ofgem in terms of allowing the funding that we need for asset health.

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Deepa Venkateswaran, Bernstein
And what's the proportion of your capex now?

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John Pettigrew, Chief Executive
The proportion, for ET it's roughly about 50% David? About 50%. Within Gas Transmission it's slightly higher than that depending on specific projects. But typically it's probably in the 70% range.

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Mark Freshney, Credit Suisse
If I think back five years ago at the start of RIIO you flagged this 200 to 300 BPS outperformance number which when you add up with the base ROEs gets you to an all in ROE in excess of 12% in the UK. Is there any illustration of the kind of overall return that you would expect in RIIO-T2? Is there anything at all that you can give us?

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John Pettigrew, Chief Executive
So I think as you heard this morning I think first of all it's too early to get into what's the level of outperformance that we're going to deliver under RIIO-T2. Clearly as you heard from Alan and from Chris and others what is important and what we're focused on at the moment is making that we get the right package for RIIO-T2 that balances that reward for the investments that we're making, but also is cognisant of the affordability for customers. And that is the focus and we're looking at a whole host of different factors in terms of baseline opex, capex, incentivisation, sharing mechanisms, speed of cash, ROE. All of that will tell us whether we've got the right overall framework to go forward.

Hopefully what you got a sense of today is that we have lots of ideas about how we can then take the business forward. Our approach in RIIO-T2 in terms of our ability to outperform will be very similar to what we did in RIIO-T1. You need to understand the framework and once you understand that framework it will allow us to put plans together to be able to identify the real opportunities to drive performance, both from a financial perspective but also to meet the needs of our customers.

I think this is my sixth or seventh price control. Usually at this point people say well where is the outperformance going to come from? I'm very confident we've got the capability and the organisation, and hopefully you got a sense of that today, to be able to identify those opportunities. And let's not forget as well technology is always moving forward, and therefore technology also offers a great opportunity for us to outperform in delivering the output.

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Analyst, Bloomberg Intelligence

Quick question, last week Severn Trent spoke a lot about starting to implement their business plan even before it's been approved by the regulator. I know RIIO-2 is starting later but is this something you're thinking of or you're going to wait till it's signed, sealed and delivered and there is a final determination before you start working on your RIIO-2 project? Thank you.

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John Pettigrew, Chief Executive
So I'm not sure who from the water company was saying that. I mean from our perspective we have a business plan in process which is basically a rolling five years. So within that we will have rate filings in the US and we'll have price controls in the UK. So we focus on doing what's right for customers and driving innovation and efficiency as hard as we can. So you know from our perspective it's a continuous process rather than a step process. It was a bit like that in the 1990s but I think these days if you're going to meet the needs of customers you need to continuously be driving the performance of the business, and that's our focus.

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Nick Ashworth, Morgan Stanley
So we've heard a lot about the UK business this morning and the potential growth levers into the 2020s with T2, and to your point John in terms of people being a little bit uncertain around the returns you can earn, you've got a good track record of delivering good returns in the UK over time. The US business is obviously now doing a lot better and is growing a lot faster returns and moving up. So if I look at it the US is doing pretty well and growing nicely. There's lots of - returns should remain decent in the UK and growth should come through, but that doesn't seem to be wholly reflected in the share price today. Now obviously there's I guess political regulatory overhangs and concerns in the UK in particular, but if I look at some of the US peers they've actually performed - shares have performed pretty well over the last couple of years. So when thinking about the share price and thinking about the Group as a whole given all of that, what's the change? What's the market missing or what can you do to help the market see the value that is perhaps not being shown in the share price today?

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John Pettigrew, Chief Executive
So I think I mean I'd start by saying - bits of your question actually which is when you look at the fundamentals of the business and it is performing very well and it's got strong prospects. So you're right, the UK business has continued to deliver 200 to 300 basis points, we've got good growth going forward and great plans as we move into RIIO-T2. In the US we've had strong growth over the last couple of years and improved returns, and as you've heard if you came to the US seminar you'd know that we're expecting strong growth to continue based on the rate filings that we've already agreed. So the fundamentals of the business are very, very good.

When we look at the share price you know the things that we believe are driving it are the political and regulatory uncertainty, so things like Brexit, things like the debate around nationalisation, as well as a sense that you know RIIO-T2 is a big price control and therefore there is some uncertainty at the moment on exactly how that will land given some of the comments from Ofgem.

So our approach is first and foremost to focus on the fundamentals and make sure that we're delivering the performance that our customers want. Secondly we work hard with the regulator to make sure that they understand that what we're doing is driving real value for customers and we're very transparent, using examples like you've used today, to make sure that people understand it's real performance and it's not some sort of hoodwinking of the regulator.

And then we're engaging quite extensively with government to make sure they understand the role that National Grid plays, both in terms of the level of performance in terms of reliability and safety, but also the role that we play in transitioning the energy future. So we spend a lot of time educating and engaging with government to demonstrate that actually National Grid in its current form actually creates more value for customers than if it was held publicly.

So it's really that's our focus and I think by doing that and increasing the transparency to the market then ultimately some of these uncertainties will unwind.

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Nick Ashworth, Morgan Stanley
And on that can we expect to see more granularity around maybe some US earnings and maybe disaggregating earnings a little bit and to be able to give a little bit more information to the market to be able to look at the two businesses maybe a little bit more separately?

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John Pettigrew, Chief Executive
Yeah so hopefully people are aware we started that process last year, and so we held the seminar for our New York business last year. And we wanted to do that because our New York business is about 50% of our US business. We're investing about $5bn over three years so it's a substantial business with a lot of growth. So we use that as an opportunity to be more transparent about that business. But we're planning on doing a similar exercise at the end of this calendar year for the rest of our US business. So we will continue to improve the transparency and disclosure to make sure that all investors and analysts understand the different contributions that each part of the business is making to National Grid.

Any more questions?

Okay if there's no more questions can I just say thank you very much. We do appreciate you taking the time to come today. And hopefully you've got a real sense of the progress that the UK business is making, the levels of performance we're delivering and the plans that we've got going forward. So thank you very much and safe journey home.

Applause

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