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10 June 2008

Dear Mr Sleutjes

We welcome the opportunity to respond to the LENS interim report and consultation.

We were pleased that respondents' views, articulated after the last workshop in December 2007, were largely incorporated. We believe that the scenario narratives are broadly coherent and this is helpful when considering impacts.

We have also been engaged in the development of scenarios and this is an approach that we support. As the scenario development process moves forward, we look forward to working with Ofgem to gain deeper analytical insight into the LENS and our own scenarios, possibly by contributing our electricity industry analysis expertise.

We have found the workshops useful in being able to feed in our views and to listen to perspectives of the future from our colleagues - both within and outside of our industry. In response to Question 4, therefore, we are advocates of Ofgem's workshop approach and are keen to participate in another workshop in the summer.

Question 1

Do you have any comments on the energy and network scenarios for 2050 set out in the interim report, or on the method used to derive them?

Scenarios, which are used in a planning context, should rightly explore a range of outcomes, some of which are more probable than others. Indeed, the implication of the question is whether each scenario is plausible, not necessarily probable. It is this test that we apply to the scenarios in our comments below.

Each principal scenario is a conflation of an energy and a network scenario. Whilst both components have evolved qualitatively, the energy scenario has had the benefit of quantitative economic analysis through the Markal modelling process. In contrast, the network picture has evolved without the benefit of load flow analysis. This would have indicated if the dispersion of energy supply and demand could be met with the network infrastructures hypothesised. This need to meet consumers' expectations is reflected in the concept of security of supply and is a concept which is strongly embedded in today's network architecture and operation. Whilst 'security of supply' has many definitions, there are generally considered to be two components;

- **Adequacy of supply** (long-term)– the ability of the energy system to access primary energy sources and to convert them to electricity, the capacity of the network to transport the electricity/energy and the capacity of the market to link producers and consumers of energy.

- **Reliability of supply** – the ability of the system to match the supply and demand pattern in operational timescales and to manage the failure of components of the energy system.

Currently, consumers receive a very high level of security of supply from the electricity system. For generations of consumers, the electricity supply has proved reliable and the costs for this service have been bundled into the price they pay for energy. There is no perceptive link between price and security of supply, no concept that some appliances need a less reliable supply than others (and can therefore be arranged in a 'merit order') and little concept that the electricity system is not guaranteed to be 100% reliable. This is demonstrated by the public response to any significant loss of supply. Consequently, we believe that all the scenarios must address this fundamental issue, explaining how there is sufficient adequacy and reliability to satisfy the needs of future consumers.

Question 1a

Do you agree that all of the network scenarios are plausible? If not, please explain why you think that one or more of the scenarios are not plausible.

After considering the security of supply question and the potential evolutionary pathway of the microgrid scenario, we question its plausibility. However, whilst we understand that the scale of the microgrids in question has been deliberately left vague, it would be helpful to have clearer guidance on this point. This is because the challenges facing the microgrid scenario are inversely related to its size. Very small microgrids, will find the challenge of meeting security of supply expectations more acute than those microgrids whose scale approximates to today's current DNO footprints.

Whilst our comments particularly apply to the microgrid scenario, the challenges are also applicable to all those scenarios not requiring a developed transmission infrastructure. How is there, in 2050, sufficient indigenous, local energy in the population centres in the South not to require bulk power flows from remote generation?

We explore these concepts in more detail below;

Adequacy

Each microgrid (regardless of size) must have access to sufficient primary energy sources and to the ability to transform these to electricity. The renewable technologies accessible to the microgrid are intrinsically variable and limited. Micro wind energy capacity is limited by lower urban wind speeds and the diameter of the turbine's blades - and solar technologies will not work at night and will be severely depleted in winter. The only other way of delivering energy into the microgrid is through a highly depleted (if not non-existent) electricity T&D infrastructure, the natural gas network (presumably supporting micro or district CHP technologies), or the road network.

For the scenario to be internally self-consistent, there will be little transmission connected generation such as sizeable offshore and onshore wind. It is likely, therefore that the microgrid is dependent largely upon natural gas and its networks for adequacy of energy supply, particularly during winter peak periods.

In the Lean Transmission/ Government led Green agenda scenario, distribution systems take on a greater burden in respect of managing security of supply. However, given that CCS and nuclear play a role in hydrogen production, it seems surprising to us that transmission is 'lean' in this scenario. The other practical way of manufacturing hydrogen is through steam reformation of natural gas, and this would have implications for the gas transmission and distribution infrastructure.

In some scenarios, such as the microgrid scenario, the gas distribution infrastructure would likely have to be upgraded to facilitate its new role of meeting supply adequacy. It follows that the electricity system would be vulnerable to disruption of our gas supplies, either through loss of infrastructure, political interference or high market prices.

Reliability

The microgrid must have access to sufficient storage and / or spare capacity in order to manage day to day supply variability. Whilst domestic heat storage can help, this can only ever act as a diurnal storage mechanism. Provision for seasonal storage may have to be made within the microgrid; clearly an even greater challenge for small microgrids.

Whilst sophisticated network management systems ('smart grids') can make the most of the limited infrastructure, the ability of the community of microgrids to access pooled reserve or storage is likely to be limited with a such a thin network. This means that there must be comparatively more redundancy built-in to the microgrid infrastructure, both in the network and generation /storage capacity. This is a situation reflective of the days before a developed transmission architecture, in which the plant margin (a measure of excess generation capacity over peak demand) could explore values of 60%. This does not compare favourably to today's circa 20% figure, and represents one of the economic efficiency benefits of a transmission system.

Evolutionary Pathway

The Government, at a European and national level is making commitments on nuclear electricity and offshore and onshore wind. As we have seen, these circa 40 year investment costs will be largely stranded in a microgrid world. This must add weight to the argument that microgrids may not represent a plausible scenario, particularly if consideration is given to today's starting point.

Question 1b

Do you agree that the interim report demonstrates that the network scenarios, between them, span a suitably wide range of plausible outcomes for GB electricity networks in 2050? If not, what essential features do you think are missing and could these potentially be accommodated within the existing scenarios?

Scenarios which could explore 'unsatisfactory' events

We infer that stakeholders are largely content in each 2050 scenario and that the suite of scenarios put forward by Ofgem represents a range of 'acceptable' outcomes. With the global challenges of terrorism, climate change, commodity scarcity and geo-politics, there must be a range of outcomes which are 'unsatisfactory'; at least to the key Government stakeholder. Many scenario planning exercises consider upside and downside as this aids the process of developing contingencies; a potential future stage of the LENS work. These could potentially be explored as sensitivities in the existing scenarios; perhaps exploring the sensitivities surrounding security of supply.

A scenario range which are 'artificially' broad?

As we understand the Markal analysis of the microgrids, a specific constraint had to be introduced to prevent the use of the existing electricity networks: i.e. the study reflects what we would need to do in the absence of an electricity network, rather than indicating that the existing network is over-sized/redundant. Moreover, in a world where there was little usage of the existing distribution and transmission capacity, the underlying charging base of this infrastructure would change from a long-run (investment) basis to short run or operational basis, making it very cheap to use. We believe that it would be informative to re-run any study that has had the use of electricity networks specifically limited, to see what the results would be like making use of the existing infrastructure.

Question 2

What are your initial views on transitional issues and way-markers for 2025, in light of the scenarios for 2050 as set out in the initial report.

There is unlikely to be a unique relationship between a signpost and a scenario. Instead, we believe that it is constructive to look at a range of signposts and consider the evidence in total, before assigning a probability to a particular scenario.

Below we make some comments regarding waypoints in 2025.

Social Trends

There is significant debate concerning the point at which the public will be willing to change its behaviour to favour an environmentally benign solution over a conventional and more expensive one. Moves toward public transport, more teleworking and less utilised road systems seem more likely to be facilitated by Government legislative frameworks than by voluntary action.

Future consumers might also be willing to compromise and make trade offs in their use of energy. This is not without precedent. For example, certain small island electrical systems have previously required consumers to manage their own energy intake and prioritise the use of their appliances. Perhaps if energy becomes a scarce and expensive resource, then technologies which effectively ration a precious commodity may become popular. In particular, consumers may value the facility to pay a premium to keep certain appliances free form interruption.

Market Trends and Government Commitments

Government commitments, and subsequent investments in large wind developments and nuclear power stations must be seen as a signpost favouring those scenarios with a transmission and distribution infrastructure than can support them.

Technology Trends

When developing scenario storylines, technology 'leaps forward' are sometimes assumed. Consequently, it is important to understand the role of disruptive technology and the limitations placed on new technology by physics. For example, the output power potential of wind machines is well understood. In contrast, the potential for cost reductions and efficiency improvements in solar photovoltaics is less certain.

Smart network technologies, including smart metering may have many benefits. These could include capital efficiencies, operational cost savings and demand reduction / carbon benefits. Developments in this technology are worth careful consideration against all of the scenarios.

Question 3

What are your initial views on the most important issues for networks and for the regulation of networks that arise in light of the scenarios for 2050 as set out in the interim report?

Regulatory Certainty and Simplicity

Network businesses operate in a low risk environment with commensurate returns. Without a clear political lead with the associated stable legislative and regulatory framework there will be an increased risk of stranded assets and inefficient investment. In such an uncertain environment network utilities will delay investments until the regulatory / legislative framework is sufficiently clear - potentially delaying the delivery of government objectives. So certainty in regulation is very important, particularly given that the investments are for circa 40 years.

Whilst little is said about the external business environment in the big T&D scenario, it seems likely that the UK will be in competition with other global players to develop infrastructure. This means that our regulatory regime must support the operation of markets which are sufficiently attractive to investment from a global perspective. Moreover, to encourage interconnection with Europe, a common and coherent view of regulation is required between European and national regulators.

The scenarios make reference to energy service companies (ESCOs) which deliver a range of services and which would lead to the 'success' of the scenario. We doubt whether ESCOs acting solely in response to commercial drivers will deliver government renewable and carbon targets and believe that some government and/or regulatory intervention will be required.

Understanding of Risk and Return

An understanding must be reached on how risk is apportioned between the network owners and its customers. Given that we see stranded investment in 'Reactive Approach' and 'Dynamic Green Markets' these scenarios throw up significant issues for investor confidence. It seems likely that regulatory frameworks will be required to allow investors a higher rate of return commensurate with their perceived risk, or allow the market to reach an appropriate balance.

There may be network investments where commitments are required ahead of contractual certainty to allow the network to develop in a timely manner; so called 'strategic investment'. This would allow the network to earn a premium higher rate of return for appropriate investment. Whist this concept is currently being discussed in the context of developing transmission infrastructure, it carries forward into many of the other scenarios.

Finally, it appears essential that a view will have to be formed on whether electricity network capacity will need to grow or shrink, before an appropriate regulatory regime can be designed. In the former case, a stable regime to reward investment must be devised, whilst in the latter it must be accepted that new network capacity is unlikely to be provided without specific funding being offered. Moreover, in the latter case any transition to the new world should manage potentially stranded assets. This would be in the interest of consumers as well as shareholders and would ensure that the costs are dealt with equitably.

Role-clarity in Responsibility for Security of Supply

In some scenarios, the responsibility for the operational security of supply may have devolved from a few highly-regulated and professional organisations to an array of smaller and more diverse entities. We note that in some scenarios day to day operational decisions may even be devolved to local computer-based systems. Consequently, when a supply interruption occurs, it may not be possible to establish exactly which entity was at fault or what actions need to be taken to prevent a recurrence

An analogy can be drawn with transport where the current arrangements are similar to air travel, where the actions of airlines are coordinated by air traffic control to ensure safety whilst a microgrid would be more like the road network where safety depends upon the decisions and actions of every driver acting independently.

Open standards and removing artificial barriers to entry

It is important that new energy technologies and new energy services are allowed to develop to meet future challenges. It is likely that microgeneration, and smaller independent networks will further develop. Both the 'old' and the 'new' should co-exist and regulation should continue to promote a level playing field in the markets. Such arrangements should be designed to minimise the risk of stranding. For example, the frameworks should incentivise a new entrant to purchase existing capacity, rather than install new assets.

It is also important to understand that in all plausible scenarios, generation of all sizes which is connected to the network should meet a common minimum technical standard. Failure to adhere to this principle may make the system behave unpredictably with potentially severe consequences for reliability.

Question 4

Do you see benefit in a fourth (and final) stakeholder event for the LENS project, following publication of the June draft scenarios report?

We address this point at the beginning of the letter, but reiterate here for clarity. We look forward to participating in a fourth stakeholder event.

Question 5

Do you have any other comments at this stage of the development process?

We reiterate the point that we support the development of scenarios and that we have found the process helpful and informative. We also note Ofgem's desire not currently to move beyond scenario development into their application. However, Government at a European and national level has set climate change targets and supported these with a range of policy initiatives. Consequently, before the scenarios are used in developing future policy, two items should be addressed; (i) a detailed assessment of the self-consistency of the network and energy components of the scenario and (ii) an analysis of the security of supply considerations (reliability and adequacy). Indeed, it is likely that the scenarios will need to be reduced to a subset of similar scenarios before there will be sufficient clarity to enable us to shape the future.

We understand that other energy networks are largely out of scope in respect of the LENS scenarios. In practice, however, the development of electricity networks cannot be considered in isolation from developments in gas infrastructure. We suggest that in subsequent work , the implications for the gas network could be considered in those scenarios whose probability of occurrence is sufficiently high to merit further and more detailed analysis.

Yours sincerely

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