Public

"Navigating the Future: Understanding the Role of the National Energy System Operator (NESO) and Addressing Contemporary Energy Challenges."

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I wonder if anyone in the audience knows the relevance of the number behind me? (95%)

As much as I'd like it to be, it's not Ireland's chance of winning the 2026 World Cup.

Actually, this figure is something incredible - it's the current record for operating the electricity system at zero carbon in Great Britain, which was achieved at the end of last year.

At NESO, this number means a lot to us, and hopefully I can convince you why I should mean a lot to everyone in this room, because it shows that when the energy industry works together, when we are focused, when we prioritise innovation and competition, when we do things differently, we can make the seemingly impossible – possible.

And what I'm here to talk to you about today is exactly that – the challenges ahead and how, if we work together, we can tackle these head on and succeed.

30 years ago, Great Britain was running on fossil fuels, where a small number of large power stations served the needs of society and the economy. That was the way of life since the industrial revolution and it continued for some time as Great Britain moved through the ups and downs of economic growth. But history tells us that Great Britain has always been an innovator - that it doesn't like to stand still - and so it was during the early 2000s that Britain decided to do things differently by taking a globally leading role in decarbonisation.

I know many people in the room today were a part of that change and let's be honest – it wasn't easy. It required transformational changes to the electricity market that received a lot of pushback, it needed bold Government and regulatory support and a risk appetite that embraced new renewable

technologies, alongside an energy sector working together to deliver real progress.

Now I'm not here to give you a history lesson – this is the Future of Energy lecture after all – so let's fast forward to the present day. In August last year fossil fuels were less than 20% of our generation mix and then in September the last ever coal fired power plant closed – a source of energy in this country since 1888.

Not only this, we recently achieved a new wind record of 22.5GW – 4 times higher than 10 years ago and enough to power over 20 million homes – a world away from not even being a source of generation to the grid just 30 years ago.

What that means, and shows, is that GB is now home to one of the fastest decarbonising economies in the world and the fastest in the G7

But there is more, much more, that needs to be done.

So, over the next 20 to 30 minutes, I will go into the establishment and role of National Energy System Operator – or NESO - the new public corporation at the heart of GB's energy system; talk about the advice on clean power we provided to government only a few months ago and then discuss the importance of strategic planning, connections and reforms to the market arrangements, all of which together will ensure Great Britain has an energy system fit for today and the future, designed, configured and operated to serve the needs of society and the economy.

So lets start with NESO and who, or what, we are.

As many of you will already know National Energy System Operator, or NESO as we like to call it, is less than a year old, born out of the National Grid Electricity System Operator in October last year to help take a transformational step forward in how our energy system works …. and that's not just a change of logo or the adding of an 'N' – it is a complete reorientation of what we do and how we do it.

Now I'm anticipating people are asking questions about why NESO is different and what it's about. It isn't just about one company & purpose, two licences, three statutory duties, four offices, five roles, six strategic priorities, seven layers of cyber defence, eight areas of activity […… and a partridge in a pear tree]

NESO is in fact special because it brings all of this together - it joins up previously siloed thinking and enables a whole system approach and it is open and

transparent, especially as we engage across our entire energy ecosystem as we look to help consumers, society and the economy navigate the transition to clean decarbonised energy, that is safe, secure and reliable, in a way that is affordable and fair for all.

Our work may be invisible to most, but its impact touches every home, school, hospital and business.

Our new ability to look across energy vectors, including gas, hydrogen and electricity when planning the future of our energy system will significantly enhance energy security, improve affordability and help speed up our decarbonisation efforts.

Let me be clear, we are not here to control everything and make every decision like a some soviet era all-encompassing plan. We are here to help coordinate, to collaborate and to listen to stakeholders across society to develop and deliver plans that are in the best interest of every part of Great Britain.

One of the first things we were asked to do as NESO, as part of our new role to provide independent advice to government, was to assess whether it was possible and, if so, what it would take to get to Clean Power by 2030.

We started by defining what clean power meant – in essence it was defined as where more than 95% of GB's generation was from clean sources and we generated more clean energy over the year than the total system demand – the difference being exports.

I understand that some of you in the room today may believe it's not possible, but our analysis shows that it is.

The scale and speed of change that is required is huge and will undoubtedly be challenging, and it will undoubtedly need us to do things differently and frankly it will not be easy. It will take a Herculean effort.

It will require delivering first-of-a-kind technology, speeding up the planning system to build the required infrastructure and looking differently at the regulatory approval process.

It will require tripling the amount of wind generation and solar generation, quadrupling the battery storage and utilising demand flexibility at scale.

What is clear to me is to achieve clean power in 2030 we're all going to have to do things in ways that haven't been done before, in timeframes that are significantly shorter than we might have envisaged just a couple of years ago.

Not only this, but as demand ramps up in the future, as we electrify household heating, as people drive more electric cars and as new technology such as data centres become widespread, demand will increase in the years after 2030, meaning we need to set the system up on a sustainable trajectory – this is not a sprint to 2030 that stops there – our energy system will need to continue to evolve and grow to meet the needs of society and the economy.

But getting this right is important – I and everyone at NESO know that Britain can only be successful if it can grow. And to grow it needs secure, affordable and sustainable power. Power to meet the demands of data centres that carry the information we use; power to drive new and existing businesses that will create jobs across Britain; power for people in their homes to enable them to do the things they want to do – when they want to do them.

What gives me hope is that in a short space of time, I've seen clean power technology move on significantly to be cost competitive or cheaper; batteries are mainstream, hydrogen and carbon capture and storage are getting closer to being commercial; we're seeing huge advances in A.I. and we're enabling greater levels of demand side flexibility.

and …. looking at some of the specifics of the 2030 Plan - work is well underway – there were 88 transmission infrastructure projects identified – 85 of these already have delivery dates before 2030 and work is underway to advance the remaining three. On connections – there are enough projects in the queue today, with connection dates pre-2030 to meet the requirements needed for the plan and later this year we hope to operate the system for a period of time at zero carbon using only clean power sources, showing that a decarbonised system is not only possible, but is on the horizon.

.. as I said earlier, we've achieved great things together already – but for Clean Power by 2030, we're going to have to do more and do it quicker – as I said earlier, a Herculean effort.

However, as we decarbonise to achieve clean power, we need to remember that at the end of the day it will be consumers paying for it, and minimising costs must remain a key focus for all of industry and for us at NESO.

For several years clean power technologies have been delivering power at a lower price than fossil-fuelled power, reflecting the fantastic progress and technology advancements over recent years as technologies such as wind, solar and batteries moved rapidly up the learning curve and down the cost curve.

More recently, tight supply chains and interest rate rises are creating headwinds, but it remains true that clean power is cheap power.

That of course is only part of the story. We also must be clear-eyed on the wider system costs that come with clean power – building the needed grid capacity, ensuring security and resilience through more storage or back-up capacity - all need to be factored in.

Our clean power analysis showed these broadly offsetting to 2030 – with the avoided cost of burning of gas effectively offsetting the additional capital cost of the new clean infrastructure and then with scope for bills to fall as legacy policy costs fall away.

Different assumptions could alter that conclusion by a few pounds in either direction of course. Importantly, as we become less reliant on gas supplies influenced by global markets – and indeed by unfriendly dictators - the sort of price spikes and bills shocks seen in recent years will become a thing of the past, delivering greater energy independence, and energy security overall, for Great Britain

Taken alongside the opportunities for local economic development and growth – which we must make sure we capture – that seems a pretty good deal to me.

Looking further ahead and beyond 2030, the development of the Strategic Spatial Energy Plan – or SSEP – will be central to the GB energy system as it involves spatially planning, for the long-term, new electricity, gas and hydrogen infrastructure for the first time ever in Great Britain.

We have seen in recent years that the system can seem at times disjointed, with generation being planned in isolation from the impacts on the networks, leading to delays or more constraints or inefficient operations with some of this leading through to additional costs for consumers.

We have the opportunity now to fix this and this is the objective for the Strategic Spatial Plan. To plan the energy system in a joined-up way – thinking about networks, with generation, with demand, with storage, with flexibility – bringing it

all together to get the right answer to support growth, to support the economy and to deliver secure, clean affordable energy to homes and businesses across the length and breadth of Great Britain.

And I want to be clear that this is not planning over, or instead of, markets. This is planning and markets, working together to get the best of both worlds.

A good spatial plan will allow us to build the network where we need it, when we need it; it will provide strategic direction and the clarity needed to enhance competition and enable markets to do what they do best - innovating, cutting costs to meet customer demands.

Working hand and hand with the development of the GB-wide strategic spatial energy plan are Regional Energy Strategic Plans – a concept where NESO will work in and with nations and regions across Great Britain – from network companies to local authorities and key stakeholders to develop energy plans tailored for, and specific to, their area.

I believe that these regional plans will accelerate progress as they will have buy-in from the communities they cover, and when you step back the combination of national and regional plans which interlink with one another will deliver the overall GB-wide ambition in the best interests of society and the economy.

As we develop these first of a kind plans there is need for us to engage with a much broader range of stakeholders than before. Previously, when we were the National Grid Electricity System Operator, we tended to be very industry focused. However now, to get societal consent and input to the plans we are developing, we need to speak to a much wider range of organisations across society – all of which have varying levels of understanding of the energy system. This is something that, for an organisation that was traditionally full of engineers, is a challenging internal transformation. We are getting out of our ivory tower, we are listening, we are brining external perspectives and the voices of customers into the heart of our decision making – for example we are extremely proud to have strategic partnerships in place with Citizens Advice and Citizens Advice Scotland.

Whilst we are engaging much broader than ever before, we are also building trust in our processes and decision making. While it is self-evident that in developing our plans there will need to be trade-offs, and in some cases, winners and losers from that process it is very important that industry, society and

stakeholders trust in the process of what we're doing and that we're going about it in a rigorous and open manner.

As part of this we need to make sure the public are aware and consulted in a meaningful and engaging way, giving them the full context of what we are trying to achieve.

A vital part of planning for the future energy system – through the Strategic Spatial Energy Plan and the 11 Regional Energy Strategic Plans – will be the connections reform programme we are undertaking.

As most of you in this room will know the connections queue has become unsustainable. We currently have a queue of projects wanting to physically connect to the grid amounting to almost 800 GigaWatts – more than double what's needed for 2050 and four times what we need for 2030.

This was an unstainable position. Working with the sector, Government and Ofgem we have set out reforms to move away from a first come first served model, to a first ready first connected scenario, prioritising those connections needed to achieve clean power in 2030.

After over a year of industry engagement and consultation, the reform proposals have been agreed by Ofgem and today we are entering the implementation period where, through the rest of this year we, working with the Transmission and Distribution companies, will re-evaluate, re-stack and re-issue over 8,000 connection offers.

This reform will finally end the long delays, remove projects that are not needed for the system or those that never intend to come to fruition – the zombie projects. All of this will deliver a queue with projects that want to move forward, have demonstrated they are ready and able and have clear committed dates that support their development and delivery on-time onto the system. This is a once-in-a-generation change to the connection queueing system to get it fit for purpose, and while there remains a huge amount of work to be done this year, I am confident that it will deliver better outcomes overall for GB plc and ultimately for consumers.

Whilst we work towards designing the system of tomorrow – and, as I have outlined, we have new processes in place for strategic energy planning and getting to a fit-for-purpose connection queue – the question about the most appropriate market arrangements remains the subject of debate.

While there is a general consensus that the current market arrangements are not fit for the future and reform is needed, this unfortunately is where the consensus ends – there are very differing views on what the right arrangements should be.

The current arrangements – where there is a single national price, and the system operator acts as a residual balancer - are not working. Constraint and system costs are rising, and developers are not getting market signals that incentivise them to operate in the right way or locate in the right place. Further, as system operator we are having to intervene the market with increasing frequency – undermining the basic premise of a bilateral self-dispatch market where participants can set and manage their own running and physical position.

While the overall market arrangements consist of many elements – from wholesale pricing to capacity markets to contracts for difference to network charging to ancillary services – the debate has focused on the wholesale pricing mechanism and whether this should incorporate a locational element through what has become known as 'Zonal Pricing' where the price would vary in different regions or zones depending on the actual real costs of meeting energy supply and demand in that region. The alternative is to keep a single national price and reform other elements – termed the 'Reformed National' approach.

Although there are merits to both systems we have been clear that location is an important element in the wholesale arrangements and the operational efficiency realised through a locational set of arrangements of zonal pricing, could deliver significant benefits to consumers.

This belief is born out of our experience as the system operator and analysis conducted by Ofgem, DESNZ, Citizens Advice and others. All of this points to very significant benefits to consumers of a move to zonal pricing – the quantum varies depending on assumptions, but in all cases it is very material and generally in the range £30-50 billion in the period 2030 to 2050.

A zonal market would improve the utilisation of flexible technologies, such as storage, interconnectors and demand side response and reduce the need for the system operator to intervene in the market.

A zonal market would also incentivise developers to site where they provided the most system benefit and not behind constraints and it could also encourage business to locate to areas where there is an abundance of cheap clean energy, fuelling growth across Great Britain, especially as businesses electrify.

But of course, we recognise that there are other - often strong! - views and that the Secretary of State is balancing difficult competing objectives. We've also seen the eloquent arguments made by stakeholders for a reformed national system and in particular the impact a move to zonal pricing would have on the cost of capital. Undoubtedly, any such change would represent a significant shift and the impact on investors and investment needs to be considered – not least because delivering Clean Power requires very significant levels of investment in generation infrastructure.

Unless these issues are properly addressed it could lead to costs of capital increasing which could offset some of the benefits derived from the move to a new pricing arrangement.

In all of this it is important, as I mentioned earlier, that we don't just look at reform of the market in myopic way, focusing only on the wholesale pricing mechanism, but that we consider reform of the full suite of market arrangements that investors face to truly get the best result for the market and for consumers.

For all of these reasons, the ultimate choice on any market reform is rightly for the elected Government, and NESO will work with whatever system is decided on, managing the system to the best of our ability with the tools that are available.

With all of the change happening around and ahead of us, whether that is strategic and regional planning, connections or market reform or the myriad of other work NESO is doing, at the heart of it all of this is security of supply and operability of the system.

Each day, hour, minute and second, engineers in our national control room are managing the flow of electricity across Great Britain, from the tip of Scotland down to Lands' End, carefully matching supply and demand, making sure we can go about our daily lives uninterrupted with the power we require.

Ensuring security of supply resilience and operability is critically important for NESO, and we have all seen with the blackout in Spain and Portugal, and in GB

with the impact at Heathrow of a fire at a substation, that we cannot take resilience or security of supply for granted.

With our energy system continually changing we need to continually update and adapt how we manage the system ensuring resilient supplies today and security and adequacy of supply into the future.

To give you an example of what I mean on how we are changing how we operate the system, traditional large power stations connected to the system provide inertia which helps maintain system stability. As we move to clean power sources, such as wind and solar, there is less of these power stations and thus they are providing less inertia.

We therefore need to actively manage inertia in a way we didn't before.

NESO are leading the world in this area, and were the first system operator to monitor inertia in real time and we now have not just one inertia monitoring system, but two.

We have also delivered a world-first pathfinder programme to procure inertia as a stand-alone service with new facilities now commissioned onto the system – from flywheels to one of the world's first grid-forming batteries in Scotland, providing all the stability characteristics that were once provided by the traditional power stations. This work means that we can decarbonise the system safely and securely.

As the system continues to evolve, we will evolve, and I can assure you that we will always make sure we can operate the system at all times securely.

I think we can all recognise there are challenges ahead, and we will only succeed on achieving a sustainable and secure system, with prices that are fair and affordable for all, if everyone – industry, society, Government and regulators – continue to work together to address the challenges we will be faced with.

However, working together, we can achieve the goal of providing a secure, cost efficient and sustainable energy system of the future that serves the needs of society and the economy.

Thank you very much for inviting me here to present to you and I am happy to take questions.