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Tim Yeo Introduction

Can I warmly thank Suffolk County Council, with whom I don’t always have such words of praise - I know we have got the Leader and various others here - but this is an absolutely excellent initiative addressing very directly a concern, which is clearly not by any means confined to Suffolk, although it is particularly acute in Suffolk, but I do think it has been a very very worthwhile exercise to get so many people here today and I am delighted that people from other parts of the country; Somerset Snowdonia, Lancashire, Copeland, many other people, who share the concerns that we have, and therefore a tremendous effort by Suffolk to get so many people here today.

I have got a long standing interest in this area. I am not here just because National Grid are currently proposing to build a new set of pylons across an AONB in my constituency - though that by itself would be a good enough reason to be here. I've had an interest in environmental and energy issues now for 20 years since I was a Minister twice in the Department of the Environment - once dealing with planning issues, once dealing with climate change issues - almost before living memory now in the last Conservative Government - but anyhow that was the origins of my interest.

I have retained a close interest in it throughout the intervening period. I was Shadow Secretary of State for the Environment in the Shadow Cabinet. I am now chairman of the Energy and Climate Change Select Committee and at the last parliament I was chairman of the Environmental Audit Committee. My current committee, before I was on it, issued a report which is directly relevant to this discussion today and will be mentioned I am sure from time to time.

I am of course extremely concerned about the impact of what may happen in Suffolk. It has provoked, not surprisingly, a tremendous upsurge of local interest and campaigning, and I am impressed by the enthusiasm and the time commitments put in by the people who are campaigning and I have been working with a number of groups in my constituency on this issue.

By a curious, and almost symmetrical, coincidence one of the other constituencies that is most affected by this is represented in parliament by Tessa Munt, who was my opponent, my Liberal Democrat opponent, in 2001 and when she was elected to the House last year almost the first day we were back I walked in, and of course it was just after the Coalition had been formed, and I sat down next to her and I said ‘Tessa, firstly can I congratulate you on being elected, and secondly can I say I don’t think either of us ever thought we would be sitting next to each other on the same side in the House of Commons.’ Anyway we are collaborating on this exercise and I am grateful to her. I think she will be here at some point during the day - that was her intention earlier in the week.

The Coalition has got an agenda about localism, about empowering communities, and today I think is one of those, perhaps rare, opportunities for people who are
going to be affected by Government policy to confront some of the policy makers and, I hope, to bring some new perspectives and raise some questions about the decision making process for something which does have such a big impact on the communities that are affected. We are really absolutely at the heart here in Westminster and Whitehall of the decision making process.

I do have to contrast in my mind the extent to which local communities are already empowered when it comes to things like applications for windfarms where it is not unusual, where there is strong local opposition, to see a proposal off - and the importance of allowing the local view and the local voice to be heard is recognised - with proposals for transmission capacity, which of course are necessary, but where there seems to be almost a presumption the other way and I think that is a rather anachronistic set of assumptions which seem to be almost on opposite sides.

I am grateful to all of the people who have agreed to speak today and one or two of them may feel they are venturing into the lion’s den a bit, but it does confirm one thing I can say to the credit of National Grid: they have been very willing to engage in the debate with people of different views right from the start and I welcome that - and I think that’s very reassuring to people who do have concerns about this; that it is a proper, constructive debate - though we might want for, wish for, and will press for, some open mindedness about some of the alternatives. Nevertheless I welcome the fact that they are taking part in this debate.

Can I say welcome to all of you that have come along today? I know a lot of you have come from quite a long way away. Local Government is well represented here today by both members and I am particularly delighted that Jeremy Pembroke, the Leader of Suffolk County Council, is here. He also happens to be a constituent of mine and so I work very hard to try and get his vote - he doesn’t tell me how he votes but I can assure him I voted for him on every occasion. Also a large number of officers and Lucy Robinson, who has been, I think, instrumental in doing a lot of the staff work here and I appreciate her presence and participation. But obviously members of the public are here; there are representatives from different campaigning groups; there are representatives from industry, from central Government. We have got a very good spread of participants and I think that shows the level of interest, as well as the breadth of the issues that we are debating.

The aim today is to consider whether the legislative, the regulatory, the policy frameworks that actually dictate the future shape of our networks are still fit for purpose. They were designed in very different historical circumstances when attitudes about energy, about electricity generation, about consumption, about greenhouse gas emissions and so on were very very different. That all dates from an era where concerns about sustainability didn’t really exist, in the way that they do today, at all.

A whole lot of arguments have been raised during the period I have been involved in this campaign which suggest that the present approach is not quite right. Let me say that I start from the point that of course we need more investment in transmission
capacity. That is a given and not an issue. The nature of our future electricity generation is that it is going to require greater transmission capacity, but I am not sure, I am not convinced, that we have an overall strategy which is going to deliver a coordinated network and one that is less intrusive.

I am not convinced that we have the right environment for encouraging innovation and that is one of the dangers that we may, therefore, rely on old technology.

I am not sure that the values that people place both locally, and nationally now, on environmental quality are properly recognised in the way the decisions are being made and in some of the decisions themselves, and in particular whether we place a proper value on our landscapes for the damage, the erosion of that value which overhead power lines in particular will have in a county like Suffolk, which has this admirable objective to be the Greenest County and one that I wholly support. And again the County Council has played an excellent has role in advancing that and the debates around it.

We depend significantly for our prosperity on tourism. There are also potential health impacts of overhead power lines, impacts on house prices which will be of concern to many families in the county.

Those are some of the background concerns which I hope we will be considering and perhaps shedding some light on during the course of the day.

A lot of that was raised in the report by the Energy and Climate Change Select Committee from 2009 - before the election and therefore before I was a member of it. I do commend that report to you and the new committee, my current committee, will certainly be returning to these issues and we have been mildly encouraged by some of the evidence we have already had on relevant matters. That committee’s investigation looked particularly at some of the technical issues around both transmission access and charging; it didn’t consider the relative social and environmental impacts of developing the network in different ways. But, if we are going to embrace sustainable development I think we do need to try and get a better understanding of these issues and a better way of responding to some of the challenges.

Anyway that is enough from me for the time being. Let’s crack on straight away with the first presentation, which is from National Grid. David Mercer is Construction Manager - Major Works. He leads National Grid’s project teams that are responsible for the delivery of connections to major new windfarms and nuclear power stations, and that is exactly what we have in Suffolk and offshore, and his colleague Richard Smith, who is Future Transmission Networks Manager. And among his responsibilities are developing energy policy to ensure that National Grid plays a pivotal role in enabling the Government to meet our quite challenging renewable and carbon emission reduction targets, and they will provide an overview of the factors that are driving the evolving landscape and the premises that underpin the development of the transmission network.
As Tim sort of said my role at National Grid is to think about the future of the energy mix for the UK. Principally what we are doing in my team is looking at everything across the whole gas, electricity mix, smart grids and really thinking about the time frames right the way through from 2020 to about 2050 which is quite important given the long life of most of the assets that we are talking about here in the sector.

So I wanted to kick off really just thinking about that landscape before we get into the real detail of how the regimes work today. The backdrop as we are looking at it really starts with affordability and security of supply which have been the basis of regulation and policy for the whole industry pretty much as long as it has existed. And of course we are now entering an era when things are changing when sustainability is very very high on the agenda, perhaps one of the highest things on the agenda and it’s come right up there, in part because of climate change but also in part because there’s an opportunity to do things in a different way.

As we are looking at the electricity industry today we are facing over the course of this decade a 25% closure of our existing power stations. We are also going to see indigenous supplies of UK gas drop to 25% of the level that we have seen in the past. So those two very big changes in where our energy is going to come from give us a real opportunity to think about doing things in a different way as a nation.

Behind the sustainability agenda sits climate change targets and of course the UK has signed up to the European targets to deliver a significant reduction in carbon dioxide emissions and to deliver a significant proportion of energy from renewables. But what that really means is thinking about the type of energy we use and the perspective we have tried to take is to look at this in the round, look at the whole picture; so not just look at electricity and how we use electricity, but look at gas and home heating, and look at oil and transport and how will these things come together.

There’s quite a few numbers on this chart, but the ones I want to draw your attention to – if we start on the left hand side – electricity currently has around about 500g of carbon dioxide per kilowatt hour of energy produced – significantly by far and away the highest carbon intensity out of any of the sources of energy we use today. Largely of course that is driven by coal which is right up there at about 1000g per kilowatt hour of energy produced. Now the climate targets are really all about driving a reduction in the amount of carbon dioxide that we put out. So for electricity, working the way across, we can see that the aim, the goal, is to get to a carbon intensity that is an order of magnitude lower than which is at today. So an 80% reduction in CO₂ emissions from 1990, and interim targets along the way to get us there.

Thinking about all the pieces of the puzzle – when we look at electricity today and the emissions that we saw in 2010, we saw about 147million tonnes equivalent of
CO₂ come out of electricity in 2010. Heat was 157mt of CO₂ equivalent and transport was 162mt of CO₂ equivalent. Now the target by 2050 is 118mt of CO₂ equivalent, so you can see just from the numbers alone this is something that requires action across the whole piece. We can’t actually look at any of these bits of the puzzle in isolation.

So in the scenario analysis that we have done to try and look at modelling the future of energy use in the UK, we have had to look at the whole sector and really spread out from our traditional thinking around electricity and how we use electricity and the types of electricity that we use, really look across the whole space around heat and transport and how we can electrify and decarbonise those. But we are also looking at efficiency - and efficiency is probably the number one start point for this I would always say, because it is by far and away the easiest thing we can do. At a personal level we can all contribute to that and if we start there you can actually get quite a long way towards making some of the inroads to actually achieving the targets that we need to.

Today’s focus is a little bit about that left hand box – decarbonising the electricity, the scenario work we have done, looking at all of this picture all together has led us to a few conclusions about the future generation mix that we expect to see;

So for coal; from around about 28GW of power generated today, we expect that to fall to zero by 2050. Much much lower by 2020 and most of that won’t be running all of the time, this is stuff we expect to see at low load factors managed through the peak demand on a daily basis, but not a consistent run as baseload energy as we see it today.

Gas; equally one of the most significant parts of our energy mix today – again to zero by 2050. Much much lower by 2020 and most of that won’t be running all of the time, this is stuff we expect to see at low load factors managed through the peak demand on a daily basis, but not a consistent run as baseload energy as we see it today.

Nuclear power; around about 10GW today. By the end of the decade around about 11GW. Now that looks very small in terms of a difference, but actually there is some churn there. We will see some of the existing nuclear fleet close, we will see a couple of new nuclear power stations open over the course of this decade. But by 2050 a significant ramp up in the contribution of nuclear energy to our mix – becoming a really big part in the energy that we supply in the country.

Of course wind and other renewables – perhaps the biggest change of all. Very low level today – around about 8GW, roughly about half wind, half other renewables, biomass CHP, that sort of thing, but significant ramp up by 2020 and really wind in principle and the other renewables together are practically the only way we can actually make this transition to a significant proportion of our energy from renewables sources by 2020. The timescales are so short that it is not credible to try and do this with a nuclear power station which has such a long lead time for construction. Wind, very easy to deploy in that sense and of course by 2050, slightly higher again. We
see this continuing to be an evolution as we still strive towards delivering those low carbon targets.

Carbon capture and storage; so this is the flip side really of coal and gas going to zero. Carbon capture and storage is technology that is widely talked about actually. We don’t have any carbon capture and storage plants today. We do have funding through Government for trials of that technology and we expect to see some trial projects on the system by 2020 and really that’s about proving that technology.

We are assuming in our modelling that that technology will be proven. Largely we are assuming that because much of bits of that technology do sort of exist today. Where they don’t exist necessarily is together and at scale and I think that is the thing that we are looking to see proved by those demonstration plants along the course of this decade. Of course if that 25GW of the mix doesn’t come to fruition, the alternatives in a carbon target sense are back to wind and nuclear again because they are the principle sources of low carbon generation.

So what does this mean for networks? This is effectively a picture of the UK electricity network in history – it’s probably a familiar picture to many people. Power generation used to be principally sited around sources of coal in the north of England. Demand centres; Manchester Birmingham, London south of that. So power flows on the network have traditionally always been in a southerly direction.

Now of course all this new stuff is in very different places. It is around the outside of the country – we have got wind offshore, there’s also obviously wind onshore, but there is a huge amount of wind offshore. The resources identified by the Crown Estates and leased suggest up to 50 GW of offshore wind. The nuclear sites identified there are all around the coastal areas of the country.

On top of that, interconnection. I’m actually going to be at a conference tomorrow on Supergrids and of course one of the things with Supergrids is how can we do this collectively across Europe together and identify some of the different opportunities for low carbon energy to be brought into the north Europe market and into the UK.

Of course that requires interconnection and these things again will all be around the coastline, so the challenge for Grid is actually changing the pattern of north – south flows, and the grid that was designed to deliver that to north- south, east-west, east in, and varying in time. Interconnector flows will be subject to markets and the type of generation at the other end of them. Wind will blow when wind blows and so of course these flows are going to vary in time, within day between days and across the course of the year.

So designing a network for that is very very different from the network of the past and at that point I will hand over to Dave to take a look at the UK regime.
**David Mercer**

I'm going to talk very briefly about the onshore regime in which we operate in England and Wales. National Grid is the owner and operator of the high voltage transmission network in England and Wales.

Firstly I thought it might be helpful if I just put some sort of perspective regionally on some of the figures that Richard mentioned - talking about a lot of gigawatts and very big numbers and what that actually means.

Hinkley B and Sizewell B existing nuclear power stations are both 1.3GW power stations, so maybe that gives you an indication of how that works out to the numbers that Richard was talking about. Sizewell C and Hinkley C are 3.6GW power stations, so very much larger than Hinkley B and Sizewell B. The peak national demand in this country in January is of the order of about 60GW at the moment in January - so I hope that gives you a flavour of what that looks like on the ground today.

National Grid has a central and pivotal role in the supply of electricity and with that comes some very important responsibilities - and those are to be efficient and economic in our operations and to have regard for the preservation of amenity. But also to ensure there is coordination of development – and that’s the point that has been put to us on many occasions including by groups represented here today, so what does that mean? The last point in particular concerns the way that we develop new infrastructure and given the scale of the change, the things Richard’s mentioned, the Electricity Networks Strategy Group has looked at this and come up a with Vision of what the Grid will look like in 2020.

The ENSG report is available online and it’s a group that was chaired by DECC and Ofgem and I think our colleagues from DECC will be discussing that a little further later, but that’s how the industry is looking across the board at what an onshore transmission grid would look like in 2020 to meet the sort of things Richard is talking about.

In addition, recognising the very particular issues that offshore development brings, National Grid publishes an Offshore Development Information Statement and that sets out the regime and the options for connecting offshore - and that’s the ODIS statement – it is available on National Grid’s website. This one is dated September ‘10 and it’s updated annually. Richard’s going to come back and talk a bit about offshore connectivity later.

New connections or onshore works; we are required to provide connection offers to any generator wanting to connect to National Grid’s system. We don’t determine where generators connect – that’s a matter for the market and for a generator to decide where he wants to connect, but our Use Of System Charges do vary around the network so that’s an indicator to generators as to where it might be cheaper for them to connect, or more expensive, and that reflects the supply and demand for electricity in the UK and we do indicate in our connection offers, the scale of works necessary and that very much drives the programme.
So those are two key indicators to generators about where they may wish to connect on to our system. Now when we get a new generator wanting to connect to our system, our approach is always to use existing assets where we possibly can. Where we can’t, we try to uprate our existing assets and that’s by putting larger conductors on our power lines, by reconfiguring our substations and increasingly by using what are called flexible AC transmission technologies. These are more sophisticated new technologies which are designed to control in a very active way the way power moves round the grid system, rather than the way the grid has operated for many years, which is largely been a passive system, where power flows along conductors, so we can actively control it. Those are techniques that the suppliers may touch on later, but it is something we increasingly use. It’s as a last resort that we look at constructing new substations, cables and overhead lines.

So, if a major new power station wishes to connect, we evaluate all the connection options and that’s against the obligations I mentioned earlier – that’s to be economic, to be efficient and to be coordinated and to have care for the amenity and environment.

If new transmission routes are required this may include; overhead lines, underground cables, AC or DC technologies, and in certain instances sub-sea connections and those are things we have to evaluate and look at. We document all of that and draw a preliminary view on the preferred connection and we publish that as part of our consultation pack, which we are required to do under the new planning legislation.

In arriving at the preferred reinforcement option, and in developing a fully detailed proposal, we are guided by the extensive feedback we have received on the current live projects and on future projects going forward, so it’s very much about informing that approach through feedback from the likes of yourselves, from local communities, from statutory consultees, local authorities and Government.

We know technology is moving forward and that is raised with us at many consultation events we have and that’s something we are very actively involved in as a company. Transmission technology is moving forward and we have been asked to look at that in detail, which we are doing in our optieeering reports. We have also been asked to revisit those and look at whole life costs and socioeconomic impacts – and that’s something Tim touched on in opening. We are updating our optieeering reports with that information. It is important to say though that with transmission assets the capital costs are so very high they do tend to dominate in an economic area, but not withstanding that we are looking at whole life costs and our optieeering reports will carry that information.

Couple of things I need to mention now; IET/KEMA. The Infrastructure Planning Commission and DECC have initiated an independent review of the costs which is being carried out by the Institute (sic) of Engineering and Technology and they are employing a consultancy called KEMA to do that work for them.
They are looking at the different costs of different transmission technologies - and that is something we very much welcome because at the moment we are a voice out there saying “Well this is what the transmission technologies cost National Grid”. But a lot of people in this room are saying “Well no no David over here it is costing X, in Denmark it is costing Y. Why are your figures different?” So we very much welcome the study that IET/KEMA are carrying out and I think we are expecting that to be published either later this month or in February. We hope that it will give a firm evidence base where all of us can collectively move forward with.

Local consultation has formed, and will form, an integral part of our approach and will be open and fully documented on all our projects for people to look at and that’s something that again we have shown to Suffolk County Council in particular and we will do the same with the Somerset councils and other councils around the UK.

Approach to undergrounding: Over the last 10 to 15 years, it is a fact that most new high voltage transmission connections in the UK have been approved overhead and most recently in 2009 the Beauly-Denny line in Scotland has received consent from the Scottish Parliament and the Norton-Spennymoor line in County Durham has received approval from the Secretary of State. Those lines have been approved overhead and if we look back longer than that, connecting up the power stations in Lincolnshire at Killingholme, South Humber Bank – again overhead connections. Then going back even further the north Yorkshire line was an overhead line connection, but that was the only one where there was a significant amount of undergrounding required by the Secretary of State.

But we recognise that there are very strong views on this. As well as the work we are doing on new technologies we have commenced a review of our approach to undergrounding. I think it would be wrong of us to be complacent about that. We are reviewing our approach and we are actually out to consultation on that at the moment and I know that some of you are hoping to input into that consultation process. And I would encourage you to go on our website and contribute to that process and to attend some of the events that have been organised.

Finally, I must emphasise this in closing; there’s a difficult balance that we have to strike going back to those initial conditions – that’s being economic and efficient and coordinated and balancing that with the effect on the environment and a duty of care for amenity. That’s not always an easy balance and it’s not right that National Grid is the sole arbitrator on that and that’s why we have a planning system in the UK and ultimately National Grid requires planning approval for building new assets and for new overhead lines that would be an approval from the Secretary of State on the recommendation of the Infrastructure Planning Commission at the moment, and in the future, the Major Infrastructure Planning Unit. And that’s absolutely as it should be. So I think that’s a run through of the onshore regime. I’ll hand back to Richard now to talk a little bit about what the offshore regime looks like.
**Richard Smith**

Just two very quick slides on this really. Most of the principles that sit around thinking about offshore transmission are very very similar to those onshore but there are some subtle differences in how the regime is enacted, so it’s probably quite useful to make sure you fully understand.

Just to start the simple headline is that that the onshore system is owned and operated by National Grid (except in Scotland which is owned by the Scottish transmission utilities - we also operate that system). Offshore we will also be the operator of this system. In my grandfather’s parlance we have got the guys pulling the levers to decide where power is going to flow around that offshore grid.

So the onshore is built by us and the Scots. The offshore grid will be built and owned by the developers or offshore transmission owners. This is the subtle difference and in a word it is about contestability, contestability of transmission. And the regime has been designed to try and bring in a bidding system for people to effectively try and reduce the cost of delivering that transmission offshore. By introducing competition, prices should fall for building the transmission that’s there.

We have recently, over the course of the last year, gone through a process where the regime has been tweaked slightly to allow developers to build the transmission assets in the first place. This is really about addressing concerns around deliverability of projects and giving certainty for people who are building the windfarms that they will have a connection point to a grid such that they can flow power into the market and to consumers’ homes. Ultimately these things will all be owned by Offshore Transmission Owners. At some stage there will be a tender – so whoever builds it in terms of a developer or an OFTO – ultimately it will be owned by an OFTO and operated by ourselves.

Our role in the ODIS, and thinking about that operational role and thinking about the bigger picture for the UK, is to actually present some views on how we think that the offshore network might develop. The word might is quite important there because this is a scenario-based piece of analysis and we actually look at four different scenarios currently in publishing the ODIS. One is from very very low wind generation to very very high wind generation and a couple of options in between.

We also look at different options about how the network could be deployed to deliver that and again the word could is quite important because this is not prescriptive. This is not a set of guidelines that says “developers you must build in this way, this is where you must put a transmission line”. Absolutely not – it is about guiding the industry – “this is the way this could happen - it is up to you now to identify your own routes properly, and do your own surveys properly to choose where you bring that power into the Grid” and of course we go through a very similar connections process to that which we do onshore. The exact determination of how this is going to pan out falls to the preserve of the developers and OFTOs and that offshore regime.
Of course in the ODIS we presented a couple of design solutions – these are the two at either end of the spectrum if you like and there’s a third one that sits somewhere in the middle.

One is radial – everything gets developed in a point to point way. As a developer comes along and asks for a connection he gets offered that connection, a cable gets built either by a developer or an OFTO and it comes into the grid and the thing gets built piecemeal over time as we work forward to 2050. As you can see that leads you to quite a lot of single individual lines serving single individual offshore power stations.

The other is an approach that we prefer actually and that is an integrated solution and this is about trying to take an holistic forward view and say “ok where wind is being developed can we actually make use of those cables to serve multiple generators offshore and can we also make use of those cables to flow power from onshore around that grid as a whole and actually really optimise some of the powers on the networks we need to build?”

Of course there is risk with that. As soon as you start to get into that coordinated grid you are talking about building assets at a different point in time from when developers may be ready to use them. So there is a little bit of risk there of stranding those assets.

So the key skill in optimising between these two solutions is “how do we best realise the benefits of coordination and minimise the impact of actually stranding an asset that ultimately consumers will have to pay for, for the life of that asset?”

Now around the industry the need for coordination is widely recognised and accepted as the right way forward and DECC and Ofgem also recognise and accept that. Indeed the current regime does not prevent you from going for an integrated network and DECC and Ofgem are committed to actually consulting further during the course of this year on how much more can be done to actually ensure we get more to an integrated solution than a single point to point solution, but as I say it is not easy, not without its risks.

So overall, we know the landscape’s changing and that change is going to carry on regardless of anything we think or do about the particular different technologies that come through in terms of potential power generation. The important thing for us, in thinking about developments to the grid, is actually that we do partner with customers and communities. Really important to make sure that we get that balanced view of what needs to be built over the next 40 years, as we move to a low carbon economy.

Working, leading with policy makers and regulators really key to make sure that those regimes support and incentivise the whole industry to collectively do the right thing.

Lastly, I always like to say “seize the opportunity” because the time is a’ changing. To go back to those three key principles up front; sustainability, affordability and
security of supply, the time has never been more critical than now to actually seize that opportunity and try and get those things balanced and get those things right.
David Walker, East Anglia Offshore Wind

Thanks to Suffolk County Council for hosting the event today which I think is an excellent initiative and gives an opportunity to hopefully get a number of the issues out on the table. But importantly for me maybe to dispel some of the myths and make sure that we are moving forward on a factual basis.

So what I would like to run through in the time this morning would be to give you some background and give you introductions to both East Anglia as a joint venture company and the parent companies, talk a bit about our offshore development proposal, the programme and then move into some of the details about the grid connections, the challenges and issues as we would see it as a developer.

So firstly to introduce EAOW Ltd. A joint venture company 50 – 50 between ScottishPower Renewables, part of the Iberdrola Renovables global group, headquartered in Spain, who are the largest renewable developer in the world, primarily around onshore windfarms, and indeed in the UK ScottishPower are the largest current operator with over 1000MW in operation and construction. Currently we have consented the West of Duddon Sands windfarm in the Irish Sea and we are in the preconstruction stages of that just now.

In coming forward together with Vattenfall, who are a hugely experienced offshore windfarm operator, and indeed have constructed a number of windfarms including directly here in the UK, most notably at Thanet and on one project which is under construction as we speak. The merging of those two companies in the joint venture really brought together complementary skills in terms of our strong development experience within ScottishPower Renewables and the construction and operation in Vattenfall. And we have now being working together for 2 years, both in the bid and leading up to the Round 3 process with the Crown Estate and now through the development phase.

So the Crown Estate ran a large process which really took us a huge step forward from the first Round 1 and 2 areas which were relatively modest projects, significant in their own right, but the Round 3 really moves us on to a far larger scale, very much targeted towards delivery of the renewable energy targets of 2020.

So we were awarded the rights to Zone 5 which was an excellent result for the joint companies for a number of reasons; this was our preferred zone – it is very close to the East Anglia coast, but has excellent wind resource, conditions out in the North Sea and importantly some of the environmental factors including water depths, but importantly the sea users both from a human, but also from a mammal and bird perspective, we believed to be conducive to developing a windfarm in that area and that’s what we are seeking to move forward on.
Just to give you a shape and scale of the project and the zone: In total 7200MW, so that’s actually 2 Sizewell C’s that we are planning to build out there, enough clean energy for the equivalent of 5 million homes.

The way we are addressing the project is to look first of all at an overall zone through what’s termed as a Zone Appraisal and Planning. There’s that process. A coarser level of detail allows us to assess the environmental factors across the entire zone and then that allows us to home in on individual project areas and the intention is that we will move forward with 6 individual projects of approximately 1200MW each.

So, in moving that forward, but to allow us to make sure that we can get towards meeting these 2020 targets, we didn’t have the luxury of waiting for another 2 years to allow the ZAP process to conclude, so we’ve taken an early view on the first project, selected a preferred area based on the least constraints and a balance of technology and economic delivery and the area identified here, the black area, is the area which we are now developing as East Anglia ONE, and what will do in parallel with the ZAP process over the next two years is to take all the environmental factors from the surveys that are currently being carried out and that will allow us then to select further areas for projects 2 through 6.

Just to give you a flavour of the overall programme timescales involved. We started out having successfully secured the zone exclusivity in the early part of 2010. We went into a major contracting round and just again to give you a scale of some of the investment – the joint company has already invested 15 million pounds in the first year of operation and that is purely related to environmental surveys – so a significant undertaking from the partner companies. So that process will continue through into the latter part of next year. We are currently carrying out a number of seabed surveys, geophysical scanning, geotechnical drillings, bird surveys, using both aerial technology as well as boat-based technology, and that process has been ongoing over the course of the last 9 months or so. That will take us right through to application which is currently scheduled for the end of 2012 and hopefully through the new IPC regime, which we are working within, that will lead to a consent a year later at the end of 2013.

Because of the long lead time and the number of these items, particularly around sea vessels - some of the vessels that we will need for these new turbines have not even been built today and we are looking at a four year design and build period for these vessels. Looking to secure those to develop the supply chain, they’ll be ports and harbour infrastructure required, both for construction, but also for long term 20-25 year operation and maintenance of the project itself.

So we have been developing supply chain matters in conjunction with major suppliers in the last year and this year we will actually go into contractual commitments so we will start to secure ports and harbours, vessels and turbines supply arrangements this year and that will continue through to 2014. That will allow us then hopefully to move into the full construction phase and ultimately we are targeting first export towards the end of 2015.
Beyond that, that’s the first project for the zone – further planning applications for projects 2 through 6 will follow so the idea is that sometime later in 2012 we will select a second project area and will then go into full environmental assessment and the five year programme that has been outlined here will then start in 2012 and there will be a rolling programme and hopefully we will have supplied, or secured a full supply chain which will provide all the vessels, turbines etc on a rolling programme all the way through to 2022 and fully operational hopefully by 2023 so a huge huge undertaking.

Moving on to the grid connection offer, I’m speaking as a developer, but most of my career was actually based in the networks business. I am an electrical engineer to background and up until 4 years ago I was providing connection offers and indeed my role at that time was to actually connect onshore windfarms in Scotland and Mersey and North Wales where ScottishPower hold the franchise for those areas.

The way the process works, in general terms – summarised here but hopefully to give you a flavour of the key considerations. Firstly we would approach National Grid to discuss options, possibilities, perhaps commission a feasibility study and indeed there was detailed discussions over a number of months for East Anglia. This is one of the largest connections that has ever been secured in the UK. I mentioned earlier it is the equivalent to 2 Sizewell C nuclear power stations so a lot of work and options that were considered and some of the process that Richard and David outlined previously in terms of optioneering, we went through from the developer side.

In that process National Grid would consider, and important to note, the contracted generation background and commitments and planned network changes. While they may have a view on things that might happen, in terms of the offer, they can only give us an offer based on what they know will actually happen from a contracted perspective – a really important point.

They will provide options and scenarios, and normally at that stage we would have some user choice as to how we might go forward so we would then formally apply and that kicks off a very regimented and time-bound process whereby National Grid need to provide a fixed design and commercial terms within an actual contractual offer within 90 days – so a very short timeframe to actually do that. Then equally, we have a short time frame to make up our mind – we have 90 days to review the offer.

In terms of the East Anglia ONE proposals that offer was in volume terms about 700 pages, so significant work to review and ultimately to challenge and accept the offer. Importantly as well to note, the developer has to provide security for the liabilities. So as soon as National Grid as a regulated business have to commit to contracts and expenditure, then if at some point the developer was going to walk away then it is important that they are secure in the knowledge that the investment will not be lost or stranded – so we need to put in place securities and again that is a large challenge in the current environment because the security, for example for accepting the first stage of that offer actually amounts to 7.2 million pounds. Having signed that in
November, if we cancelled that today we would need to write a cheque to National Grid for 7.2 million pounds.

Important to note, I mentioned the time-bound nature of it and you get a flavour from the 90 day process that we run thorough - very much a regulated process and an open and transparent process.

Important to note only the contracted background can be considered and therefore other potential connections at the time of the offer cannot be considered. So therefore the design becomes fixed. Although, as perhaps the contracted background or perhaps as other generators come on board or accept their own offers or the background changes, perhaps through existing station closures, then the offer can be varied in the future, but it is fixed at that point in time.

In terms of accepting that offer or the acceptability of it there is a number of key considerations for the windfarm developer. Firstly the capacity – making sure we can have the full capacity for, firstly East Anglia ONE, 1200MW, but also importantly for us the fact that we have a contractual commitment to the Crown Estate through the zone development agreement to deliver the overall projects and therefore very important that not only East Anglia ONE is secured and available but also the full capacity of 7200MW for all future projects becomes available as well. The dates that can be provided is also very important and also can they be delivered to those dates and I’ll come back to that point later.

We also have to take a view as well around the consenting risk. It is one thing to say well the capacity may be available in 2015 and we are comfortable we can deliver a programme of construction and consenting, but there maybe a large consenting risk involved and therefore as a developer we would want take a view on that because, if we believe there is perhaps public inquiries, maybe a high risk then that is something we may seek to avoid.

Also the cost of the actual connection itself and importantly the liability and security and indeed the step ups in the liability as we move forward as National Grid company invest. If they start to place major equipment orders then potentially on cancellation we could we could ultimately be liable for hundreds of millions of pounds. That’s therefore a key consideration for us.

Also, making sure that the design is integrated and is done in an efficient way which will provide security of supply to make sure that we can export - because ultimately our main consideration is that we can export and get the clean renewable power to market.

So with a backdrop in place of key considerations that was the main consideration for us in terms of the acceptance of the offer which was provided which results in East Anglia ONE being connected at the existing Bramford site. Importantly for us that is an existing substation, there is permitted development rights within that substation so there is no actual consents required for that connection.
In terms of firm capacity, firm being that that can provide a connection on the basis of the system being intact, but under the planning scenarios if there’s faults in the network, outages due to operation and maintenance then there is further wider system reinforcement required to make sure that the full 1200MW can be generating on a continuous basis – so that’s also a consideration. Also important to note, under the current regime and Richard touched on this in closing, the offshore transmission works are not included in that National Grid offer, so the point of connection onshore is included, but the offshore element is excluded.

This is an indicative diagram of existing onshore assets, National Grid assets, but also a number of possible platforms. A and B platforms are the first projects and then there are groups of possibilities. Again the actual locations and the actual size and shape are to be determined in the future and that will be determined by the ZAP process and our selection of future projects. But what we are working on very firmly now is the first connection into Bramford – the blue line from A and B. As noted there the actual future connections – you can see some indications, possible Norwich, possible Lowestoft, which have been offered as connection points in the future, but that will be determined as the design progresses.

So we’ve been in some ways left with the ‘how do we overcome the challenge of getting the export from the windfarm to the National Grid connection points?’ The so called OFTO works. Now one of the things we could do under the new OFTO regime – we could basically enter that regime and then wait for an OFTO to be appointed. The OFTO would then carry out the design and consenting and then ultimately they would construct and provide the connection and then operate and maintain that over the lifetime of the asset.

The problem that gives us is, is that it will take quite some time and is way beyond the timescale of our first project. The tender process itself is on an annual round – in April of each year and in round terms it is an 18 month process so effectively it is couple of years lost to us if we were to enter that process.

So what we are bringing forward is on the blue line as indicated on the previous slide; OFTO connection, blue line A-B into Bramford. Firstly we need to get from Bramford to a point on the coastline and there’s a number of options – could be overhead line, could be underground cable these are things we are starting to consider in some detail. Once we get to shore we then have a subsea cable in approximate routings of about 70KM out to East Anglia ONE. The actual design could be either substations on an AC system or perhaps HVDC due to the length involved. So potentially we could be looking at converter stations at the Bramford end as well as platforms out towards the windfarm itself.

The illustrative photographs here – that’s actually 275KV cable circuit in Scotland – that’s just to give you a flavour of what that, if it’s a single circuit connection, what that might physically look like. These are joints on the cable in the bottom photograph.
As a developer, and I mentioned onshore cable or overhead line in the top point, we have a choice that we can make - we can take a commercial view on whether we would want to go for underground cable or overhead line. Coming back to one of my key considerations is consenting risk. Clearly overhead lines can be controversial. Part of my background - I was responsible for the development in ScottishPower of the Beauly Denny overhead line, mentioned earlier. I was an expert witness in the public enquiry so I have some detailed and personal knowledge of what that’s all about. For us, as a windfarm developer, that’s a consideration. And if you consider how do we ultimately make returns on our investment as a developer – we are developer therefore we want to be generating the megawatts. It is a multimillion pound, billion pound investment we are making, therefore the earlier we can get consent, get connected, means that we can drive a far stronger economic case and that allows us to take a commercial view, which is very different from the regulated environment that National Grid find themselves within.

The future five projects we also need to consider as well and one of the current challenges is that due to the current OFTO tendering process, on the current view of timescales and the annual tendering process as has been outlined, that actually means for us, of the six projects in total, five of which we will need to build ourselves so as we sit here in 2011 some of these projects won’t even be built 10 years from now. Under the current regime we actually have no choice. We would like to enter an OFTO process but to meet our timescales and ultimately to meet the 2020 renewable target we actually don’t have a choice in that regard.

Also as well going back to Richard’s diagram of individual point to point connections, versus an integrated network; because of the regulatory environment that we find ourselves in, we don’t have an awful lot of choice in that regard as well. So while we would like to see an integrated network design it is actually very difficult to achieve that in practice.

So some of the key challenges for ourselves. We are a generator, asset owner - after the windfarm has been developed we have really no direct interest, certainly not in an ongoing basis, in transmission assets. Clearly, we are very interested in how much it is going to cost us to rent the connection through the Use of System Charges and how reliable it is going to be to make sure we can export to make our returns, but we have no interest in transmission and indeed given the choice we probably even wouldn’t want to be involved in the OFTO process at all. We would like a connection out at the windfarm and a simple, straightforward efficient route to market.

OFTO, as I mentioned earlier, as designed, the current regime, adds two years to the delivery timescales which is obviously a real challenge for ourselves particularly when you consider the fact that East Anglia 6 is probably the only project that we can consider for the current regimes. Therefore generator-build consenting is really the only way forward for us, as currently designed, to allow us to maintain our programme and meet our delivery aspirations.
In terms of grid connection offers themselves, I have given you some detail on the background as to the process and how that actually operates. So it’s important to note contracted generation background only. Therefore for a fixed point in time, significant security liabilities which make it very difficult, particularly for some of the other developers.

We are very fortunate that we have a very strong company commitment. We work for a renewable energy company – that’s our bread and butter - so we have strong corporate support. Equally, as the corporate team in Spain look at global opportunities – if the UK market doesn’t look as attractive to them – if it becomes difficult to deliver, for sure they will invest somewhere else – they have the choice to do that – therefore it is really important that we can challenge the current environment and make sure that we can deliver the targets and the megawatts.

Because of the individual nature of the projects as has been seen through the Round 1 and 2 connections which are currently going through the earlier OFTO process, effectively the way it is designed just now it forces you down the point to point connections so while we might like an integrated network the way it is currently set up it is probably unlikely that is going to happen. Therefore if we roll the clock forward on the basis of the current, today rules, I think you will see Richard’s picture 1 rather than the integrated picture 2. Therefore I would just challenge “Is that an efficient way forward?”

Also as well David mentioned the IPC which in itself, through the Government changes, is changing as an individual unit itself, so the rules are being developed as they go. There’s a number of both people and structural changes within that. We are jointly trying to work our way through the planning process and our experience to date has been one of very much a strictly legal tick box process. We have not seen a huge amount of pragmatism – it has been a really challenging environment and we are nowhere near even getting towards a consent. So the current process that we are going through that is a key consideration for us as well.

And also as we started out on the project a year ago – the IPC and the planning environment that we were working in, we were looking at focussing in firstly on the windfarm and then the OFTO elements would be separate and potentially delivered by others. Where we now find ourselves, the Development Consent Order, the DCO, must include both the windfarm and the OFTO works, which I think from an overall development perspective is absolutely right – it means that the issues can considered on both sides, but as a windfarm developer, including OFTO then becomes an even bigger challenge for us.

In summary East Anglia Zone is a hugely significant contribution, 7200MW towards the national targets and we are planning to do that in 6 individual project stages

The OFTO works are obviously excluded, as I have highlighted, from the current regime and therefore to allow us to meet our aspiration timescales we need to progress those ourself.
Key challenges in the development of the transmission system is the fact it can only be developed currently on the contracted generation background so the optioneering which is very helpful in some ways becomes a bit of a useless exercise if you can never implement it in that regard. So I think that’s worthy of some further consideration as well.

Important to note that even though the windfarm assets currently are designed for 25 years, as turbine technology develops we would hope that can maybe be stretched in the future. But one thing we know for sure is that the transmission assets are designed and have been tried and tested on 40 plus years, including some of the technologies, some of the new cable technologies as well. So a long term view is absolutely required in our view, around strategic network planning and also investment as well. We would certainly strongly the argue that the current regulatory and planning environment doesn’t actually create a truly efficient or integrated network and therefore one of things we would certainly urge, and are more than happy to debate today, is to take lessons from other regimes as well.

Within my own role for example, I have four projects in the German Baltic Sea and therefore direct knowledge of the regulatory environment within Germany. They have taken very much a planned approach to the delivery of the renewable targets both from windfarm development through to the transmission offshore, OFTO elements, and the onshore grid networks and the companies in Germany that are responsible for that work in a very coordinated way and indeed the companies have a legal obligation to deliver to a certain timescale and there are penalties involved, that is certainly be something we would be interested in in the UK as well.
Somerset & Suffolk & Essex Community Groups

Paul Hipwell

As Richard said earlier on we have an opportunity today and part of that opportunity is to debate what sort of electricity system we would like to see in the 21st century.

There’s been many new campaign groups formed in response to National Grid’s proposals but we all work very closely together. I’ve had a lot of help and John has as well with his presentation today and some of the people that have helped the presentation are here in the audience so thank you.

We also work within the democratic process – our Local Authorities, our District Councils, our Parish Councils, our MPs and of course our chairman is an MP and Tessa Munt is here from Somerset. Very important that democratic process. And I know that Dr Liam Fox and John Penrose would also have liked to have been here today but they’re constrained by some of their Ministerial duties.

And it’s great to see so many councillors and local authorities here, Suffolk and Somerset of course, but also much from further afield. I think Phil Megson is here from Lancashire, Phil Hughes down from Lincolnshire, so it really is a national issue now. And we have some very well established countryside groups. Campaign for Protection of the Rural England is here, Snowdonia Society, so a broad interest.

But what we all share in common is we all understand, and I think that applies to everyone in the room, that we depend on electricity. I don’t think any of us are against progress or development, in fact quite the opposite but we all passionate about by our countryside, our environment and our communities.

John and I are co-presenting today. John, as you heard, is from Suffolk and leads the Suffolk and Essex amenity groups. I am from No Moor Pylons over in the southwest, one of the groups sprung up to fight the proposals for pylons across the Somerset levels - an area that is potentially a world heritage site. We are volunteers and we are here on behalf of our communities. And yes, ‘Moor’ is by the way spelt ‘oo’. It refers to the Somerset Moors and Levels, that flat area between the Quantock Hills and Bristol.

So what are the key points?

Well, we believe there is a better way than pylons that transmit electricity in the 21st century. We are passionate about getting the right solutions, what is right for UK Plc. We believe that National Grid’s consultation has been, and is, profoundly flawed, that changes are needed to the regulations and the laws such as the National Policy Statements.

Costs for new electricity transmission technology are already falling and will fall a lot faster and further especially if we encourage that to happen. And we will talk this
morning about the big picture. How we believe the country should move forward, from here and the benefits this will bring.

The challenge I have for you today is “how do we ensure that the regulatory and planning regime allows us to achieve what is best for the UK?”

We are proud of our core values and the approach we have taken on this issue. Each campaign group has its own strengths and works in slightly different ways. It is amazing the range of expertise and experts we have amongst us.

But there is a common thread and that common thread is that we are all taking a very positive and constructive approach to this debate. We are working to find the right technological solutions and working to ensure that the policy and regulation work together to deliver the outcomes we are all seeking.

We in Somerset and the Bristol area, and our friends from the East, we have a lot in common. Somerset like the Constable Country and the Gainsborough country is a stunningly beautiful place and it is very flat.

Imagine our surprise when 18 months ago a plain envelope arrived in our letter box from National Grid proposing to build monster 150 foot pylons across this landscape. The Somerset Levels are unique. They are very important to wildlife, to wetland birds, but they are equally important for tourism. 27,000 people work in tourism in Somerset and I think it’s a similar number in Suffolk. I believe tourism is worth to Suffolk County Council (sic) nearly a billion pounds – that’s a lot of money. There’s absolutely nowhere to hide 150ft high pylons. Mitigation is a nonsense. The advice in the Holford Rules that pylons should be hidden in the hills and valleys and the trees - it’s irrelevant.

So what’s happening in the West? What are our particular circumstances? We are going to have the first of this new round of nuclear reactors at Hinkley and that will of course connect into the National Grid to get the power from the southwest where there is a surplus to the southeast of the country where they need it. When all this started about 18 months ago we didn’t know much about pylons but we thought, and the penny suddenly dropped, surely there must be a better way.

Do you remember these? What about these? How many of you still use that? I would suggest to you that they are all now redundant. In the 21st century there is a better way.

As we thought about it, there is an obvious answer as to how to sort out electricity transmission over in Somerset – why not put it under sea? Hinkley is on the coast, Avonmouth is on the coast, straight line up the Bristol Channel. Or what about this – the M5, running through our area, why not put the cables underneath that. So there is a better way in the 21st century.
So I say again. “Is this really the right environment to put pylons – why not generate the electricity where it is needed? What about security of supply?” Pylons are very vulnerable to flooding, they are vulnerable to high winds, to bird strikes and to terrorism.

What about tourism? On the London Olympics site the high voltage cables have been taken down and buried. Pylons are clearly not acceptable for tourists coming to the London Olympics for 4 weeks. Why are pylons acceptable for tourists coming to the countryside for 50 years?

The other big issue is health – standards on health and EMFs are very different in Europe. They are seriously concerned about health issues. They do not allow power lines to be built near schools or near houses so why is National Grid planning in Somerset planning to put pylons across the top of a primary school? “Does not our Government have a duty to enable the safest possible method of electricity transmission?” We should be working on the precautionary principle, and not risking the health of our children.

Now as we all know the 2008 Planning Act brings in a totally new planning process. We are learning about that and how it is going to work with all these major planning infrastructure projects. It is being done to speed up the process and to make a decision quicker. At its heart is the requirement for National Grid to consult properly.

Well everybody is united in saying, and this is a newsletter from Somerset County Council - we are all together in our views, the County Councils, District Councils, the Parish Councils, residents our MPs - we are united in saying to the IPC that the consultation at the moment is fundamentally flawed and there is a better way.

Now the way the IPC will decide on the application is to look at the rules and the rules are set out in the National Policy Statements. As I am sure we are all aware DECC is at the moment consulting on the National Policy Statements. EN1, the Overarching National Policy Statement on Electricity (sic) and EN5, the specific one about electricity transmission.

There is a lot of problems with these policy statements in our view and you will find some detailed notes on this outside. Some of our group have done a lot of work on this. If you want to see the detail on this it is in our notes. Thanks to Dr Maggie Gregory and Peter Gregory especially who have done that work.

There is a lot of problems with EN5. First of all it makes pylons the default choice. They do not create a level playing field for alternative technologies. The current draft privileges overhead transmission lines and if you look at the planning control regime we have got, it is chaotic. If you want to approve pylons you have to use the National Policy Statements, if you want to go undersea, it’s the marine regulations, if you want to go underground, it’s a different set of regulations. It’s not joined up, it’s chaotic.
We think there should be a level playing field here and all transmission methods should be considered together, and I mean all.

And that decision to decide on what electricity transmission technology to use should be based on lowest whole life cost, it should include environmental and social costs, it should not be dictated in a National Policy Statement, it should take into account local factors.

The timing is certainly wrong – we know that KEMA is going to report in February, and yet the consultation on the National Policy Statements ends next week. It does not give the public any chance to take into account KEMA’s conclusions in advising or commenting to DECC.

EN5 fails to take any account of the environmental side. It doesn’t even mention tourism or the impact on the local economy. EN5 actually suggests mitigation to try and mitigate the impacts of pylons. How do you mitigate pylons across the flat Somerset Levels? What trees grow to 150 foot high? Besides would you really plant high trees on the coast where it is equally flat? EN5 is not helpful in this respect.

Do we really also want a National Policy Statement that suggests that pylons in Constable Country or the Vale of Avalon is the best possible option? Now we do have an opportunity to change these National Policy Statements, and the Energy Select Committee (sic), chaired by our chairman, is looking at this and I am sure going through it in quite some detail over this coming few weeks.

I have some good news to report to the Symposium here this morning. Thanks to Sedgemoor District Council, we met with DECC last week and had a very positive discussion with them around what the issues are with the National Policy Statement and it is quite clear they are listening and they are starting to recognise the problems that do occur there. I am sure we will hear more about this afternoon and maybe in the debate afterwards.

So now I would like to hand over to John to do the next bit
Thank you very much indeed Paul.

Over in the East we have also learnt a great deal in quite a short space of time. For starters the UK has the potential to earn more from renewable energy than was earnt from North Sea gas and oil put together. That is really quite staggering. But to achieve that we have to have the right sort of energy infrastructure and to do that we need the right policy and regulatory regime.

Now I am going to show some more maps – I know you have had a fill of maps and these are much the same, but I am just going to quickly run through some of the points that were made this morning.

The current grid was developed around inland coal, as we know, so all paths lead down the middle to London. Very simple story. The future, as we have already seen is offshore and on the shore. What does that mean? Well quite simply the existing grid is in the wrong place. We have also learnt that in preparing for our renewable energy future, our local National Grid projects such as the proposed reinforcement of grid between Bramford in south Suffolk and Twinstead in north Essex are only the tip of the iceberg. The existing regime can only lead to the progressive expansion of the pylon network and not just in East Anglia.

So as we have just seen the dilemma is quite simple – “how do we get the power from where it is going to be generated to where it needs to go in the best possible way?”

More power is needed, we are not arguing with that in the slightest. And the forecast, thank you very much to National Grid, is for a six fold increase in electricity exported from East Anglia, mainly to the southeast by around 2021, or we suspect possibly a little after that.

At least 90% of generation is either going to be offshore or coastal - actually it’s going to be a bit more than that but I don’t like the term 100%, so say 90 for now - but the proposed grid reinforcement, as we know is all over land. This means multiple onshore connection points, each requiring large, very expensive substation developments - that was that Map 1 that we saw earlier. We are definitely in favour of the alternative. National Grid’s answer to this as far as we can see is more ugly pylons. As I have just said the implication for the future is that under the current regime, pylons will continue to spread across England – it doesn’t stop at what we know about it.

National Grid has a monopoly for all high voltage overhead transmission lines – its remuneration comes from its on land network. If each section of offshore power comes to the nearest grid point we risk having more and more pylons taking power from shore to grid and in the East a demand for more massive transmission lines to reinforce the next stage. At present no-one can say for sure how many more lines
will be needed overall, but on an earlier map we saw today, looking at East Anglia there was a nice red blob on Lowestoft and a couple of thick red lines going from Lowestoft across to the line coming down from Norwich. That’s right the way across the middle of the Waveney Valley. One of the most precious Anglian landscapes, one of the most precious UK landscapes, so that may soon also be a target.

With the huge increase in capacity from offshore windfarms and the development of the North Sea grid, undersea cables that deliver electricity more directly to market must be the way forward. There isn’t another way. This commitment has already been made very clear in the Coalition statement. The question for today is “how do we help the Government deliver their promise of an effective offshore grid sooner, rather than later?”

The other thing I don’t think we should forget is that environmentally preferable transmission methods should not be reserved just for designated landscapes and urban areas.

Much of the British landscape has very high amenity value. It is not just much, just about all of it - yet it is not within an AONB or a National Park. AONBs obviously need protection, but they don’t have a monopoly on natural beauty. I don’t think that Constable said ‘well I really ought to go down to Flatford Mill today, I stand a good chance of seeing a haywain because it is in an AONB’. He drew inspiration from the entire landscape.

In fact many AONB’s were protected because they came under threat. Other areas have not had the same protection because until now they have not had the same threat.

Now this is where life starts to get a bit more complicated. Why have we had to live with it – how have we got here?

Well let’s take a step back and see how the regulatory regime got us to this point. Some of the later speakers will cover the policy and market aspects in a lot more depth than I am going to, but I just want to touch very briefly on the complexity and just one or two aspects. I have put down a bit of challenge to some of those speakers and will leave it at that.

At the top there we obviously have Government policy and then we have the market. We then have, and we have already heard about it, ENSG Vision for 2020 which is the industry level and we have Ofgem regulation. We then have something of a legislative tangle; the Electricity Act 1989, the Energy Act 2004, etc etc; the decision made by the IPC or the MIPU and that’s made to the National Policy Statements EN-1 and 5. And as we have heard they are not fit for purpose. The result is an entirely irrational outcome.

Now I just want to stay with this slide for a little while and just talk through some of the aspects, some of the specifics. We are not quibbling about the policy at the top,
about the need for an efficient, low carbon economy. What we want to highlight is that we still have a system that gives very little scope for innovation or one that can be engineered for the longer term. At the end of an extensive Select Committee scrutiny under the previous Government, it was agreed that there was a need for further review of the regulatory regime. That need, Mr Chairman, is now very pressing.

The other thing I wanted to dwell on, just for a minute, that Ofgem is in the process of replacing the old 5 year price control system RPI-X with a new nominally 8 year RIIO. RIIO, I should spell out R, I, I, O. It stands for revenue using incentives to deliver innovation and outputs and we will hear a lot more about it this afternoon.

Now at face value, RIIO appears to offer much that we have been campaigning for. New business plans for example which should take account for the need for innovation, it’s actually in the title, greater emphasis on visual environment – that’s a deliverable, greater consultation and much more besides. It’s all good stuff, but although it seems to be encouraging the market to deliver what is needed, there is no alignment at present with EN-5 as it is currently drafted. So the operating companies will be heading to a modern market shackled by policy statements embedded in the old regime. They’re hampered before they start.

There could also be conflicts over interpretation of key sections of the 1989 Act – in which the balance between cold economics, we have already heard them once mentioned once today, and the environment, we have heard that mentioned too, was never fully reconciled. They are uncomfortable bedfellows in that Act. So is RIIO just window dressing – well I hope our speaker this afternoon will reassure us that it is not.

And, if RIIO is as good as it looks and DECC listens to our groups on EN-5, where does that leave the industry’s own policy – ENSG Vision for 2020? Look closely and you will see that this so called ‘Vision’ was blinkered to begin with. Now our glasses are not so very rose tinted anymore.

Right now is the perfect opportunity to reform the regime for a better future.

And finally how can National Grid press on with the existing consultation when all the fundamental benchmarks have changed since it began?

And when its next RIIO-based ‘well justified’ (and that’s what it says in RIIO ‘well justified’) business plan, before any work begins on the grid projects, will look very different from the last, how can it carry on as it is?

So what do we need? Well obviously the National Policy Statements, RIIO and all the other regulatory systems must mesh together. If they don’t there’s a horrible crunchy noise and they might need quite a bit of oil.
So what are the outcomes that we need? They must include maximising economic potential and energy security, while at the same time minimising environmental detriment. And finance and the environment are not necessarily mutually exclusive and Paul will explain a little more in a minute why they need not be.

It is essential that these outcomes are built on a proper assessment of affordability and whole life costs and we’ll hear more about that. You will also hear at the end of the day about environmental detriment valuation. But our group has been looking at this very carefully and if you haven’t already picked it up there is a paper on this available on the desk.

So, in summary we don’t need a patched up old grid built on old technology. Paul’s going to tell us what we do need.
Paul Hipwell

So look at the big picture. What we need to do is get the energy from the coast, along the coast to the market. We need a grid that carries energy under the landscape and we need a grid that is smart in every sense and we have got one of the world’s leading energy companies here today, Siemens, and we will hear more about that technology this afternoon.

But the question we are always asked is – can we afford it? What is the cost of these alternatives. Well let’s get these costs in perspective. Even at higher end of the costs that National Grid are suggesting, the cost per household for each of these major projects is less than one pint of beer.

And this is because transmission costs less than 3% of the total cost of supply of our electricity. Compared to the cost of the low carbon generation, the cost is insignificant. Factor in the potential benefits that tunnels and going underground could offer, lower power losses over long distances, the ability to add extra power cables, maybe even high speed communication links, economically into some of the tunnels.

As I said, take a look at lifetime costs over 50 years – now we’ll hear more about this from KEMA, next week or early February when they report. I just want to show you very quickly this graph here with costs on the left handside and production and time along the bottom. We all know as new technology comes in it costs less. Think of flat screen TVs – 3-4000 two or 3 years ago, what are they now 3 or 400 pounds? Costs come down dramatically with time - that’s what economists call the experience curve.

What about pylons, a mature technology, been with us for 50 years, costs are pretty static. What about the new technology, like HVDC, there’s only 1 HVDC converter station in the UK, I think, at the moment, half a gigawatt. With all this offshore there’s going to be 30 to 40 in three or four years time; those new costs are coming down and sooner or later they will converge and the challenge now is to decide what we want to do based on prices in three or four years time.

So I do want to embrace the big picture. The reason why we are here today is climate change and the Government’s renewable strategy. Should we not be investing in technology that helps us to reduce the carbon footprint and reduce electricity losses? The issue here is that National Grid do not pay for transmission losses, so they have not even considered them in deciding their options.

So what about localism? Should we not be taking the local environment into account. How many tourists go to Constable Country or rural Somerset to admire pylons?

And what about 21st century technology we are going to hear about this afternoon from Siemens? Several Ministers, Charles Hendry included, have talked about UK Plc leading the way on technology. Does investing in 1960s pylons help the UK be at the leading technological edge?
Finally, what about jobs, new private sector jobs are absolutely vital to get us out of this economic mess? With underground technology we have the chance to be leaders. We have the chance to generate new jobs. The UK has lost all its indigenous cable manufacturers. Making a decision to invest in underground would give us a huge green dividend.

So the challenge I leave you with today and what I would like you to think about is “what’s stopping us investing in the future? What’s stopping us make the right decision for UK Plc?”

The challenge for the law makers and the regulators in this room is what do we have do to change the current regime? We need to enable and encourage National Grid to take the right decisions. We need to ensure we are achieving our aims in reducing climate change, creating new jobs and above all protecting our countryside for our children and future generations to enjoy.

And if we get this right, the legacy we will leave future generations is one where a vibrant economy is powered by a secure energy system that thrives in a beautiful landscape. That is a legacy to strive for, and for us all to be proud of.
Morning Round Table

Q: Tim Yeo MP: Let me just kick off with something for National Grid. I think they were at pains to explain the difficulty of getting the right trade-off between economics and costs, efficiency and environmental amenity. That’s a dilemma which a large number of businesses wrestle with all the time. Could I ask them whether the guidance under which they operate has changed in the last 10 years because in most other areas the importance attached to sustainability, to the environment, to amenity has risen dramatically. And that equation, that trade-off, is now looked at in a fundamentally different way by almost every business I know, compared with how it was 10 years ago. Is that true for National Grid?

David Mercer: The position for National Grid on this is that it is for National Grid to look at how it adopts that balance. We operate within a framework that is set out in legislation and it asks us to be mindful of the matters Tim has mentioned and I have mentioned in my presentation, but it’s for National Grid to decide how that balance is to be made. National Grid as a company is absolutely aware of the increasing requirements for sustainability, for taking care of the environment, and as a company we are absolutely committed to doing everything we can to those ends. Absolutely committed.

Part of that is looking at future networks and part of it is ensuring we have a coherent plan for it. I have heard all of the criticisms of the ENSG report but it is a coherent look at what the Vision for 2000 (sic) grid is. So we are aware of it. Yes of course it influences and we have moved the way that has influenced our proposals on Tim in the last 10 to 15 years but as I said in my presentation, ultimately that balance is for planning, it is not for National Grid to say what is absolutely right in planning terms, there is a democratic planning process and National Grid has to follow that and what we propose will have to be subject to fair scrutiny in exactly the same way as the Scottish companies have done with the Beauly Denny transmission line and we have done ourselves in transmission reinforcements in the past.

Maggie Gregory Pylon Moor Pressure, Somerset

In the National Grid presentation earlier both Richard and David mercer mentioned the statutory responsibilities for National Grid – this actually follows through from the last question. One of these is to develop and maintain an efficient, coordinated and economical system – how do National Grid square that obligation with the continued use of overhead power lines, when it is well known there are substantial power losses from such lines?

Graham Lamburn, Powerwatch

Richard, you made a good presentation describing all the carbon neutrality goals and trying to shift generation to more renewable sources. David, you mentioned that there was a report done on socioeconomic cost modelling.
So my question is really ‘What is the level of transparency and accountability on what the socioeconomic and environmental cost modelling actually is with regard to things like depreciation of house value, potential health issues, environmental impact, for example on areas of not yet recognised natural beauty, shall we say and do you have quantifiable objectives and targets to show that National Grid is not only committed to but achieving the goal of preservation of visual amenity?’

DM: Okay I’ll try and take – I think the two questions relate to the same area, so I’ll deal with that then I will hand over to Richard to deal with on a national or future networks level and I’ll concentrate particularly on the two projects which are the focus for what we are here with today.

Any development potentially can impact on the environment and it can impact on businesses and communities and we know that – that’s why we have a planning process in the first place. The issue of socio economics is one that has been raised with us but it could apply to any developer. What we have done is we, in response to the consultation feedback we have had in both Somerset and Suffolk, is we have revisited our strategic optioneering reports for both projects where we look at all the reinforcement options available to us, including subsea technology, HVDC technology, to look at how losses effect the economic balance and these projects, each individual option might effect the socioeconomic issues in the environment and we will document that in our strategic option report which will be published for consultation as we go forward on both projects. So we’ve addressed that, we have looked at that.

And I said in my presentation, with specific regard to cost, the cost of transmission equipment is so high, the capital cost of it, the operating cost over the 40 year life from transmission losses are a relatively small factor in the economic balance and that doesn’t change our view in our strategic optioneering report, but we will make that available and it will be available for communities to look at.

Richard Smith: just to pick up on the question of cost from that national perspective really, Ofgem’s publication from last year from Project Discovery looked into the total cost, if you like, around building the generation assets, building the networks out to meet a low carbon future over the next decade and the figures widely accepted around that, and there is similar corroboration from other bodies like Ernst and Young, PWC in the analysis they have done, all of these came to a figure round about 200 billion for investments in the networks and the generation required to delivery low carbon.

In the context of that 200 billion, the estimate on transmission was roughly about 15 billion, so a quick bit of simple maths there, that’s around about 7.5% and I will compare that 7.5% of the total investment requirement against the 3 or 4% of the bill today that transmission costs. so if you look at that in the round, it still doesn’t seem that huge if you think transmission could move in that 3 to 4 % up to say 7.5%, but actually in the context of transmission alone, that is a near doubling potentially of the level of investment required and the impact on the consumer bill, so I think it is only
right that there is a level of regulatory scrutiny around that investment to make sure that us and the other network companies are incentivised to make sure that it is done in an efficient way.

**Q: Richard Barnes, Stour Valley Underground**

I’m just interested in the connection offers and process. The Scottish Government are talking about their generators and the charge that National Grid make to deliver the power to where it is needed. I just wondered what sort of influence National Grid have on where the connection is and whether the generator could say “right we want to connect to where the power is used in London” and what cost-benefit there is for National Grid?

**Q: Peter Gregory Mark Parish Council**

Mark is a Somerset Levels village. I want to go back to National Grid’s mindset about this. In all the presentations I have seen about National Grid. We have had a very persuasive account of the strategic shift which is needed in generation but we do not get the same strategic approach to the issues around transmission. In his presentation, Richard said that the industry was looking at doing things in a different way, reflecting the change in the strategy. But we have not heard anything about a similar innovatory approach to the grid.

And David said that in looking at key options at the start of consultation all the options were considered, well in our experience in Somerset, that was unequivocally not the case. What worries me about this is all I have heard today confirms National Grid being stuck in this old mindset and what I am looking for is a much more innovative, strategic approach and I regret that is not what we have been hearing so far this morning.

**DM:** If I try to deal with the first question regarding charging arrangements. Generators wishing to connect on to our system can apply for a connection anywhere in England and Wales on to the National Grid system and we are obliged to offer them a connection. The generator has a whole host of factors that they need to consider in making their siting decision, so the generator will need to look at what his fuel source is, available land, what the chances are for consent of their project. They also need to factor in how we influence them.

The charging regime in England in Wales and in UK as a whole does vary and it is more expensive for a generator to connect in the north of the country than it is in the south and that is to try and encourage people to connect closer to the high demand areas. On the flip side of that, where people require an offtake from our system, offtakes are more expensive in the south than the north. There are directions from generator charges, but that is just one factor in the mindset of a generator when deciding where they locate and often fuel sources is probably the primary driver and the availability of a suitable site.

**RS:** The one thing I would just add on the back of that is of course that Ofgem have launched Project TransmiT which is a review of the charging regime, so obviously...
that is a consultation that is in progress at the moment, but that is actually designed to take a look at ‘are the balances between the way we currently look at charging set appropriately?’

I would also just note as an undercurrent to that, actually we kind of sit in a very neutral position here because how the charges are divided up is obviously very separate from the level of charges that are required to build the network. So they are actually two quite distinct things and actually the division of those charges doesn’t have a direct impact on our business model. We have no axe to grind in that argument – it’s a very open debate as far as we are concerned and should look as holistically as possible across charging.

If I can pick up a little on the second point a little around innovation. I think there is a couple of things to note in there. Our last price control, the RPI-X traditional price control did include an element of funding for innovation. It was a level of funding that was there on a use it or lose it basis, so there is no regulatory gain here whereby we can benefit investors by not investing that funding that was allowed. Effectively you have got to invest it and of course that’s in our interest at well. Through innovation hopefully you perform better as a business in future.

Around that as well we also have the Low Carbon Networks Fund that obviously DECC and Ofgem have put in place through the course of last year. It is not directly targeted at transmission at present – it was targeted at the distribution networks but we partnered with several distribution networks in their bids into that pot of funding designed to really spur on some innovation for future networks and we were successful in one project. One project looks like it may secure some other forms of funding.

Indeed they’ll be another round of this as we go forward so we are in very active discussion actually as we go forward with a lot of the other networks and industry players in terms of how we can look at some of the smarter technology solutions of the future. Smart Grid is one of the things that falls in my remit and in my team to think about and we have a very dedicated team and we are looking at all the holistic implications of these things and what they do mean for grids as a whole for grids over the next 20, 30 40 years.

Q: Tessa Munt, MP for Wells, Somerset

I wanted to concentrate a little on consultation and your interpretation which clearly has been different perhaps from local people’s interpretation of what consultation means and, I think it would be safe to say, that in the first part of what we deemed to be consultation we were disappointed by what you interpreted as being consultation. I know that you are looking now, you are asking for people to comment on undergrounding. I wondered if you could explain to us, exactly what part the responses to that consultation will take in how you move forward with transmitting power across the country?

Q: Chris Ambrose, Chairman Wraxhall Failand Parish Council, North Somerset
National Grid over a year ago said, quite publically, that undergrounding/undersea were technically not really possible. Under a question of a challenge about cost, which they also said was excessive, a question came from Liam Fox. The answer to the question ‘What would it cost?’ was for every billion pounds spent it would cost us £1 a year on our domestic bills.

Now in the same vein as Richard has just outlined that is a very small amount of money on our bill not to have underground or undersea solutions. So I put it to you that the technology is now available, the cost is minimal, if I may add since the Government recently introduced its own measures - 30% on our bill, rather significant, rather than this - less than 0.05%. so I put it to you there is no reason why you couldn’t do it, except that the IPC in planning which you refer to dictates that you will put overhead lines in. Otherwise you don’t need the IPC- it’s all a fact of life - you can go without any determination. So you’re being governed by the 2008 Planning Act and there are a number of reasons why you are in a very difficult position but I think there are solutions.

**DM:** Firstly, we are no way in any shape or form governed by the Planning Act requiring us to build overhead lines. This is about looking at what are reasonable transmission solutions that are affordable for the country and are the right thing for the country and yes we do work within our framework of obligations. The IPC as a planning regime – needs to look at our proposal and see whether it is justifiable, so we are not forced by IPC in any way shape or form to build overhead lines. Technology is a matter for us to look at, based on our experience, previous planning decisions and what we think the right balance is, then to put an application forward, if the IPC disagree with that we wont get our consent. Or the Secretary of State because now you are probably very well aware that the Secretary of State will make the decision.

Regarding costs and technology it is a fast changing area, the position, Chris, to do the particular project in Somerset the cost would be enormously more than an overhead line. The costs are set out in our ODIS report which is available online and it is also information we put into the domain in Somerset. Technology and engineering it is moving on.

I would have to say integrating an HVDC link within our transmission network, as that would do, is not without its challenges we still think there are significant challenges. That’s not to say they can’t be overcome but there are challenges. It is very very different operating in that manner to connecting up an offshore windfarm, bringing power in one direction into the grid. I hope that’s dealt with your point

Tessa, on consultation. First point is that we wont be making any application in respect of the applications until 2013. All the work going on regarding consultation on the DECC EN plans and on our own approach to undergrounding and indeed what the IET KEMA report brings back we will have to take account of in any submissions we make.
From our perspective what does our approach to undergrounding mean and why are we consulting on that? Well, we have this enormous challenge which we went through this morning, Tessa, and I know you are familiar with it though you weren’t here this morning, and we felt it is appropriate that we look at it. Whatever route corridors we opt for on the two projects in Suffolk and Somerset, we will need an extensive dialogue with local communities and with councils and with yourself and others as to where undergrounding might be appropriate. We felt it was important to update our approach and that is what we are consulting so we will have to take account of it and we will do in our projects.

**Q: Adam Sedgwick, Dedham Vale Society**

David Walker from ScottishPower was very clear and said firmly, in some detail, that the present regulatory system militates against an integrated approach to grid development. Do the National Grid representatives endorse that conclusion?

**Q: Dustin Benton, CPRE**

My question is really about urgency and this is for the whole panel. I was pleasantly surprised that it looks to me like all the people that are sitting at the front of the room seems to share an interest in an integrated network which could help to reduce the onshore reinforcement that could be necessary in the future, but I see a huge number of perhaps not barriers, but hurdles.

We have had the description that you could do an integrated network solution, you could do undergrounding, it is not ruled out, but it’s very very difficult and it is not the obvious commercial choice and coming back to the point about urgency; the decisions that we take now as to where we put substations, as to which agreements are made between developers and National Grid will have huge effect on how the network is developed.

Because once a connection is agreed, once a substation is built then lines will automatically flow to that and potentially more lines will to it. So it is important that we get this right and we get it right quickly before the infrastructure it built, so I wonder if we could have a comment from the panel about how we deal with getting a more integrated solution, getting more undergrounded in the near term rather than in the long term?

**Q: Lucy Robinson, Suffolk County Council**

I just wanted to take the pressure off National Grid for a minute and my question is for David Walker. We heard from John Foster and Paul Hipwell that we might think about a more comprehensive grid offshore which would take power undersea and up the estuaries. I just wondered how that would work for East Anglia offshore wind, whether that seems like a sensible thing to be aiming for in the future as an alternative approach?

**Q: Sasha Davies, Anglesey Energy Island**
A few points in brief I would like to make. Up in Anglesey there is overall very strong support for the proposed new nuclear power station to be built hopefully by Horizon up at Wylfa. However I think there really are a number of quite serious risks that could potentially eradicate that public support and I think mainly linked to grid matters and that really is going up the agenda in terms of from the public’s perspective.

I think first of all, although the good working relations we have had to date with Grid I think there needs to be a greater element of trust with the Local Authority in terms of early information provision in terms of, for example, looking at the preferred route corridor options etc and I have a number of suggestions how we could take that forward, maybe a further discussion outside of this room.

I think also fundamentally in terms of the timing of Grid’s proposed planning application to IPC and that of the developer in this case being Horizon, really needs to be sorted out. Clearly Horizon and their respective shareholders are going to find it difficult in terms of agreeing and signing cheques if the Grid application is not in there and hopefully approved in some of the forms that we have heard about earlier today, so I think that timing is really an issue in probably some of the other communities around the UK too.

I am also very interested clearly in terms of the undersea cabling potential – obviously as an island, very important to look into that thoroughly and undergrounding - some of the respective colleagues in the room have said today. I would just like to put those forward and interested to hear the panel’s thoughts.

David Walker: In terms of your question about alternative connection points and a more comprehensive grid offshore. First I would say that we are more than satisfied that the process Grid and we went through in the current regulatory environment in terms of providing the connection offer. There was a number of options considered, detailed scrutiny and indeed getting the approval for the liabilities that we had signed up for was a significant challenge as you can probably image, so we are more than comfortable that the offer that has been provided and signed up is the appropriate one at this stage within the current regulatory environment.

Could we go elsewhere, could we consider other points? I guess we probably have a neutral view in that the key considerations I would go back to of capacity, of deliverability, of timescales and similarly consenting risks, the solution we have in place at least for East Anglia ONE taking us to Bramford is a clearly deliverable solution for us and it gets the generation away so we are more than comfortable with that.

I guess as we look forward, we are very interested in the interconnection and possible development of the possible offshore grid for the future, which may give us some flexibility between the various projects, so we would be interested in that. In terms of the actual connection points, we are comfortable that a robust assessment has been made and therefore we really have no challenge in that regard. We would
be happy to consider others but we don’t really see any other alternatives at this point in time.

**DM:** Sasha if I could deal with your point – this is with regard to the Wylfa B connection on Anglesey. Firstly I would say the timescale I mentioned for Hinkley and Bramford-Twinstead line are well ahead of the position in Anglesey and we really do welcome the opportunity to engage with you and go through that and share all the issues regarding route corridors and technologies and that sort of thing.

I particularly wanted to pick up on one point you made and that is regarding timing and the timing between the Section 36 application from the generator and how the generator closes its business case to fund the development which clearly is very important to you because I know how important to the economy of Anglesey this project is and then how this fits in with the Section 37 application, which is essentially what we would be doing under the new planning act.

There is a difference in timelines there and it is a significant challenge and it something DECC are very much aware of. We are in a situation where you have a connectee proposing a power station in one location and they can relatively quickly do their own Environmental Impact Assessment, consultation and bring forward a proposal from a planning perspective, but they then have a very long build time of potential five, six, seven, years.

The connection that we are providing is completely the other way round. A major, long linear power line or cable or whatever involves a great deal longer upfront development, consultation, landowner agreements with many many landowners. Can typically take five, six years to get consent and then a relatively short build. So the two don’t fit well together and I can’t hide that. It is something that is very much on DECC’s agenda so they may want to comment on that later. What I would say to you is that we will obviously – the developers want us to – proceed in a timely manner and that is very much driven in our Connection Agreement to do that. We are aware that there is an issue with that timing point.

**RS:** I will pick up on Adam and Justin’s (sic) questions about integration and particularly in relation to the offshore regime. I think I would want to say very very clearly the regime today for offshore does not prevent integration. If I was an Ofgem representative sat here I would be wanting to make that point very very strongly. It does not prevent it.

Rather I would cut to Justin’s (sic) remarks, there are perhaps hurdles that exist and they are not hurdles within the regime, they are perhaps commercial pressures that sit behind developers and I am not going to move to a position where I blame bankers for all of this, but ultimately there are investors behind all of these projects and what they need is certainty that these projects can connect to the market and can flow power. The minute you try as a developer to integrate your project with other people who have different time scales, different financial backers, different geographical locations different concerns, you start to raise the risk of those projects
actually being deliverable and that starts to make the funding very very shaky behind these things.

So the problem for us as an industry and I think everyone would recognise this – DECC, Ofgem and everyone within the industry, would recognise to get integration the question is how do we help overcome those hurdles and what can we do to change the regimes to make sure that those hurdles are sufficiently dampened that more integration can occur.

There is something that gives me comfort that debate will occur- DECC and Ofgem have committed to consult further during the course of this year. They did that at several points during the back end of last year actually. But equally I think they are very aware of the timeliness required around this. The original offshore regime was four or five years in development - now last year, following a lot of dialogue with developers, Ofgem and DECC moved very very quickly to implement the generator self-build option to give greater certainty to people connecting their power. That was a change to the regime over a very very short space of time, within a year, so actually the knowledge that this needs to be done in a timely manner is absolutely there. I am an optimist I am confident we can get through this as an industry.
I’m Tom Luff I’m from DECC and first off I’d like to thank Michael, the chair and the organisers for inviting me here today and giving me the opportunity to set out the Government thinking, but more importantly I am here to listen. I thought this morning was a really really valuable experience for me to understand a bit more what other people are thinking on these subjects. So hopefully I’ll be able to hear more and take away some of your questions today.

I’m the head of the Electricity Networks Delivery and Access team in the Department, so I guess I am the person who is mostly responsible for ensuring that the investments are made in the right places and I should say, I’ll talk later on, what we are responsible for is setting that very high level policy, then Ofgem (the regulator) and industry will deliver it.

My presentation will give an overview of the regulatory and planning processes governing the building of the new network. I am not in a position to discuss the details and comment on specific cases, such as specific planning applications. Also I am not really able to talk much about too much of the technical details. I will leave that to the various experts who are here today. We are kind of doing this in two parts. I’m presenting the DECC part and Iain here will be doing the Ofgem part of the picture.

Here’s a summary of what I am going to talk about today. I’ll start by setting out what is driving the need as we see it for changes to the electricity network and why the new infrastructure will be needed in the future. I know that we have heard about this morning but I thought it would be important to stress why we think this is an issue, in particular the climate change side of things.

I’ll set out at a very high level the role of Government and the role of Ofgem in developing and implementing policy, then I’ll discuss one of the real central challenges, that has been talked about a bit already, which is the difficulty in assessing what future network is actually needed – but particularly given the fact that the precise location of new electricity generation is often quite difficult to predict, then I’ll go on and consider the Government’s policy levers looking at network regulation and then looking at planning and I’ll conclude with setting out some of the key milestones ahead.

This slide I think people are probably well familiar with, and it, to some extent, reiterates what we heard this morning. So I mean this is really to say why Government needs to be concerned with electricity transmission infrastructure and why right now.

The first point is tackling climate change and securing energy security is two the Government’s two really key priorities. We signed up to the EU renewables policy which requires 20% of the EU’s energy to come from renewable sources by 2020
and for the UK this means 15% of our energy - which equates to about 30% of our electricity. Given that we have got about 7% now that is quite a massive ramping up in the next ten or so years. There are also major energy security challenges. As we heard today a quarter of our existing generation will close by 2020. That all needs to be replaced.

Second point is that there is an urgent need as a result of this for a diverse range of new low carbon technologies and by 2020 we’ll need significant new renewables. National Grid forecasts approximately 32GW of wind. We’ll need new nuclear, again about 3GW according to National Grid, and then also new coal and gas.

So electricity networks are obviously vital in enabling this transition to a low carbon economy. We’ll need reinforcement given the increases in sizes of electricity flows, particularly from north to south, but also from Eastern England to demand centres in the Midlands and in the Southeast.

We will also need new infrastructure and I think this is a really central point, the electricity grid was built for a very different energy world. Most of the electricity generation at the moment is fossil fuelled plants. They tend to be located near to demand centres. But wind, for example, needs to be where the wind is strongest, which may a long way from the current grid. Government recognises that we need to be proactive in grid development and provide as much strategic leadership as we can.

To deliver these changes DECC works with the independent regulator Ofgem as well as with the transmission companies – National Grid and the two Scottish companies. An independent regulator is really important in providing regulatory stability. It is also a requirement under the package of the European energy directives that we are currently implementing into UK law. The regulator needs to protect the interests of both existing and future customers. This embeds some really tough tradeoffs. This is often illustrated through what costs are acceptable to place on today’s consumers in return for long term environmental benefits. These are really difficult tradeoffs and it is for Ofgem to resolve these tradeoffs, within the context of Government’s broad policy goals.

So in terms of the diagram, DECC Ministers are the democratic representatives and they set the overall strategic policy direction. They are deciding on the high level objectives that the network needs to deliver,. be it energy security, safety, low carbon, cost effective, but also crucially as we have been hearing today, having regard for visual amenity, local environment.

These policy objectives are then implemented by Ofgem. They develop the regulatory Codes to meet these high level objectives and then industry, in this case the grid companies deliver the grid itself in terms of maintaining it and developing it. And they do this by complying with the Code rules to maintain efficient and effective networks.
I should note on the right hand side here, DECC are currently reviewing Ofgem’s regulatory role. This is a big exercise that will report in the spring, along with the Electricity Market Reform White Paper. Really we are considering whether any changes are needed to consider whether there needs to be any realignment of the regulatory network with our strategic priorities.

I think a key challenge for us all is assessing what electricity network is needed, given the fact that the location of new generation such as wind turbines is not always easy to predict. I think this trade-off is really important to stress, because on the one hand there is the real urgency of meeting low carbon targets, maintaining security of supply, but on the other hand we need to minimise building of any unnecessary grid in order to minimise any local impacts, but also to reduce costs for consumers.

To help guide thinking on what new electricity network might be needed in the future, the Government and Ofgem set up the Electricity Networks Strategy Group (the ENSG) and this was referred to earlier by National Grid. The group is made up of experts from DECC and Ofgem, Transmission Owners as well as major electricity generators. The group wrote a report in 2009 setting out the scale of the challenge facing the grid in bringing about the transformation needed.

It sets out the views of energy companies of where the electricity network needs to be reinforced or augmented. I think there are a few key things to mention here. It is a technical and economic analysis, so it provides a sense of the likely scale needed for the new network, but it is not intended to be an all encompassing assessment of all network options. It is certainly not a Government plan or programme. It does not pre-empt the planning process in any way. It should not be read as assuming that any individual project referred to in the Vision will be constructed. Finally it is not the Government’s view, it is the view of the transmission companies. It is the best overview we have got available to us.

The last thing I want to say about need relates to the offshore side of the equation. The offshore electricity transmission system is obviously in very early stages of development. Government is paying particular attention to the development of this offshore network to make sure that it develops in a coordinated way and avoids the need for unnecessary infrastructure, both onshore and offshore. A few things to mention here.

One is the Offshore Development Information Statement which helps ensure these objectives by setting out what is happening and giving a very clear description of the state of play on the offshore development. Also I should point out that DECC and Ofgem are going to undertake a joint review of options for the offshore network so we want to consider and bring in stakeholders from industry and from all areas who will be affected. We want to consider what additional measures might be required to deliver this coordinated offshore network and, if required, how these measures might be actually implemented in practice. I think it is fair to say we haven’t got a firm conclusion yet on how that would work in practice and that is what the project will aim to achieve.
I said I was going to talk about network regulation. This is the first part of the policy equation – this and planning. The network regulation governs what network is allowed to be funded. The Transmission Owners, the network companies like National Grid have a statutory obligation to develop and maintain the electricity transmission system and this is set out in the Electricity Act of 1989. They have a duty to provide a connection whenever or wherever one is required and they are required to be efficient and coordinated and economic, but they are also required to have regard to preservation of amenity in developing this system.

The next point – Ofgem is responsible for assessing which investment projects are justified - what new network is needed and how much the network companies can charge supply companies and thus pass on to consumers. The framework it uses to do this is the price control system and Iain is going to talk about this shortly.

One more thing to mention here is the Security and Quality of Supply Standards (the SQSS). These set out the criteria that National Grid must use in the planning and operation of the electricity system. Essentially they determine how secure the network is and ultimately reduce the threat of having blackouts. These standards have served the UK well over the years and one of the strengths of the UK economy is the reliable power system it has got based on these standards.

On to planning. This is something that again we have talked about a bit this morning. The Planning Act 2008 introduced changes to the planning regime. Its intention was to provide for a faster and fairer development consent system for nationally important infrastructure projects. The Act makes provision for the creation of a new independent body, the IPC, and this took over responsibility for examining applications for development consent for these infrastructure projects. It creates a more streamlined system for deciding on these big infrastructure projects. The previous system was considered to be fairly cumbersome and overly complex.

The Act makes provision for the Government to produce National Policy Statements which will provide clarity on the national need for infrastructure.

The NPSs will play a central role in the new system as the primary document used by the IPC in making these decisions. They have been written to try and integrate the various objectives – the environmental, economic, social objectives and provide clarity on the need for infrastructure. The idea is to enable the IPC then to balance the various benefits and adverse impacts of any decision. The NPSs are being consulted on at the moment and the consultation closes on the 24th January. After that they will receive further parliamentary scrutiny and the revised versions will be laid before parliament, I think later in the spring. We expect these NPSs to be fully compatible with the new RIIO arrangements and as such we are working very closely with Ofgem to make sure we can reflect the emerging thinking of RIIO while being aware that has not been fully formed.

I should also say that going forward the new Government decided to give Ministers responsibility for taking infrastructure decisions, so the IPC commissioners will be
replaced with elected representatives. A Major Infrastructure Planning Unit will be established within the Planning Inspectorate to examine and make recommendations to Ministers on major infrastructure applications.

I think the final thing to say is that the Planning Act regime is very new. The Government will be reviewing the entire system, including thresholds, once the Major Infrastructure Planning Unit has been established and a number of varied cases have been through the entire process.

We are listening very closely to the experiences of those using the new regime for the first time and this includes members of the public and community groups as well as industry.

Finally, I will just say a few things about what this means for applications. The Government is technology neutral in this sense. It is important to emphasise we do not promote one technology over the other. We expect the developer to use the appropriate technology to suit those circumstances. Each project will be assessed in the system on a case by case basis.

Every planning application requires an Environmental Impact Assessment and this includes the assessment of cumulative environmental impacts. (This means the impact of that particular project, combined with impact of other projects.)

Different circumstances will necessarily require different technological solutions. In some cases the case for undergrounding will be considered appropriate - where the costs are outweighed by the benefits in terms of reduced visual impact. In other cases, overhead lines may be considered to be more appropriate. And sometimes different technologies will be appropriate for different parts of the system or different parts of the project. But it is important to stress that there is a duty on National Grid to do what they reasonably can to mitigate any impacts on natural beauty.

I think one of the difficult areas has been understanding what the various technologies cost, and this is certainly something we have been thinking about here today. We have recognised there has been no independent calculation of the costs of undergrounding and with that in mind we are really grateful and welcome the independent report being undertaken by the consultancy KEMA and the Institution of Engineering and Technology. This report will cover the whole life costs of a number of technologies including Gas Insulated Lines.

The final report will be produced around the end of the NPS consultation period so there will be ample opportunity to consider the report alongside responses to the consultation. We believe that the report will be a general reference document for all interested parties, including the IPC and the intention is to reference it in the NPS. Obviously, the IPC will be open to consider any other information that is presented to it.

So this is my final slide and talking about the next major steps coming up. As I said the KEMA study is due to report at the end of this month – January/February. In early 2011 we will begin the consultation on the coordinated development of the
offshore transmission system. In the spring we will have the revised National Policy Statements laid before parliament. Publication on the Ofgem review will also be in the spring. Looking ahead a bit further, the next price control period will start. On that note I will hand over to Iain to talk about the Ofgem perspective.
Iain Morgan, Ofgem

Good afternoon everybody. I am Iain Morgan from Ofgem and I am delighted to be here. Thank you to the organisers for both arranging and inviting me.

I would echo Tom’s point – I am very much both here to speak now but also to listen and I have gained quite a lot of insight from this morning’s session and I was particularly appreciative of the degree, both of reference to, but also of understanding of, some of the aims of reviewing the way we regulate, coming up with RIIO and putting it into practice. One of the main focuses of what I want to talk about now is really how we use this time because it is a very important time in the regulatory cycle.

Firstly for those unfamiliar, who is Ofgem? Ofgem is the independent economic regulator. It traces itself back, in terms of the electricity network side, back to the privatisation of the Electricity Act 1989 that privatised the industry. At that time it was Offer and it has since merged with gas and also developed from an individual regulator to a board structure in Ofgem.

The way it’s regulated the networks in terms of economic regulation has developed right from that starting point and it has followed, as someone mentioned, the RPI-X approach, which has been used across different networks like telecoms, railways and water, as well largely to encourage the networks to develop in ways that don’t abuse their market power, their monopoly position.

The way that the regulatory decisions are made by GEMA, our board, are set out in statute. The functions are set out in statute and the decisions are made in light of a range of duties.

Now Ofgem has a principal duty set above all others, we have got to focus on the interests of existing and future consumers and that is promoted above the other duties.

We have another duty now high up in the order behind it around the achievement of sustainable development and a lot of the duties require the regulator, when it is making decisions, to make tradeoffs and to understand the interactions between different things - for instance the key economic function of the price control, which I will speak to in a moment, is centred around meeting the existing and future consumers interests including encouraging efficiency and economy but also making sure the network companies, such as National Grid and the Scottish transmission companies on the transmission side have enough finance to support their activities and requirements so they can obtain and retain investment.

So I am going to focus on our price control. It is not the only aspect of Ofgem’s business and I am going to talk at the end a little about the interaction with offshore transmission, which has been talked about this morning.

In terms of the onshore electricity transmission networks, the key focus has been in terms of setting price controls and it has broadly been on a five year basis. We set
the allowed revenue at the base for that five year period. We set arrangements for dealing with changes, such as changes in volume and we set incentives, to try and be more efficient, and other quality incentives and then in doing so - and one of the beauties of economic regulation means it doesn’t mean we actually need the answers at the start we actually encourage others to work to try to find the answers and certainly that has been very successful in encouraging the transmission network companies to identify ways of being more efficient in their production and we have seen dramatic falls in costs and also, in some cases, increased investment in the quality of the network.

As you mentioned before, last year and the year before, Ofgem decided to do what was really the first fundamental review of the price control process. The price control process has amended over time but this is a once in a 20 year review– that is why it is called RPI-X@20 review – where we really spent time saying does it work now and what successful elements of the current regime might work better with some new elements. And clearly the challenges that were talked about right at the start of the morning in terms of security of supply, decarbonisation of electricity and yet keeping the affordable service - that finally is the key challenge. It is a challenge where we thought there were a number of areas where the current price control, the length of it, how it focussed on the regulator, and the companies etc felt it may not work to the full advantage and so I'll focus in on this slide which presents RIIO in terms of its key elements.

What was not working as well, or what can be improved? Firstly, in terms of length of time horizon of thought. With a five year time horizon at best you were going to get quite short term thinking and I noticed in the text as I was reading it that Ofgem was criticised perhaps for its regulatory framework leading to an incrementalist approach in development. I think one thing that we recognised in RIIO was that we really need to encourage longer-term thinking on the part of the networks. And I must emphasise here, that is not to say that the networks haven’t done that in the past and I will say that with other parts of the regulatory framework. One of the beauties of the economic frameworks is that if you get it right you can encourage real development, but one of the limitations of the regulatory framework is that it doesn’t work on its own, it works through encouraging others. In some cases we will have seen long term thinking. In other cases, it might have, at the margin, encouraged short-termism.

So what we have tried to do is we have set an eight year price control. Five to eight years does not sound that much but that is only part of encouraging lengthening of thought. We are encouraging the type of business plans and I very much appreciate the earlier speaker’s reference that they are ‘well justified’ as although it sounds a bit pompous potentially, the title was deliberately chosen. The difference in the business plans which we want submitted as part of the current price control as opposed to previous price controls is really significant in terms of asking further questions.
This price control we are dealing with now in terms of RIIO is due to be implemented in April 2013, but we are at a crucial time at this point because it is the two years before a price control when the work is done and in particular under the new approach, work is being done at the front end and that is partly because of, and I'll start by explaining RIIO from the bottom, ‘outputs’ because I think that’s an important place to start in terms of the new approach.

In the old approach, the focus was setting the revenue constraint, encouraging efficiency. Over time some quality elements came in. What we have tried to do this time is to start at the other end. Actually, the plan that we want from companies for the price control period of April 2013 to 2021 should be led by ‘what are the customer-focused outputs that we are going to deliver as a network in that time, given the context of the Government policy and the other contexts? And so that, for instance, and we are working on that now, there are obviously things about reliability of network in there, but as was mentioned earlier, there are also environmental impacts, so that, for instance, the point about losses mentioned earlier, very much, that potentially could be a measurable sort of output that the companies are held accountable to and it uses to justify its business plan.

Also, we had discussions around the wider environmental impact and we might come to that in the discussion. That is a difficult element to pick out in terms of an output.

It is also about changing the regulatory framework to encourage rather than discourage innovation and that’s not to say that a new way is always the best way, it is very much to say that one of the things that natural monopolies tend to do is to not think about different ways of delivering, it is tending to prefer the safe way that they have used before. It is an element of competition that is quite difficult to simulate in regulation, so we are looking to encourage and we are saying that a well justified business plan is only one where clearly different options have been looked at and the reason behind the chosen option is well justified and that’s what we will be appraising when we look at the business plan.

The other thing that is important that probably isn’t really borne out on that slide is stakeholder engagement and involvement. The regulatory price controls tended to be focussed too much on the debate between the regulator and the regulated company, where the regulated company would submit its plan and the regulator would appraise it. Now as you know, and many of you have been involved in Ofgem consultations before, there have always been consultations but what we decided going forward was that’s not enough.

Written consultation is only one element of proper stakeholder engagement and involvement. We have set up a number of things already in terms of workshops around specific areas, policy working groups, very much with the idea that we are not just looking at the industry, but we are looking at a wider group. I know CPRE are represented here and the Organisation (sic) for Areas of Outstanding Natural Beauty which are both represented on working groups that we have had and also on a
central forum, managing the price control, so hopefully, passing out information to other constituents, if you like, or related bodies, on what’s going on.

We are very much at the time now – we have just consulted on our proposals at the end of December - but we are very much at a time where we are trying to develop what to set out in March for the companies to put in their business plan and they’ll be developing their business plan then until the summer and they are already showing signs of taking up this new stakeholder engagement very positively by each individually setting up various ways of engaging directly and I think I’d emphasise certainly for this forum, that stakeholder engagement, one, doesn’t just mean with us as regulator, but also with the companies directly, it does mean very much what you were describing earlier the constructive, positive interaction. It’s no good just going and engaging and saying we don’t like that option, it’s got to be constructive because only then can the company take that on board.

Finally I am aware and I heard quite a lot of different projects discussed earlier - one of the risks, and very visible, hearing this morning, that either there can be gaps while one element of the regulatory framework is put in order and another one isn’t and another thing is that it does take time to implement these things.

I was challenged this morning ‘is this just window dressing?’ – well I don’t think it is and I would stress that there was a real drive from across the stakeholders in this review. We really emphasised that we wanted people to feed in their ideas. But it will be a continuing challenge to make it right and it will only be genuinely working when we get to 2013 with an implemented, successful regime, so it is very much on all of us to try and communicate the interactions that are going on with all the other different named projects and I am aware that even with Ofgem projects there can be some confusion about the different project names ‘Discovery, TransmiT etc.’

And I just wanted to draw together a key point on this slide which is that we’ve got a lot of context behind both the review work and the price control that we are now doing. A lot of context from the work on the Transmission Access Regime, looking at and improving the speed on connections etc and resolving problems in terms of queues and getting new generation on and Project Discovery, which was very much a look at the market and seeing the energy market, how it might move in the period going forward given the financial shock and some of the energy shocks that have faced it and we are also feeding in some of the ideas that we have developed in the most recent Electricity Distribution Price Control, for instance the Low Carbon Networks Fund which was talked about this morning. A positive point I can give you is that we are proposing to have an innovation stimulus which would follow that same principle but apply across the different types of energy network. This is an element at least where people can make bids competitively to attract funding for innovative projects, so it opens up extra options, in terms of what the networks can do.

And we have got as well as the price control, another key element TransmiT, which is looking at the charges and the connection arrangements. They are tied together because for instance in any outputs in terms of what a network will provide in terms
of connections should be mirrored by a clear policy in terms of the commercial arrangements for connections.

I would echo the comments from this morning in terms of the relationship with offshore transmission regime but certainly as someone who is working on the price control on the onshore regime it is very much a challenge that I will retake from this morning that we need to make sure that in looking at those business plans proper cognisance of the impact of the offshore development is taken.

I would echo the points that National Grid made this morning that on the offshore side, colleagues have emphasised that the work on the integration of more information, more strategic role is being developed, but in terms of the onshore side I think there is a challenge to us, given the timing, to take into account the continuing challenge on that.
First of all thank you to Suffolk for asking us to come here. It has been a fascinating day so far and we look forward to the panel session at the end of this one and go outside and hopefully don’t get kettled.

We are here to give you a glimpse but by no means an in depth look at technology. This is not the right forum for an in depth look. We will do it in the order that Michael has requested us to do. We will start with HVDC which is probably reasonably well known. Steve will take that one forward and then I will follow with a short chat on Gas Insulated Line, known as GIL for short. Thank you

Steve Aughton

Thanks Colin, Mr. Chairman, ladies and gentleman, so HVDC technology in 3 minutes. That should be a challenge. What I am going to do a little bit of today; an introduction to DC technology, a little about what it is, what are the different types of dc, what are their applications, what have been their applications and then talk a little bit about the future as well and I will reference things that have been discussed to do such as ENSG and ODIS and things like that as we go through

So there are two types of transmission system possible – one we are all very familiar with which is the High Voltage AC system and the other one is a DC system. The AC systems are the least expensive and most widely used for onshore grids and also for windfarms closer to the shore. HVDC, as I am sure you are well aware, becomes more economical for longer distance. When we are talking about some of the big offshore windfarms, for Round 3 certainly we are talking DC for many, if not most, of them. The typical break even distance for DC cable technology and we are not talking about price, we are talking about technical break point, is about 80-90KM.

There are two types of DC technology. One is Classic or Classical, which is thyristor based, so a bit of terminology for you. I’ll come back to that later. Then there is something what we call Plus or Voltage Source Conversion. Again I’ll explain a bit more about what they actually mean in a moment

At the moment HVDC is mainly point to point connections. Interconnectors and onshore point to point connectors and offshore. Future grids may be multi-terminal so you would have multiple connections. That’s been a topic of today and I will touch on that a little bit later.

So is it new? No. DC technology has been around since the ‘30s and certainly Siemens has been delivering DC technology for the last 30 years and you’ll see the reference projects on that sheet.

What is fair to say is that a lot of that is based around the Classic technology. What is new, or relatively new, is the Voltage Source Converter technology, so it is probably wise to differentiate between the two as we go through
So HVDC Classic – based on thyristors, light-triggered thyristors, and it’s usually used in inter-country connections, so we have got a few examples coming up, ones you will be aware of; the Moyle connector and Brittany for example.

Voltage Source Convertor technology again relatively new. This has been developed really to allow connections where there is not a stable grid between the two on either side of the connections. So when you are talking about things like windfarms it is ideally based, from a technology perspective, to address those issues.

Couple of references for you to see what the art of the possible is. First, Classic, relatively recently completed project from the UK to the Netherlands. Again another example would be the Moyle connector between Scotland and Northern Ireland. So this is 1000MW connector providing energy trading capability between the UK and the Netherlands.

Start to get a bit bigger in China. We’ve seen a huge expansion in China, certainly in all developing countries where they have got long distances to transmit the power across. This example in China is about 1400 KM. I would think it is fair to say, unlike the UK examples I have quoted, this is overland and I would also point out this relies on overhead lines. I get the general impression that overhead lines are not that popular and am actually pleased to say that at Siemens, the one thing we don’t do is overhead lines. Clearly you can put DC on overhead lines, it gives you greater power transfer capacity, but the downside is your towers are a lot bigger than your standard AC transmission system, so that’s certainly one of the considerations. But, 5000MW.

Then India as you would expect as well. Again large power transmission, large distances talking about well over 1400 KM in some cases, but again it is overhead line based, because of the power outrate required.

I put this one up - it has been shown about 3 or 4 times today already. I think one thing to say is we do, through the ENSG report, we have seen recommendations for interconnectors. I heard reference today that all the reinforcements were onshore I think I would slightly disagree with that because certainly the Eastern and Western Connectors are offshore and that is part of the ENSG plan. The Western one, again you are looking at a power rating of about 2GW and you are starting to talk about getting towards the end of the technology in terms of its capability. We are talking India and China 5GW. When you are starting to go subsea your limits are lower, to be fair.

So applications for Voltage Source Conversion. Well I mentioned the 80KM plus limit before. Typically you need Classic when you have got a strong AC network at each end. So your Lcc or Classic is not suitable for offshore windfarms, Voltage Source Conversion is. Some advantages are that is has some built in redundancy. It has black start capability and effectively you can use it for offshore windfarms, connecting to oil and gas field and such like.

Key figure for you – 1GW is possible now and we are developing further improvements in the technology to increase that capacity. That 1GW in the context
of current conversations, probably quite important. The other thing I would say – it has got a configurable footprint as well because it is modular. Again when you are working offshore in particular that is quite important.

So if you look at the way this is being adapted for offshore, for example, this shows several different ways of connecting. If you take the connection at the bottom where you have the big heavy lift vessel, that is typical of the windfarm connections that have taken place to date, so Thanet, Greater Gabbard, London Array, things like that - where the distances to shore is short enough to have an AC offshore substation to connect into shore. When you are talking about distances further out you are talking about DC converter stations - you still need AC collector stations to feed into that and the maximum transmittal capacity is about 1GW at the moment and that is what most developers are planning on – there or thereabouts

There are natural opportunities to connect more than one windfarm or more than one part of a windfarm, but there are also natural limitations in terms of the technology capability and as I say most people are planning around 1GW connections today.

Converter station. This is a 400MW converter station. We have got some dimensions on there. The main converter station you see in blue and green there. There is some opportunity to reconfigure that. It does not get you out of jail completely as you have still got an AC switch yard but HVDC Plus does give you some ability to configure a converter station to fit a smaller footprint. And to be fair most of the developers we are talking to are very cognisant of that and are trying to achieve smaller footprints and this gives you an example of that. These are converter modules and there are some of the ways you can configure them.

So a few features and benefits. I think important ones from the discussion we have had this morning are around; losses; around low harmonic noise; and around the scalability giving you some flexible footprints. So I think they’re the key things and as you can see there are some other benefits – more from a technical perspective than anything else.

So point of debate. Interconnection and integrated solutions. Again this one has been used a few times together already. As you are aware, current windfarms are delivered on an individual basis. In effect all connections are point to point. There is some merit in a more coordinated solution. That’s been mentioned several times today and National Grid’s ODIS again puts a proposal forward on that basis. As a manufacturer, I don’t intend to try and address all the regulatory issues and who’s going to pay for a larger connection for the first windfarm in anticipation of the second windfarm coming along. That’s certainly a regulatory issue. What I will try and do is try to illustrate some of the key principles of that.

So where are we today? Windfarm A connecting into a substation, and again be mindful of the costs on here. This is from my mathematics. This is not indicative of real prices. If you want some more real prices or real costs, the best place to look is the ODIS appendices.
Clearly if you start building sequential connections, you get no benefit, you get double the cost. If you build a single connection there is an argument to suggest that a larger connection will cost you slightly less. The issue is if you build that connection first and then the second windfarm comes along a lot later, who’s going to pay for it? Will the investors pay for it? Technically it is possible at the moment to do a gigawatt, maybe more in the future.

This scenario reflects where you have got possible implications of restrictions on the onshore grid. It may initially force a longer connection for Windfarm B. Because you are not able to connect into the northern substation and if C is built you may need to reinforce that onshore line anyway, so this is back to that argument of coordination.

As I say there is a limit to what you can achieve. You could optimise the connection like that and build one connection rather then going through the onshore reinforcement and then two individual connections, but the fact remains that you are restricted by several factors; yes, cost, technical limitations such as cable technology, converter technology, what other generation is there around that area; distances; economics; and things like platform technology. You can only make platforms a certain size for example before the technology runs out.

These are the principles of an integrated solution and each case would have to be looked at on its own merits and this is consistent with what ODIS is actually telling us.

So commercially sensitive he says? What’s commercially sensitive? So we’re selling 1GW Voltage Source Conversion at the moment. We are currently developing future technology to increase the capacity and capability of those converters but what they might be in the timescales it is difficult to say. If you read ODIS it is fair to say we would not disagree with anything that is stated in ODIS. So you may get a doubling of capacity, but you certainly are not going to get to a situation with the limitation on volts, which are cables for example or the converter design on the current – you are not going to get to a situation where you are going to throw 7GW down a DC line. So you are still going to have a need for multiple connections for some of the larger Round 3 windfarms regardless of how the windfarm develops. It is how you minimise that.

Now we move on to Supergrids. Again they have been mentioned today. You will notice a few people have had a few ideas on Supergrids and this is just a selection. There are numerous proposals for fully interconnected grids. The proposals are 99% focussed offshore. Key issues obviously around security of supply and energy trading and as a starter for ten, you obviously need multi-terminal capability. Multi terminal capability is obviously around energy transmission between several points on the network as opposed to point to point.

Few examples. This is a new leap in technology. So it is technically possible it’s just not here now. There are lots of technical debates around whether you need a DC breaker, whether reaction times are quick enough, how you coordinate and balance
several interconnectors and the associated control systems etc etc. So there is a lot of work to be done on this before it become reality. But it is technically possible and it’s the same issue as we are debating on the onshore today - there is a lot of regulatory issues that then have to be resolved on a pan–European basis, not just in the UK.

So future DC grids are they possible? Yes. As I say current debate focuses onshore. It needs a combination of technology input and then standards and then we need to go on after that to address the business case. Some of this is happening at the moment, the technical side is being developed. The likes of ourselves are developing DC breakers but we do need some guidance under the auspices of bodies like Cenelec and they have a report due at the end of this year on certain standards, standard voltages. Then we need to look at the technical development period thereafter. I am pretty sure this will happen, the question of course is when in what timescale. If I come back to the technical side, yes, it’s possible.

So just an illustrative example of some distances. You can do long distance power transfer. It’s being done in China and India. If you transfer the same distances on a European basis and you start to talk about European Supergrids, well the distances are not much different to be fair. I think the fundamental difference is that in China you are talking about point to point connections. In Europe you are talking about multi-terminal which is a different ball game and a little bit further away.

So from a technology point of view, many things are possible. We can provide, as an organisation, most of the technical solutions. I think it is fair to say DC is not the panacea, it is not the end to all problems, but it does start to get you some way there. We will leave others to makes decision of the economic benefits of that, but from a technology point of view, things are continually evolving and there are obviously possibilities in the future as I have alluded to.
Colin Johnston

In our view and I think we speak for the people that supply the technology in general, further developments that are required will at least keep up with the pace at which all the other stuff that is likely to happen - even if it accelerates.

A quick talk through the Gas Insulated Line technology. Because we recognise that very few of you may have seen this we brought along a pile of flyers on it.

What it is, if you look at the picture on the left, it is essentially two concentric aluminium tubes with post insulators keeping them apart. I've highlighted a few things in white there. Ideal for when you need high capacity transmission where losses and availability are important – low losses that is and high availability, definitely not the other way around.

Going on down to the bottom ones in white – to date the longest circuit we have put in is approximately one KM. We can do the technology up to 70KM without having to do reactive power compensation. Beyond that there isn’t any theoretical limit on what we can do but it does require reactive power compensation - which is of course required with cable at much shorter lengths. Taking the one KM, or the five or six KM, one possible potential use in the present context is undergrounding certain sections of overhead lines.

It’s quiet. I’ve been stood in that position once, not in that particular installation, but you hear nothing - there is no buzz.

There’s hardly any heat either and they don’t switch it off when you go there, because there isn’t any need to. The one I have been in is the one in Geneva airport which is one of our reference projects.

No risk of fire. An other point that can be important, certainly is for some projects – very very low electromagnetic radiation.

If we look at the three elements of the lifecycle, and this is quite generic and certainly in Siemens we can apply it to any technology. When you engineer, install - effectively procurement cycle - there’s the lifetime operation, and there’s what happens after that which I refer to as the end of life disposal.

Some pictures here to give you some idea of what this technology looks like. Essentially, the aluminium tube, that’s an outer tube on your left – the 500mm one comes in 10-12m lengths depending on how you have decided to engineer the project and if there any special transport conditions getting it there. The technology is assembled onsite, which is obviously the reverse of what you have with cable solutions.

It’s an automatic welding situation – it’s a welded technology. A clever little machine goes right round the pipe then another one follows it checking the integrity of what the first one did. After that the pipe is rolled out into either – if it’s a buried
installation, then you have done an excavation or if it’s a tunnel installation then it’s rolled into the tunnel.

On the buried GIL - those are photographs from a project that we completed at the end of last year. It is close to Frankfurt airport. Difference there to tunnels of course is that you need to leave the entire thing open until you have finished or if it’s a longer length until you have commissioned an individual section of it. That one’s one KM length so the whole thing was left open until all of the commissioning was done.

The chief advantage of the direct buried is that it is the shortest construction period. The picture on the bottom left of those four is onsite construction of what we call a low cost tunnel a compromise of between simply burying the technology and having a traditional tunnel and the gentlemen on the bottom right you can see standing within the tunnel and there is some dimensions on the picture above that.

That’s engineering and installing, in operation: that one shows comparative losses with the other technologies that are available. As the power transfer capacity increases it tends to favour GIL. If you come towards the left hand end then things begin to merge together.

Maintenance: our oldest installation has been in the ground for 35 years and we have hardly had to do anything. A periodic inspection is all we have had to do - great to be able to say that. First time I did this presentation five years ago it was 30 years, now I am happily saying 35.

Question we always have to deal with is when we offer the technology is what happens particularly if there is third party damage. The most complicated situation is where you have it buried then you have to excavate. I am not going to go through the steps on that diagram – you can see more in the handout - but we have a process that deals with that.

On auto-reclosure, which is an important thing in transmission networks, the gas insulation itself recovering, and after reclosure can be performed virtually immediately. With other technologies there may be a while that you have to wait. Again, I would refer you to the appendices of National Grid’s latest ODIS report for a description of the various technologies there.

End of life disposal, which 10 years ago people might not even have asked - what do you do after the asset has done its useful life? It’s almost totally recyclable and reusable If you take the two key things; the aluminium – that can simply be melted if that’s what you want to do with it and be reused; the insulation gas mixture – that is completely reusable. The only bit that isn’t recyclable is the gas cast resin components that keep the tubes apart. That is a very small proportion of the total material content of Gas Insulated Line.

Switching back to more of where this meeting has its origins. If you’re selecting a technology these are things and may be some others that not there that you need to consider. I am not going to trot through those - the next speaker may have more to say on some of those. The bottom one is cost. I put that in capital because I
expected that there would be a lot of discussion on that today and so far there has
been and I expect there will be until we have finished. I am not saying they are in any
priority order either.

We have a chart there – these are the kind of guidelines what we would see. I would
draw your attention first of all to the bar at the bottom – ‘the details are extremely
dependent upon project conditions’. Every project is different - you cannot totally
generalise on this kind of thing. The essential message there is that if the power
transfer capacity is less than 1500mva then you do need other reasons to justify the
use of a technology like GIL. And that’s why that cross is in brackets because in
some cases there are other reasons that justify using that. As you move further up
the scale, then depending on the precise rating of the connection - hence the project
conditions qualifier at the bottom - then GIL may be the correct answer, in some
cases it won’t be. From our point of view it is one thing that we have in the tool kit to
do this stuff.

There are approximate cost comparisons there. Again I would refer you the
appendices to the latest ODIS report from National Grid. What we have there, I
would say, there is roughly in line with what they have there with reference to cable
technology. Once you have to build a tunnel or dig a trench, then obviously your
costs are going to go up. The lifetime of the technologies: National Grid are far more
able than me to make a comment on the overhead line side - we are expecting at
least 50 years from the GIL. Siemens used to have a cable business and the figure
of 30 plus there really comes from our experience at that time. Again the health
warning at the bottom – details are extremely dependent upon project conditions.

There is one thing if you are doing a direct burial. The phase separation requirement
on GIL for that double circuit there - you can get away with a 9m excavation. With
cable you have to go wider.

Electromagnetic radiation – again may be best looked at at leisure – the blue one is
the overhead line, the pink one – same colour up there- sometimes it is different
when you are looking at the two things - obviously with cable it is much more
contained but it does have a relatively high peak. With GIL it is equally contained as
with cable, but it has a low peak and in some countries the requirements for levels
for microtesslas are getting quite stringent. Switzerland and the Netherlands are two
that we observe becoming very tight on that sort of thing.

Last of all, I don’t expect you to see any of that in detail. That’s most of the reference
installations we have – the oldest one in the place with wonderful name of
Schluchseewerk in the Black Forest down near the Swiss border that has been going
happily for 35 plus years. The one I mentioned in Geneva, that was justified primarily
by the lack of electro magnetic radiation because they were extending the exhibition
space at Geneva and there is a 380kv overhead line and you cannot run electronics
exhibitions when you have a 380kv electric line - so the Sudwest Suisse, I think was
the utility, said ‘lets put it underground, get rid of the radiation and get rid of the
towers as well’.
On Elstree, one of National Grid’s sites, we have had a test length operating within the confines of the substation since 2004. I mentioned the Frankfurt airport project which I was updated on this morning and will go into commercial use next month. It has been handed over to the customer and they have paid 95% so we reckon that they must feel happy that they have a useable asset there. There’s another mega project we are doing in China at the moment as part of the Three Gorges, but that is no way typical of what we have done in GiL.
Allan Provins, eftec

In terms of background to the presentation, I was asked today if I could present on the topic ‘prospects for delivering a sustainable network’ particularly with respect to reinforcement of the network.

So taking that remit, my interpretation is that on one hand we clearly need a reliable transmission network that needs continued investment to maintain the existing infrastructure and also reinforcement and enhancement to connect new sources such as renewables. But we also need to recognise that the reinforcement of the network can have significant social and environmental impacts such as visual intrusion of overhead lines and pylons which has obviously already been discussed quite well today.

I have about 10 slides which I’ll use to run through one particular way in which we can think about social and environmental impacts and how we can perhaps make them a bigger consideration in investment decisions that are made with respect to the future network.

I also realise that my presentation is probably going to be slightly different from what you have seen today already. I have quite a lot of concepts, methods and ideas to run through today. More so than practical examples, but if you bear with me I will get to the practical points at the end which I hope will demonstrate how we can actually take account of these sorts of impacts. I will mostly focus on the visual disamenity elements but the ideas are relevant across all sorts of topics so we could be talking about a number of environmental, health or social impacts from various visual infrastructure projects, renewables, wind turbines, tidal barrages, new roads, new rail, high speed links, whatever - it all applies across there.

And just to start. This is a fairly obvious statement - we know that the productive capacity of the economy is dependent on the various bits of infrastructure we have – so the transport network, communications, electricity, gas, water, waste water and so on. Basically all this stuff is very important and it makes our lives a whole lot easier now that we have it. When it comes to thinking about how to maintain or improve this infrastructure we want our investments to be cost efficient. We don’t actually want to spend more than we have to on these investments, since the resources that we are expending might have other good uses too.

The idea that investment planning should seek the most cost-effective solution or cost minimisation is very important. But, we also want to think wider in terms of sustainable development and it is the case that efficiency, or more correctly productive efficiency, is not the only policy objective we may have. Perhaps we are interested in some other things.

On the slide I have some very cut down versions of what I think are the most recent set of sustainable development goals. In fact it doesn’t really matter if they are not – it is just to illustrate the point that these are the kind of things that we are interested in – employment is obviously a key one, equity and distribution in outcomes too,
protecting, enhancing the natural environment - that is obviously a core element of sustainable development. Productive efficiency comes up in it as well. Plus there is also some notion that everyone can contribute to sustainable development or to the collective outcome through the decisions they actually make at the individual level also. So they are the kind of things we are interested in when we talk about sustainable development.

Cost-benefit analysis (CBA) is the framework within which I am going to talk about how we can explicitly account for environmental and social impacts as part of our investment decision making processes. CBA is simply an investment planning tool that allows us to weigh up the costs and benefits of a particular action. It could be investment in physical infrastructure, it could be a policy to establish something such as a marine protected area, a protected area on land, or various aspects such as that but we will stay with network reinforcement.

Using CBA we can ask questions such as ‘are the costs of putting new transmission lines underground outweighed by the benefits that will accrue in terms of avoided visual disamenity to local communities? And if so, if benefits do outweigh costs, would that change our investment decision compared to a cost effectiveness analysis that is the basis for deciding which technology to use?'

CBA is interested in the outcome of a particular action on society overall, rather than just individual agents within that process, and its purpose is to determine which option generates the greatest net social wellbeing. What we have to do is compare all costs and benefits of a project. And when I say costs and benefits it is not just financial items such as construction costs, but positive and negative impacts – so visual disamenity and other environmental and social impacts should also be considered.

What we are interested in is the economic value of those costs and benefits. We have particular ways of measuring costs and benefits so that all are expressed consistently in the same unit of account, so we can have a genuine comparison of all the costs and benefits of an action. The unit account that we use is money so we have an easy way weighing up what the costs and benefits are and determining the net benefit of a particular action.

For our network reinforcement option, here is a selection of the type of impacts that we may have – clearly there are the construction and maintenance costs associated with the undergrounding of transmission lines. We also need to account for supply and reliability issues. Now I am no expert on this, but there may be a difference in service outages between using overhead and undergrounding so that sort of assessment needs to be taken into account particularly if that’s going to impact on houses and business and the energy they use.

We also have the visual disamenity or amenity impact that we would avoid from undergrounding and there are likely to be some other environment impacts to weigh.
I imagine digging holes in the ground may mean we are going to have some carbon emissions from construction so we would account for those impacts too.

Strictly these impacts would be assessed against some baseline as I implied with that supply-reliability issue, so we are probably looking at these impacts in relation to the difference between the case for overhead transmission lines and the case for underground lines.

I said that we compare costs and benefits in monetary terms. For some of these impacts we have market price information which gives us a good idea of what the monetary value might be, so we call these market impacts. Obviously construction costs come under this as do elements of disruption if there are actual costs to businesses. In practice we may have to adjust these prices so they actually reflect economic values so we remove the items such as taxes and subsidies, but generally it is a very straightforward process and this is the bedrock of what you do in a cost effectiveness analysis.

However we also have to value these impacts which do not have market prices. You can’t buy a unit of visual amenity down the shops so these are non-market impacts. We want to include these aspects in our CBA – so how do we go about valuing them and comparing them to these more traditional financial actual costs? The next set of slides will take you through that.

Let’s be a little bit more precise. Here we have a selection of non-market goods which we are interested in from an environment policy perspective – water, air quality, biodiversity, natural areas and landscapes – the visual amenity aspects, peace and quiet and also elements of health and safety – we will label them Q.

When we are assessing the benefits of a policy or the costs of an infrastructure project, what we want to value is the change in the provision of that non-market good – the change from level Q0 to Q1. That could be an improvement in air quality, perhaps an improvement in water quality, perhaps some impact on local environmental amenity – could be noise impacts, visual impacts whatever. This is all improvement on this slide, but we could equally be talking about deterioration too. What we want to measure and value is the impact of the change; so the change from Q0 to Q1 on social wellbeing.

Just to think a bit more about what we mean by wellbeing. Well we have a typology of ‘total economic value’ (TEV) – this establishes that market and non-market goods generate wellbeing; that is, they confer economic value for a variety of reasons. These relate to the services or uses that are supported by them. To explain it might be better to think about something more tangible than visual amenity, so let’s just take a woodland for example. How might a woodland contribute to social wellbeing?

Firstly, we can manage the woodland sustainably to produce timber, which we can use to build things such as a garden shed or whatever, and that is a direct consumptive use of an environmental resource.
Woodlands are also very popular destinations for our recreational activities; walking cycling, horse riding, etc. Again we have a direct use of the woodland, but in this case it is non-consumptive. We go there, enjoy our walk and leave the woodland intact.

We also know that woodland or trees sequester carbon – this can help mitigate for carbon emissions. They can regulate water flows, help moderate flooding events, provide habitat for wildlife. So there is a whole host of other benefits we also derive from these sites indirectly and this gives us what is known as the ‘indirect use values’.

There is a third relevant use – even if we are not using the woodland today we might want to use it in the future for timber or recreation, so there is an option value, future use value, which we might associate with such a site.

Then we also have benefits that people derive from the natural environment which occur without any direct or indirect use and we term these ‘non-use values’. They are attributed to motivations such as altruistic values - I want others in the current generation to benefit from using that resource, or bequest values – I want future generations to benefit from being able to use that woodland.

Then there is a notion of an existence value whereby I might gain some satisfaction from knowing that a natural resource is simply conserved for the sake that it exists. Overall this typology provides a basis for establishing how wellbeing is actually generated from non–market goods.

What about visual amenity? It probably comes under non-consumptive direct uses. I can enjoy it while I am visiting a recreation site. There is also an indirect benefit from living in a nice pleasant environment, so we want to account for that too.

And finally you can get non-use values associated with conserving landscapes that are iconic – National Parks, Areas of Outstanding Natural Beauty or other scenic locations. These are the kind of things we want to conserve for the future. This gives us an overall idea of how we think about the benefits of visual amenity and how we might value them when we say there is a visual impact, basically in terms of these use and non-use values.

We can actually understand quite a lot about the value of non-market good if we understand people’s preference for market goods.

‘Preferences’ is just another piece of economic jargon. We can understand preferences in terms of what people do – what they choose to do, what they buy in the supermarket, where they choose to go on holiday, what good causes and charities they choose to support and so on. Some of these preferences are expressed in market settings, so whether I buy a Fair Trade product or the Smart Price product, but preferences for other goods such as visual amenity cannot be directly expressed in markets and hence we are back to this non-market issue and the unpriced element. On the slide we have the set of non-market goods again. And here is a set of market goods.
All those market goods have a price attached to them. What we are saying on the bottom of the slide is that the wellbeing an individual derives will depend on the quality and the quantity of the non-market and the market goods that they can consume as well as the income they have as well.

What can this framework tell us about the valuing of environmental goods? What we want to do is look at the relationship between the market good and non-market good. They could be substitutes, so take water and bottled water for example. Bottled water can substitute for poor quality domestic supply or health risks associated with poor water supply. The amount people are prepared to spend on bottled water may infer or tell us quite a bit about how they value consumption of water in a marginal situation. Likewise, the value we place on peace and quiet. Perhaps we can infer that by how much I am prepared to spend on double glazing to avoid something like traffic noise or airport noise. Also we can think about how we value reductions in the risk of injury. Well that might be inferred by how much I am prepared to pay for products which reduce that risk, perhaps a cycle helmet.

So to be more formal, what we want to do is consider is whether the wellbeing received from a market good or non-market good is in the first case substitutable. You can derive the same welfare or the same wellbeing from one or the other - the bottle of water example is that case. We have methods such as avertive behaviour, defensive expenditures - I won’t go in too detail as they are probably not of that much relevance to visual amenity.

Then we have complementary relationships - I need to consume both the market and the non-market good in order to derive the benefits from the non-market good. The example in this case is the time and travel expenditures that people incur when visiting natural areas (e.g. National Parks, AoNBs, etc.). Here we can use the travel cost model method.

There could also be an attribute relationship between the non-market good and the market good. The classic example is the property market and demand for houses. Local environmental amenity, visual amenity, noise - all these elements are characteristics of a property. When I go to buy a house I am consuming all these things. So we can infer from the demand for housing - if we can control for all these effects - the value of these environmental attributes. The method we use for this is called hedonic pricing.

There’s a further method too, which utilises the same sort of relationship and it looks at the choice I make between visiting different recreational sites (as opposed to a single recreation site). If I can control for the environmental quality of these sites then I can also infer the value of them via recreational demand models.

So that is a suite of methods we can use to value environmental goods and this grouping is known as ‘revealed preference methods’ - they exploit the relationships that exist between market and non-market goods.
The good thing about revealed preference methods is that they are based on hard data. They use the choices that people make - you can observe those choices, get that data and infer the value from them. Therefore they are a sound basis for valuing non-market goods. However there are also some non-market goods where we simply don’t have this relationship or don’t have the data - biodiversity is a good example of this.

In these circumstances we have another set of methods and these are called ‘stated preference methods’. The basic idea with stated preference methods is that we specify a hypothetical market and use surveys or questionnaires to ask people to trade-off monetary amounts with changes in the provision of non-market goods. The two most common methods are contingent valuation and choice modelling.

If I was valuing visual amenity impacts, I would start off thinking about whether I can use hedonic pricing - this would allow me to estimate the use value impacts to communities affected by overhead transmission lines, in terms of effects on house prices. That obviously will only capture residents or local communities and clearly there will be a proportion of the population that could visit sites affected by overhead lines. These individuals would not be captured in a hedonic study, so we may also need to think about the travel cost model or recreational demand models too. But also if an iconic site is impacted we also need to consider non-use values. The only methods that can only capture non-use values are stated preference techniques so again there may be a case for those too.

Stated preference methods can also capture use values so there can be overlap between these methods. Overall the implication is that we need to think very carefully about which valuation method to apply, what elements of total economic value are to be estimated, which population groups are going to be captured within any study, and where it fits into the overall CBA framework and the investment decision process.

What about some actual examples? There aren’t too many studies that have looked at disamenity impacts of transmission lines and those that do have looked at high voltage lines.

We do have a hedonic study – Sims and Dent. This looked at properties in Glasgow. We don’t need to go into the details of the study but the basic results were that selling prices for properties that were within 100m of the transmission line were on average 12% lower than those that were further away, and for properties that were within 100m of pylons - well they were affected even more, with an average 21% reduction in price. They also found a ‘distance decay’ in values, and beyond 250m there was no discernible effect on house prices. And that’s a typical result that we see.

Some caution on the results you are see here. They are context specific so whether the actual values and results hold in different contexts is a key issue. I would not say they are generally applicable results but they are of interest certainly.
We also have a stated preference study. Day *et al.* used a contingent valuation approach. Respondents were sampled from a range of households from 500m to 5km away from transmission lines. They estimated the value of the amenity impacts on households was in the range of £60-80 per household. That’s a one-off amount. They also find that willingness to pay declines with distance and there is no actual significant difference in impact between whether it is a rural household or an urban household.

A further study by Atkinson *et al.* actually is based on the same survey as Day *et al* but they report on a different aspect of that work. They looked at the design of pylons and whether visual amenity would be impacted less by alternatives to the common lattice design. They found no strong preference between the differences in designs. So one interpretation may be that there is actually not much you can do to mitigate the visual impact of the pylon once it is there. Different designs do not really make a difference.

A more recently reported study comes from Norway (Navrud, 2008). They report CBA results for a 3km stretch of line in Oslo and found that the benefits of undergrounding those cables outweighed those costs. Being a city though, quite a few households were affected, so the aggregate result is clearly dependent on the scale of that affected population.

Just to say also that these methods are applied in other areas. I’ve picked out transport here. Results from Bateman *et al.* (2004) – a hedonic study - are used as part of the Department for Transport (DfT) appraisal guidance for valuing noise impacts of road schemes. This is an example of where economic valuation methods are used day to day in Government or investment appraisal. DfT also looked at landscape impacts in a study which we have done for them (eftec, 2009).

Ok, a bit of change of tack. This is the ecosystem services approach – you may have heard of it. It is a developing concept which aims to draw together various strands of environmental science, economics and social sciences to establish a consistent framework for thinking about environment management and policies.

Initiatives include the UN Millennium Assessment, the more recent Economics of Ecosystems and Biodiversity (TEEB) and the UK’s current Natural Ecosystem Assessment. This is an area that Defra is working on to incorporate environmental impacts and sustainable development in policy-making.

Basically the approach is about recognising the benefits people get from ecosystems, making use of the TEV concept. It gives us a classification of all the goods and services the natural environment might provide to us. Some of this is repetition but we have provisioning services; the natural environment provides things such as crops, food, water, and timber. If we develop ecosystems we might lose those services. It also provides regulating services, so again climate regulation, flood mitigation, etc. Visual amenity - this comes under the categorisation of cultural services.
All of the provisioning, regulating and cultural services are underpinned by these supporting services and biodiversity. Within the ecosystem services classification we can identify all the various elements with market and non-market benefits, so it is perhaps a more comprehensive way of looking at some environmental impacts.

Finally to conclude - what I intended to do was to set out to you that we have the variety of methods and tools within the cost benefit framework that allows us to take explicit account of environmental and social impacts. Economic valuation and CBA is only an input into the decision making; we don’t make decisions on the basis of CBA alone. There are a lot of other considerations but CBA is a nice way of weighing up explicitly costs and benefits and trade-offs between the different options.

There are practical challenges which I’ve not covered much at all; I’ve mostly focussed around data. These relate to the actual application of methods and also the scientific and technical understanding of environmental impacts.

One thing that is often raised in relation to the CBA and valuation approach is the ethical concern; the environment is priceless, you cannot put a monetary value on it. Which is true, but that isn’t what valuation is doing; rather we are looking at relative and marginal changes in the provision of some sort of quality or quantity benefit which is derived by affected populations – not the absolute value on the environment. Moreover we know these trade-offs are made; we don’t spend everything we can to reduce health risks; we don’t spend everything to reduce pollution and environmental degradation. CBA just makes these trade-offs explicit, which I think is very important.
Afternoon Round Table

Q: Tim Yeo MP: It’s clear that there are increasingly sophisticated methods of measuring the costs and the benefits of all alternative transmission choices. Could I ask DECC and Ofgem what the obstacles are now that we are going through a process of looking at pricing, it seems a rather timely opportunity to consider whether we could reflect these costs in the pricing mechanisms in the future. What are the difficulties about trying to do that?

Tom Luff: From the DECC side. I thought that was really useful and it shows that these things are not static. I think a long time ago we didn’t have Environmental Impact Assessment and actually I think a lot of the stuff we talked about just now is an extension of that thinking of bringing in additional understanding of costs and benefits and I think that is really good. I think that can continue to develop and I think that is developing. In terms of how we measure some of the costs I think, just going back to this study, the KEMA & IET study, I think that is going to be a really useful way of understanding some of those costs and getting sort of that common ground to understand going forward. That’s said in terms of the planning process, I don’t know in the regulatory process…

Iain Morgan: I agree it is the right time to do it and it certainly should be part of the putting together of the business plan from 2013 to 2021. I think the difficulty is that actually it involves both the regulatory price control but also the wider policy context because these issues where they compare the interests of one set of consumers with another, there isn’t really the mechanism in the regulatory decision making to decide between one or the other so I think it has got to be…that’s where the revenue is established and the outputs are established for the transmission network, but I think it’s got to reflect the Government priorities on planning in that set because that’s where that judgement has got to lie. So there is room for it for it now to be part of the regulatory framework but then it feeds into that wider process so that’s why we need to work carefully together.

Q: Kathy Pollard, Suffolk County Council

I was very interested to see the difference in the costs for the GIL system compared with those that we have heard previously from National Grid and the difference in the smaller effect of the electromagnetic field, length of life and heat generation is quite a different picture from that which we have been lead to believe is the case and a much smaller trench if that’s put in rather than in a tunnel. So I am really wondering if, I presume, this is being taken into account by the IET/KEMA study about what the costs are but it’s kind of news to me and thank you to the organisers today because I have learnt a lot.

Q: Peter Gowan, South Suffolk
I also was very impressed by information on the GIL system. What I would like to say is we are always being bombarded, practically every meeting by the massive increase in cable compared to overhead line. This is totally misleading in my opinion. What should be taken into account is the cost of the generation that is feeding that line, the substations at the start of the line and the substations at the end of the line. Can I ask the powers that be that they take this into account when looking at the cost effectiveness of cable over overhead line.

**Q: Ashley Thomas, Board of the National Association for AONBs.**

This is an absolutely majestic assault on our landscape and one gets a horrible feeling that our countryside is dispensable. If we can’t protect our protected area then what hope is there for other quality landscapes? Sections 85 and 63 of the CROW Act applies in this respect only to Ofgem – it does not apply to National Grid, nor to the generators. So it is Ofgem really that carries a considerable responsibility in terms of its obligation to have due care for protected areas. What demand or encouragements does Ofgem exert on the National Grid to research or innovate in this respect. Indeed how much does the Grid spend on research or undergrounding?

**TL:** On the first one about cost effectiveness on the cables side I think best to pass over – I am pretty sure that you guys have been involved in the study.

**Colin Johnston:** Yes, as some of you will know I did a pretty similar presentation at the IET/KEMA event on the 9th December. Therefore this information should be taken into account of in the report they produce.

**TL:** On the Ofgem responsibility on innovation, earlier we spoke a bit about the Innovation Fund so there is money that Ofgem asks companies and requires companies to put into innovation. I think as Iain was saying the new RIIO framework has a particular focus on innovation so it is certainly something that we think is very important. On the actual cost of how much National Grid actually spends on innovation – if there are any National Grid people still here they might be able to help… I must admit I don’t know the figures there. Iain is there anything you want to say?

**IM:** Ofgem, across all the licensees who are regulated across the industry, we have worked a lot harder with them to report more about their environmental impact and then consider the issues of the impact and I am aware of some of those specifics of obligations, of a range of duties, but I take that on board.

In terms of the new price control, which is central to the decision making in terms of transmission networks going forward, sustainability will be a fundamental part of the costs and benefits that should be considered in the business plan in a way that perhaps, at least the perception of different parties was, that it wasn’t in the past. But it will be important for stakeholders to work with National Grid and encourage them to develop their plans in that way. So in terms of looking at the substations at the beginning and the end it is important to make sure that they are encouraged to do that, so that it is clear that if they weren’t to do that in their plan we would be able to
see that in the justification – you know “why haven’t you done this, when such and such has raised that point?”

Q: Chris Leney, Bury Not Blight

We had a slide in that last presentation that said that 21% of the value of your house would be wiped off if a pylon went within X meters. Something I would plead with DECC and Ofgem - whoever has the ability to look at it – to look at the compensation provisions. At the moment you can have a pylon there right past your house and the legislation is such that you will not get a penny of compensation and that’s really something that does need looking at generally. Hopefully National Grid will have taken note of the comments and everything else and decided to put everything underground but no doubt they have got their own box of tricks and they tend to tend to use that box of tricks every time. But do please look at compensation though as it is a major issue

Q: Graham Lamburn, Powerwatch

One thing that has come up a few times is the exceptionally higher cost of undergrounding compared to overhead lines. Now I have noticed there are an enormous number of people here that are elected to stand for their members of public, who seem to be saying there is an enormous amount of concern among the general public that these power lines are going up. We have now heard that from one of the delegates earlier on that actually if this cost was put on to the consumer it may be in the region of £1 per household per year to cover the cost of undergrounding these installations. If that is the case what White Papers or research have Ofgem commissioned, or at least read and digested, that give evidence that the public is unwilling to put this £1 on to their bill to make sure these lines are undergrounded, because none of this has been referenced so far.

Q: Ruth Chambers, Campaign for National Parks

Following directly on from that I sit on the Ofgem Price Control Review Forum and I have asked to give a presentation at next weeks forum about willingness to pay and designated landscapes, because we think there is a significant gap in the research. Following on from that speaker, so that’s something that we hope DECC and Ofgem will directly respond to and commission urgent research on this.

My question very briefly is to Siemens. Fascinating presentation – thank you very much for it. In relation to the various challenging scenarios that you have had painted this afternoon in terms of connection, are there any technical reasons why your technologies that you presented to us could not meet those challenges, setting aside local circumstances which are going to be different in every case. But say for a new line across the Somerset levels, which you heard about this morning, or for connecting the new nuclear power station via a subsea cable is there any reason why your technologies could not be used for that?

CJ: Short answer is ‘no’. I said earlier on while some things remain to be done and developed and Steve mentioned some of them in particular, we are pretty confident
that those can be done at at least the rate at which things are going to find us a sensible way forward, so I can still give a ‘no’ – there are no reasons why, unless something came up far far quicker than anybody ever expected it to.

**Steve Aughton:** I would agree with that. I was just thinking, pointing back to my presentation, there are current technology restrictions. There is a limit in some cases to what we can do now particularly in terms of VSC technology, but Colin’s right, technology will develop and hopefully will keep pace with the requirements that are put upon us.

**CJ:** Very brief further comment. Piloting a technology at transmission level can be quite a brave thing to do and out of Ofgem, DECC and other parties it would be very welcome to see an increased push towards being able to do that. I would say nobody wants to pilot a technology even if it is 35 years old like the one I spoke to. People are very reluctant to put in say a 10 kilometre length on our National Grid or ScottishPower network, whatever, unless there is some kind of backup arrangement. That’s human nature although coming as supplier you don’t need to because we have had this for 35 years.

**IM:** Just in relation to the points made around the cost of undergrounding. Firstly I heard the points made this morning. The transmission network element of the overall consumer bill has been around 3% but I would very much endorse the comment made by I think National Grid earlier, and based around our own data as well, that it is likely to increase and that increase is substantial and you are talking a billion pounds worth of increase over a control period, so I don’t think that suggests we should discount it, but it is fair to say we should look at willingness to pay and I think Ruth will back me up on this - at the last PCRF and I suspect from what she said at the next one as well, there will be a bit of a debate around this because it was useful to have both sides of the argument, because we had the moderate and large users of electricity saying actually one, we are not sure for how much of the network we are requesting an increase and probably two, we are not sure if we are willing to pay for this, so you are going to get the debate which is good so you can take the thing forward.

In terms of research I would question whether…certainly at some stage we do need to keep the research updated. There was a lot of research done at the last Transmission Price Control Review 5 years ago and I think there is scope for more but it is who does it that and at what stage. The way the regulatory framework is it is probably something that we should be encouraging National Grid and the other transmission owners to lead on and develop.

**TL:** On compensation provisions, I think this is a very important question. So far it tends to be individual companies at their discretion if they want to ensure that they can make sure that their project is more likely to go ahead, then they are more likely to compensate. I don’t think there’s a very clear overall policy on whether we should be encouraging that kind of compensation or not. It goes wider than just transmission – it goes to all areas of infrastructure and it could well be something that is picked up
in the localism discussions, in the Localism Bill, later on in the year, but I certainly see it as being something worth considering more.
Tim Yeo Closing Remarks

Just to summarise, I think that it is clear from the day, as most of us knew, the concerns about what is proposed are very widespread and very deep.

This is not just nimbyism, these are decisions that have an impact on the landscape for 50, 60, 70 years and what appears to be the assumption from National Grid is that technology which was considered appropriate 70 or 80 years ago is sustainable, right, for the 21st century. I don’t think that’s a view that is very widely held by the populations who are going to live with consequences of that.

I believe that we have learnt a lot about some of the alternatives. There have been serious questions raised about the cost of these alternatives - which may be less than some people have suggested in the past. I think there are some new technologies which could be harnessed to advantage.

I personally have a real difficulty understanding why, now that we realise we have got to move to low carbon forms of electricity generation (most of which are more expensive than the old high carbon forms), that the cost of the actual generating process we accept requires some sort of subsidy. Whether that comes from consumers or tax payers makes very little difference as those categories almost entirely overlap. What we do not yet accept, however, is that the new transmission capacity that clearly is needed is not going to be treated in the same way. There is a real irrationality there and I and the other MPs are concerned about this and we are very grateful to work in close cooperation with our colleagues in local government as well.

I am sure we are not going to let this argument drop. Each time I have a discussion like this the momentum is building. I certainly feel even more strongly than I did this morning by what I have heard today and I am rather encouraged by quite a lot of what I have heard.

There is an opportunity, given that we are going to renew or increase a lot of our transmission capacity, to do so in a 21st century, sustainable way and it will be scandalous if we allow some convoluted regulatory structure, or the short sightedness of the companies responsible for this, if we fail to do the right thing by the next three or four generations.

The concerns exist, the alternatives exist, the opportunity is now with us and I hope that all of us will go away from here even more strongly motivated to make sure we seize this – what I think is – a real opportunity.