

Dear Secretary of State

I was honoured to be asked to investigate and report on how to accelerate the deployment of strategic electricity transmission infrastructure in Great Britain. I am delighted to present my findings and recommendations after nine months of work supported by Energy Systems Catapult (ESC). Our recommendations cover every part of the process and can be regarded as an integrated programme of reform.

Speeding up the delivery of strategic transmission is both vital and challenging. We should celebrate the extraordinary progress that we have made in developing offshore wind generation and our ambitions reach much further. To deliver 50GW of wind power and 24GW of new nuclear will be a major step towards decarbonising our economy and providing customers with clean, secure, affordable electricity, but that magnificent achievement will be wasted if we cannot get the power to homes and businesses. The implications of being able to build wind generation faster than the associated connections to customers will be serious: very high congestion costs for customers, and clean, cheap domestic energy generation standing idle, potentially for years.

Currently, the expectation is that strategic transmission may take twelve to fourteen years from identification of the need to commissioning. Very few new transmission circuits have been built in the last 30 years and a dramatic increase will be required through to 2050, so even these long timescales may be challenging to meet if we fail to streamline the process. Substantial wind generation can be built in half this time. So, the challenge to me, set by the Secretary of State at the time, to reduce the timescale for building strategic transmission by three years, and ultimately by a half is the right one. I believe that we must hit the more ambitious end of this and reduce the overall timescale to seven years. I am confident that this is achievable.

The current process is complex and involves many different parties. The need case must be identified and evidenced, it must fit into an integrated network design and the overall energy system. Regulatory approval must be gained, a detailed design must be agreed, affected individuals and communities must be consulted and listened to, major orders for specialised high voltage grid

components must be placed with equipment manufacturers that already have full order books, and a large skilled workforce of engineers and technicians must be mobilised to plan, design, build, commission and connect these new assets into one of the most complex electricity transmission systems in the world. Every part of this process must be, and can be, dramatically improved. Many significant improvements have been introduced in recent years and my recommendations support and seek to build on this excellent work. The recent changes still leave a process with many unfortunate attributes. We don't have a settled, strategic, efficient and timely process for identifying need for new transmission assets. The regulatory process has evolved from considering individual transmission lines to groups of them, but it is not settled, streamlined, regular and operating at a system level. It still adds uncertainty and significant time to the process – this is time we cannot afford. The planning process is where individuals and communities can influence the plans and where planning consent is delivered through the Electricity Act of 1989 in Scotland, and the Planning Act of 2008 in England and Wales. Currently each application appears before individuals, communities, the Planning Inspectorate, local authorities, and national governments with little political or engineering context being established previously or at a system level.

The Energy National Policy Statements (NPS) are badly out of date and offer little guidance as to national engineering and environment priorities and trade-offs. There is no long-term spatial plan to demonstrate the position and need for a new line within the integrated system. There is no agreed and public guidance as to how, where, and why lines should be onshore or offshore, overhead or underground, lattice pylons or novel designs. There is no agreed and public guidance on how system design should balance different environmental benefits and costs and how to trade-off global, national, regional and local impacts. Is it so surprising that such alarm, emotion and controversy is aroused by the schemes? And is it surprising that developers find the process long and laborious when every aspect must be evidenced and argued from scratch on every proposed line? It would be amazing if the Planning Inspectorate and statutory consultees were not overwhelmed by this volume of work, and the number of applications is set to soar in the next few years. There are no agreed and public rules or guidance on community benefit, so affected individuals and communities are confronted with infrastructure proposals that are difficult to

understand and may bring detriment to their lives. And when developers have negotiated all these challenges, they then need to secure complex, high specification assets from a supply chain that has a vast increase in orders as the rest of the world travels a similar path to Net Zero. In particular, high voltage cable and HVDC equipment look likely to be in short supply for years or decades. And the numbers of highly trained engineers and technicians required to manage the end-to-end process to deliver the new electricity system will be large. Professional engineering institutions in the UK have long reported on an engineering skills gap. This is likely to haunt this vital programme of work unless we invest heavily and quickly to create a new reservoir of talented staff in the UK.

Faced with all the above, this report seeks to be bold. We do not lay out a detailed plan to reduce the time by three years. This would remain too long when wind farms can be built in five or six years. Furthermore, some degree of anticipatory investment will be required, and this will inevitably pose a new risk of suboptimal asset choices being made. These risks will be minimised by taking transmission investment decisions as late as possible. So, halving the timescale will in itself shield customers from risk as well as getting clean, affordable and secure energy to them earlier. A double win.

In this report from me, I shall describe the principal areas of recommendation. These are supported in detail in the accompanying report from Energy Systems Catapult and more detailed recommendations are contained there. Many stakeholders commented on difficulties around the connection queue, physical local transmission connection constraints and distribution connection delays. This work does not address these issues directly although speeding the build of strategic transmission may assist somewhat in resolving these difficult issues.

The associated ESC report includes a brief discussion regarding the institutional arrangements for delivering the new electricity system. Further work needs to be done to define with crystal clarity, the roles and responsibilities of the various parties under the proposals, in particular, the Government, Ofgem, the Future System Operator (FSO), and the Transmission Owners (TOs).

**Recommendation 1**

The FSO should be established quickly and be responsible for producing a Strategic Spatial Energy Plan (SSEP).

The excellent work on Holistic Network Design and early thinking on a Centralised Strategic Network Plan (CSNP) should go further and faster. We need a SSEP for Great Britain. To reduce energy bills as much and as quickly as possible, we need bold decisions on energy policy right across the system. An enhanced blend of the current market and regulatory arrangements can mobilise substantial private capital and bring flexibility and efficiency. It is, however, unrealistic to imagine that we can wait and see what energy sources and demands arise, then hope to build the necessary networks in time. This would guarantee that network capacity upgrades will be late and insufficient. A SSEP will forecast the supply and demand characteristics and their likely whereabouts. It will also be an opportunity to explore the characteristics and potential effect of digitalisation of the energy system which will be such a critical component of the transformation. The SSEP should be supported by the CSNP, plans for other networks such as hydrogen and carbon dioxide, and regional strategic multi-vector plans. In translating the spatial energy outlook to network plans, substantial optioneering will be required to maximise the economic use of flexibility services, innovative solutions and optimise the set of networks that constitute the total energy system. These plans will initiate the building of strategic transmission as late as possible to be consistent with the seven-year timescale to commissioning. We are suggesting two multi-vector energy plans focusing on ten-year and twenty-five-year horizons. The ten-year plan would be refreshed every year, the twenty-five-year one every five years. These plans will also provide a useful backdrop to allow the introduction of regular updates to the NPS. This proposal can be seen as taking the concepts in the consultation on the CSNP, providing a strategic spatial energy system overlay, adding regular decisive input from Government, considering all aspects of the total energy system, bringing more timely system wide regulatory approval, and always anchoring our network plans strongly in the current energy policy.

**Recommendation 2**

The FSO, supported by Ofgem, should urgently assess the scope for new short-term and long-term regional flexibility markets.

Although this recommendation does not directly lead to shorter delivery times for electricity transmission, demand flexibility and smart investment and operation of energy storage facilities can reduce the need for new transmission investment. Urgent development of zonal flexibility markets and new, more encouraging, planning and operation rules will reduce transmission investment costs and provide valuable opportunities to deploy more renewables earlier. These new markets need to allow the value of all forms of demand flex and storage to be accessible to customers and developers quickly.

**Recommendation 3**

The SSEP should reflect detailed and intensive joint working between the FSO and The Crown Estate and Crown Estate Scotland

The Electricity System Operator (ESO) and The Crown Estate and Crown Estate Scotland should be congratulated on recent close working to identify the optimal combination of seabed use and transmission network configuration. This has the potential to unlock vital anticipatory transmission investment by identifying areas of the seabed available for substantial wind generation and the associated impacts on the electricity transmission system. This would allow the process of reinforcement to begin before the leasing process has been undertaken.

**Recommendation 4**

Ofgem should provide strategic oversight and approval of the method of production of the SSEP and network plans

By giving Ofgem this function, we can remove significant time from the process. Currently Ofgem give regulatory approval to the need case and high-level design on a scheme-by-scheme, or group of schemes, basis. In this new structure, Ofgem will give oversight to the processes and methods of analysis and design at a system level and can endorse the need cases when they emerge naturally from this process. This should give greater assurance to stakeholders regarding

the need case for individual transmission lines and take regulatory approval off the critical path.

### **Recommendation 5**

Department for Energy Security and Net Zero (DESNZ) should regularly provide key inputs to the SSEP

DESNZ should establish a new function to provide and update public policy priorities and Government projections of key elements of the energy system. These would be provided annually to the FSO as part of generating the SSEP and would inform the process of regular updates to the National Policy Statements. Such a process would also allow Government to understand the whole system impacts of the timing of key policy choices.

### **Recommendation 6**

The NPS should be updated urgently and regularly thereafter.

Helpful changes to the National Policy Statements are currently being consulted on. As recommended by the National Infrastructure Commission (NIC), amongst others, the NPS should be updated routinely every five years. In addition, the Energy NPS should be updated again urgently after the current round of changes that are currently in consultation, to reflect the recommendations in this report.

### **Recommendation 7**

The SSEP should be endorsed regularly by DESNZ and Ofgem, and be referred to in the Energy NPS.

This will give solid guidance to stakeholders, and in particular, the Planning Inspectorate regarding the alignment of need case, system configuration, and design with national priorities, environmental management and economic efficiency.

**Recommendation 8****A new document Electricity Transmission Design Principles should be created**

The Electricity Transmission Design Principles (ETDP) will be created by the FSO working closely with the TOs, under regulatory oversight by Ofgem. This will be a public document detailing the principles and methods used to design the system and decide the configuration of assets; onshore or offshore, overhead or underground. This ETDP will be regularly updated, referred to in the NPS and endorsed by DESNZ and Ofgem. This will give a clear basis for communities and other stakeholders to understand proposals and a clear foundation for the Planning Inspectorate's consideration. It could also be used to drive innovation and best practice sharing.

**Recommendation 9****Ofgem should urgently conclude the Future Systems and Network Regulation (FSNR) consultation and establish a new regulatory arrangement with the TOs**

Contestable provision of all strategic transmission assets looks an unlikely route to success, at least in the medium term, for reasons discussed later in this introduction and the ESC report. Certainly, this option should be retained but the strong presumption should be that the TOs must deliver the majority of these upgrades, at least in the next ten years. Acceptance of this reality needs to lead to a strong and heavily incentivised responsibility to deliver to time and cost. The TO responsibility needs to fully encompass all aspects of delivering these assets including the interaction with the FSO on initial design and the consenting process. While it is fair to say that the TOs do not completely control some of the risks here, they exercise a much higher degree of control than the customers and should be strongly encouraged to focus management activity on this important task. And returns to shareholders should reflect this. Successful delivery should lead to superior returns, unsuccessful delivery to lower returns. In my view these incentives should be reinforced by a strong emphasis on their licence obligation to provide an efficient, coordinated and economic system. Similar arrangements should apply to any contestable provision.

These proposed new arrangements immediately take two of the three regulatory approvals off the critical path. Currently, in essence, Ofgem approves

the need case, the overall design of the solution, and the efficiency of the delivery thereby allowing the investment into the Regulatory Asset Base. In these new arrangements the need case and the design will be outputs from the SSEP process. The final approval, efficient delivery, must also be taken off the critical path, either by assessing efficiency after the asset has been commissioned, or setting delivery prices and incentives ex-ante as part of the SSEP exercise. It will also be important to make decisions about contestable provision alongside the SSEP process. We cannot afford an extra step to consider this if we are to deliver in seven years.

### **Recommendation 10**

#### Implement reforms to the Development Consent Order (DCO) Process in England and Wales

Proposals made earlier in the paper should significantly improve the planning process efficiency. In particular, having an updated suite of NPS which reference and are supported by a SSEP, the associated network plans and Design Principles will reduce the pre-application period and assist the Planning Inspectorate. There are a number of other excellent recommendations in the Department for Levelling Up, Housing and Communities (DLUHC) action plan and the recent review of major infrastructure planning by the NIC that need to be acted on urgently. In particular, the benefit of sharing environmental, geological, economic and social data and providing more guidance on environment trade-offs is likely to be significant. I am hopeful that with much better supporting evidence produced at a system level, strategic transmission projects can be a good candidate for the proposed fast track process.

### **Recommendation 11**

#### Implement reforms to the Electricity Act 1989 consenting process in Scotland

There are a series of reforms in the attached ESC paper aimed at aligning the consenting system used in Scotland under the 1989 Electricity Act and the Planning Act of 2008. The intention of these reforms is to broadly align the processes used under these two pieces of legislation by introducing a pre-application consultation, defined timescales for the different stages and clearer responsibilities for each party involved into the operation of the Electricity Act



in Scotland. These reforms are vital. The very significant amount of wind generation in Scotland needs substantially better transmission infrastructure to be developed quickly. Furthermore, alignment between the processes in Scotland and England and Wales will assist the significant task of reinforcing the system across the Scottish border.

We also recommend that the trigger for mandatory public local inquiry is removed from the planning authority so that only a Scottish minister can trigger one based on all responses from statutory consultees. This amendment to The Electricity Act of 1989 should be progressed as a matter of urgency, possibly through the current Energy Bill passing through Parliament. This is required to support 2030 projects required to meet energy targets.

### **Recommendation 12**

The FSO and TOs should work with the Government to design and implement a focused information campaign on the need for a grid refresh

The next three decades will see a significant upgrade to our electricity transmission system. The importance of this work to our country and to the environment needs to be communicated to the whole population so that when individual proposals for reinforcement are made, communities have some context in which to view them. The TOs should be congratulated for initiating this work already. It would be desirable to join this up into a national campaign supported strongly by UK Government and devolved administrations. This might also encourage more people to seek careers in this exciting area, a need discussed later in this report. Although beyond the remit of this project, I suggest that Governments consider the merit in broadening such a campaign to communicate the more general transformation to our energy system that is ahead.

### **Recommendation 13**

A clear and public set of guidelines for Community benefit should be established

Following the recent DESNZ consultation on community benefit, Government and Ofgem should agree and publish guidelines on benefit sharing for individuals and communities affected by new or upgraded transmission lines.

We suggest two components:

- (i) Lump sum payments for individual households close to new lines.
- (ii) A community fund to be established and distributed in the locality of new lines. The distribution of this should be governed locally and the money should be spent on local schemes to decarbonise the energy system and homes. I acknowledge the difficulties of local governance, but this proposal ensures that the money is spent on green measures, and where it is most needed while reducing bills near infrastructure does not. There is every opportunity to be generous with these payments. Undergrounding power line costs between five and 10 times more than overhead lines and causes more environmental damage.

#### **Recommendation 14**

The new regulatory deal established by Ofgem with TOs should place a strong responsibility with the TOs to address the acute supply chain constraint

The global supply chain for key components is extremely stretched. Many companies and countries are already seeking to invest heavily in high voltage cables, power transformers and inverter technology. It is vital that the TOs establish long-term relationships with key providers. Five-year deals would be a minimum. Ten-year deals may be necessary. This is one of the reasons why the strong presumption should be that the TOs will deliver these new assets. It is difficult to see how such relationships can be established in the contestable model although we do support the retention of the option particularly where the most efficient and effective TO could build assets in another TO's licence area.

#### **Recommendation 15**

A major review of engineering and technician skills in the UK needs to be undertaken. This should be led by Government

The problem with the UK's engineering skills base has been well reported for many years. We have had many engineering industry groups working to tackle this shortage of engineers and technicians, but progress is slow and the need is

large and urgent. I can only believe that this problem must now be tackled by Government, working closely with industry. The need to recruit and retain a large workforce to take these assets through consulting, construction and commissioning is another reason to support the presumption that most of these assets will be delivered by the TOs. The review should also urgently assess whether other skill sets are likely to be a constraint, such as planning and environmental assessment.

### **Recommendation 16**

An Energy System Delivery Board, chaired by Government, and including Ofgem, the FSO and TOs needs to be established

The current process has multiple parties, is clunky and complex. While the recommendations outlined above are implemented, a strong senior programme Board, I suggest chaired by a Minister, should monitor, and drive delivery. As the process becomes more streamlined and coherent the need for this will reduce.

### **Recommendation 17**

A senior Change Management Committee will be required to implement the recommendations

These proposals are far-reaching and will require determined leadership, goodwill and hard work across industry and in Government if they are to be implemented quickly. There is no time to lose. I suggest that this Committee is also chaired by a Minister with senior officials and industry figures. It should be time limited and accompanied by change committees in Ofgem and the ESO.

### **Recommendation 18**

The institutional arrangements that will be most effective to deliver this infrastructure need to be agreed quickly

The attached ESC report includes analysis and proposals regarding the institutions, and their responsibilities to enable the streamlined process to be established and operated smoothly. Government, Ofgem and the industry should finalise and publish guidance on this so that stakeholders can understand how the programme of grid refresh and upgrade is carried out.

The recommendations outlined above will reduce the delivery time for strategic transmission to around seven years. This is the required timescale. The changes will be most effective if taken as a package. In the associated ESC report we comment on the likely timescales, costs and difficulties of implementing these changes to give a high-level assessment of the effect of not implementing the whole package. There are also many other more minor but crucially important recommendations to be found in the ESC report. I fully endorse these recommendations including those on land access and outage planning.

I want to thank ESC for its excellent work. I also want to thank Ministers, department officials, Ofgem, industry, devolved administrations, and many other stakeholders for their splendid support and advice.

I would also like to acknowledge the excellent work of my fellow “champions”, Tim Pick, Jane Toogood and Simon Bowen. Several themes are common to all our work, particularly around the need for strategic planning.

**Nick Winser CBE**  
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