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Demonstrating the Need for Electricity Infrastructure

A Report by the Electricity Networks Strategy Group

June 2009

Overview

This report has been produced by a working group of the Electricity Networks Strategy Group[1] as a contribution to the UK Government's work to simplify and streamline the planning regime following the UK Planning Act 2008. The report sets out proposals on how the Infrastructure Planning Commission (IPC) and other planning authorities could assess the need for individual network development applications and their relationship with the wider strategic energy policy needs. These proposals are expected to be of particular relevance to the development of National Policy Statements.

The UK Government has been clear on the need to meet renewable energy targets and to tackle climate change. This requires significant changes to the generation of electricity, both in terms of technology, and as a result, its location. The amount of electricity network capacity required is expected to increase as the proportion of electricity demand fulfilled by intermittent renewables increases. In addition the geographic location of the network will need to adapt to accommodate the construction of new low carbon generation (renewables, nuclear, fossil fuel plant with CCS, etc) and closure of old fossil fuel fired plant. Overall there is expected to be a higher level of generating capacity relative to demand in order to provide back-up to intermittent renewable (wind-powered) electricity generation. This in turn will have an effect on the size and location of the electricity network.

The new UK Planning Act 2008 will assist in the timely progression of new electricity projects, both generation and networks. It is anticipated that most applications by energy promoters for development consent under the Act in England and Wales, where there are both electricity generation and network infrastructure proposals, will be synchronised in their preparation and considered as linked proposals by the IPC.

However, in some cases synchronising considerations by the IPC may lead to significant delay in implementing new electricity generation capacity. A generation plant, for instance, may not require much time to prepare and submit an application for development consent to the IPC, yet may require a significant length of time to construct, whereas the network connection may be the opposite in terms of programme: a lengthy period to prepare and submit the application for development consent, yet a short time to construct. In these special cases, synchronisation of consideration by the IPC or decision-making body may combine the longest preparation times with the longest construction periods for two linked developments. This approach may lead to decisions which are uneconomic and inefficient, or untimely; which may have adverse environmental implications; and may ultimately affect climate change and security of supply objectives.

An example of this case is where electricity network development needs to be progressed in the absence of formal user commitment, but where clear generation requirements are anticipated and where a network extension could facilitate timely connection and therefore help in meeting climate change

[1] Terms of reference and membership of the Working Group are set out at annexes A and B.

objectives. A second example is where the timing of associated generation and networks, either because of extensive pre-application requirements for the network proposal or for extended construction periods for the generation plant, means the applications should be submitted to the IPC at different times and decided separately.

In Scotland, the second National Planning Framework[2] under the Planning (Scotland) Act 2006 sets out a number of national development priorities to support the Scottish Government's central purpose of sustainable economic growth. This includes a range of onshore reinforcements to the electricity grid transmission system aimed at providing the transmission capacity to realise and deliver Scotland's renewable energy resources. It also highlights the importance of developing sub-sea links, both between parts of the UK, the EU and other markets. Both aspects will be key in helping to meet Scottish, UK and EU renewable energy targets and in addressing climate change.

The overarching intention is to ensure planning systems across the UK are complementary and facilitate effective, timely and appropriate development of the UK electricity network, and that for developers borders are not seen to be boundaries.

This report presents two case studies which demonstrate the need for the IPC to consider certain network proposals separately from associated generation or from anticipated generation. The report also suggests criteria which the IPC or other decision-making authority could apply in deciding development consent applications for electricity networks.

[2] http://www.scotland.gov.uk/Publications/2008/12/12093953/0

Electricity Network Development Case Studies

1. It is anticipated that most applications by energy promoters, for development consent under the Planning Act 2008 in England and Wales, where there are both generation and electricity network infrastructure proposals, will be synchronised in their preparation and considered as linked proposals by the Infrastructure Planning Commission (IPC). However, in some circumstances this approach may lead to decisions which are uneconomic and inefficient, untimely and/or may have adverse environmental implications. For example, the consideration of generation projects in isolation may lead to a proliferation of overhead line connection proposals, or delays in connecting generation plant. In these cases, it may be more effective and/or appropriate to present unsynchronised applications to the IPC. Two case studies are presented below which demonstrate these issues, and criteria are suggested in paragraphs 35 to 37 which may assist in deciding development consent applications.

2. Case studies of potential network developments provide a useful starting point for understanding the interaction of the development consent process and likely generation and network projects. One case study is drawn from the ENSG report '*Our Electricity Transmission Network: A Vision for 2020*'[3] and the other is of a nuclear generation proposal.

3. The need to maintain appropriate levels of security of supply, and to tackle climate change, will mean a change to the current generation mix in terms of technology and its location. Overall there is expected to be a higher level of generating capacity relative to demand in order to provide back-up to intermittent renewable generation to ensure existing demand security levels are maintained.

4. The nature of the generating technologies likely to be deployed, and the location of their deployment, will lead to a need to extend and reinforce the existing electricity network.

5. The need for extensions to the electricity network can be triggered by one, or a combination, of the following factors:

    a. The need for the timely connection of different and/or additional generation capacity;

    b. demand growth;

    c. or network rationalisation driven by requirement to replace network assets.

6. In general, it is most likely that the need for major extensions of the electricity network in a mature system, where there is relatively low demand growth, will be a consequence of generation developments, either

[3] www.berr.gov.uk/files/file50333.pdf

openings or closures. This report therefore focuses on the first factor (a) above, and the case studies will consider two generation connection scenarios.

7. While this document is aimed at the projects that would be considered by the IPC, the principles contained within are applicable to all voltages, planning levels and scheme sizes.

8. For electricity network extensions driven by new connections, the need for a network extension and reinforcements would (under the present framework) be clearly evidenced by contractual agreements between the electricity network owner and a generator or other party seeking connection. Prior to the network company proceeding with works required to accommodate this new connection, the connecting party would be required to provide appropriate financial commitments.

9. Present practice is for the network owner to consider each application, as and when a connection is requested. The request for the connection to the network is considered against a generation background of all connection assumed to be proceeding. This approach ensures that reinforcements triggered by that connection are clearly identified within the connection offer and agreement and appropriate financial commitments are made by the companies that trigger proposed reinforcements. However, this approach can lead to less then optimum reinforcements, with potentially more detrimental impacts on the environment and/or significant delay in connections.

10. In undertaking the analysis to determine the shape of the future network, it was recognised by the ENSG that if this incremental approach to network reinforcements continued, it would be likely to lead to delays in accommodating generation required to meet the EU renewable targets. It was therefore proposed to take forward a series of strategic network reinforcements; these would provide an optimal solution for the networks, assist in meeting the challenges of climate change and security of supply, and lead to less of a proliferation of network developments.

11. For wider strategic network reinforcements, potentially not directly connected to sources of generation, there cannot be the same reliance on connection offers and agreements. This is because:

    - wider network reinforcement developments tend to reflect the cumulative impact of current and future location of generation and demand;

    - the longer development time required for wider network reinforcements compared to generation means that, in some cases, network development needs to commence significantly prior to projects either needing a connection agreement and/or seeking development consent for the generation project;

- network developers are required under Section 9 of the Electricity Act 1989 to develop economic, efficient and co-ordinated networks. As such, network developments need to be capable of accommodating reasonably anticipated future needs as well as existing needs, for example, building infrastructure when only a proportion of anticipated generation has made contractual commitments.

- Network developments occur in large increments and the most efficient, co-ordinated and flexible solution may need to be larger than the development for which immediate generator commitments have been received.

12. The case studies are intended to establish what evidence of need is likely to be available to network companies as they develop individual reinforcements and in particular to consider how individual development proposals, where some or all generators have either not entered into a connection agreement and/or made a financial commitment, can be shown to be supporting the strategic need identified in an overarching National Policy Statement.

13. The key questions that were examined for each case study were:

    a. when and how the corporate decision process starts for those projects;

    b. the development process, timetable and evidence of need available at each stage;

    c. how the findings are used in making a final decision to invest;

    d. and how an individual project could be demonstrated as helping to meet the national strategic need.

14. Whilst the case studies are associated with the transmission network, the same methodology should be applied to the 132kV system and the same principles might be applied to lower voltage networks.

Case Study 1 - Anticipatory network investment, North Wales

15. This case study is one of the transmission network reinforcements proposed in ENSG's *'Our Electricity Transmission Network: A Vision for 2020' (section 5.3).* It demonstrates that in some cases, an initial network investment will be required in advance of firm generator commitments in order to assist optimal network development and to reduce the potential incidence of a plethora of incremental connection and network investments which would each have their own environmental impacts.

16. Timely investment in the transmission network would enable overall economic and efficient designs to be prepared which have the least

environmental impact whilst facilitating connections of renewables, nuclear or conventional generation with minimum overall costs.

17. The current transmission network in North Wales serves existing nuclear generation at Wylfa (1320MW) and offshore windfarm capacity of 720MW, and is physically constrained by topography and by the presence of Snowdonia National Park as well as by the Ynys Mon (Anglesey) and Clwydian Range Areas of Outstanding Natural Beauty and other significant environmental designations.

18. The potential generation interest in North Wales, which would seek to connect to the transmission network, is large (potentially greater than 7GW) and would necessitate significant transmission network investment. The generation interest includes:

    - new nuclear proposals at Wylfa,
    - offshore Round 3 windfarms (the Crown Estate's offshore lease tender process potentially adding around 4GW of further generation),
    - onshore windfarms enabled by the Welsh Assembly Government's Technical Advice Note 8,
    - potential interconnectors with Ireland,
    - as well as any other potential generation proposals.

19. As currently regulated, National Grid would await a customer connection request from a generator and would then be required within 3 months to offer commercial terms to connect them, during which initial connection studies would be undertaken. The generator would then consider the offer, and may accept it. Following acceptance of an offer National Grid would commence work to attain the connection, involving optioneering and development studies, routeing and siting options, consultations and evaluation, environmental impact assessment and engineering design. Given the need to consult and seek external consensus on the right way forward and to carry out thorough environmental impact assessments, for most projects of any scale this process typically requires at least 30 to 36 months.

Optioneering & development	6 months
Route / siting options evaluation	9 – 12 months
EIA & detailed design	15 – 18 months

This would be followed by preparation of a development consent application to the IPC, supported by the signed connection agreements, and potentially the associated generation development consent applications.

20. Under the current regulatory framework subsequent customer connection requests would be treated in the same way, creating an incremental set of studies and engineering designs, with applications to the IPC. This may result in a less than optimal transmission network, with resultant environmental and other consequences.

21. In addition, generators further down the 'queue' would receive connection offers for connection dates further away in time, as generators ahead of them in the queue would use up available transmission 'capacity'.

22. In this case study, Round 3 offshore windfarm connections would be likely to be delayed as the lead time to complete the required reinforcements could be in the order of 7 to 8 years. This lead time is dominated by the requirement to construct a new 400kV line from Wylfa in Anglesey to the mainland at Pentir and additional reinforcement from Pentir to Wylfa, which would not be commenced until development consent had been obtained for the new line identified above. This needs to be considered against the lead time of 3 to 4 years for the consent and construction of offshore windfarms.

23. Again, in this case study, under current processes, the central Wales windfarm generation proposals, facilitated by the Welsh Assembly Government's Technical Advice Note 8 policy, would be treated as a separate connection proposal, connecting to the transmission network in isolation from north Wales developments.

24. If the central Wales development is considered in isolation, it is likely that the shortest route, as the lowest cost solution, would be the preferred option. The separate treatment of north and central Wales' generation developments may not lead to optimal transmission development. However, when considering both the north Wales and central Wales proposals together, the central Wales line could form the basis of a line out of the North Wales network to the English Midlands region.

25. If transmission infrastructure were to be planned ahead, and an application subsequently made to the IPC, without dependency on signed customer connection agreements, it would facilitate generation in North Wales. Such an anticipatory development proposal could progress through the stages outlined in para. 19 above, utilising security of supply issues, Round 3 offshore windfarm commitments and stated generation intentions (where no connection agreements were in place) to justify the need for the development.

26. Timeline steps in progressing these applications would be as follows.

Timeline steps	Network Operator	Generation
1	Need for reinforcement/ new line identified	

2	Identify study area, map constraints. Identify corridors	
3	Identify potential route alignments	
4	Strategic & public consultation on preferred route alignments	Support from generators and developers. Perhaps first public commitments.
5	Select route, undertake EIA, and produce Environmental Statement.	Support from developers and generators. Developer / generator public consultation stage.
6	Submit application to IPC	Developers / generators support application in principle, by giving public statements / evidence of intent to IPC where possible.
7	IPC grant consents, subject to conditions requiring further details at connection points.	Developer / generator site selection, EIA, etc commences.
8		Developer / generator applies for connection agreement
9	Network operators finalise detailed design	Submit IPC Application
10	Network commence construction	IPC grants consent

Case Study 2 – Hinkley Point C nuclear proposal.

27. EDF Energy is proposing to develop a new 3600MW nuclear generating station at Hinkley Point, Somerset (Hinkley Point C).

28. EDF Energy is proposing to submit its application for development consent in relation to the construction and operation of Hinkley Point C to the IPC in April 2010. However, National Grid will not be in a position to submit its application to the IPC for the grid connection works until at least April 2011.

29. The reasons for these differences in submission dates are:

- EDF Energy has been able to develop its proposals for a new generating station in advance of seeking a connection agreement with National Grid.

- The scope of National Grid's works is considerable as it comprises both connection and wider system reinforcement

works. The scope not only comprises a new long-distance overhead transmission line (of at least 60km) but also includes new and extended substation developments, and numerous upratings of existing overhead transmission lines.

- Environmental assessment requirements are therefore extensive

- The scope of National Grid's works covers a significant geographical area and as such will involve significant stakeholder engagement, not only in terms of numbers of local authorities but in terms of Section 42 consultees (landowners, occupiers, those with interests in the land, and other prescribed persons), etc. The consultation process for a long linear route is likely to be more complex and time-consuming than for a single (albeit, large) site.

- Some of the works also fall within geographical areas where National Grid currently has no transmission assets and therefore no established relationships with the associated authorities, environmental stakeholders and public. This contrasts with the Hinkley Point C locality where such relationships are long-standing and well developed.

- National Grid has to assess and examine connection options, route corridors and substation site options before selecting the preferred option to progress to IPC submission.

30. The National Grid programme is as follows.

- National Grid is currently undertaking high-level routeing studies to identify a preferred overhead line route corridor(s) to connect Hinkley Point C to the electricity transmission system. National Grid is also undertaking substation siting studies. All these studies are due for completion in autumn 2009.

- Discussions with consultees and public consultation on the preferred route option is planned to commence at the end of 2009.

- Environmental impact assessment (EIA) studies will commence at the end of 2009 and will take 12 to 16 months to complete. This would enable a full year's seasonal data to be gathered for ecology and protected species.

- Preparation of the documents to support National Grid's application for development consent would then enable submission to the IPC in April 2011.

31. For these reasons, if de-synchronisation of the nuclear generation and the transmission connection proposals does not occur, there is severe risk that

the generation of nuclear power will be delayed. If the determination of the generation proposal is held back until all connection details by National Grid have been submitted, it would delay commencing construction of the nuclear station. Construction of the nuclear facility is likely to take some 5 years while the transmission connection would take 18 - 24 months to construct. Thus delaying one of the two connected proposals has the effect of delaying the completion of construction by some 12 months.

Criteria that may be applied to decisions on development consent applications

32. The IPC is under an express duty to decide a nationally significant infrastructure application in accordance with any relevant NPS. Criteria which the IPC could apply to decisions on energy development consent could be included in an NPS.

33. The case studies have demonstrated that, from a network investment perspective, a reliance on signed contractual agreements, providing full user commitment in advance, in some cases would be likely to result in delays to the connection of new sources of generation, which could prejudice security of supply and put at risk the fulfilment of the UK's climate change targets. It would also result in a sub-optimal approach to network investment.

34. An appropriate set of criteria could allow the IPC to take decisions that promote security of supply, support developments consistent with climate change policy and encourage efficient investment in electricity networks.

35. The criteria listed below could be taken into account by the IPC in deciding any application for a connection-driven network proposal. It is envisaged that either criterion a. or b. would be required in order to demonstrate that a generation-related investment was required.

    a. The project is wholly or substantially supported by connection agreements or contractual arrangements to provide connections.

    b. The project responds to reasonably anticipated future requirements, such as:

        - It is located in an area where demand for either significant generation, or significant load as appropriate, is likely to be located;

        - A licensing or site assessment process, or other major initiative directly arising from government or regional policy, is expected to stimulate demand for connections.

36. In the case of a straight-forward investment project, driven by criterion a, and with no need to de-synchronise IPC application timescales, no additional criteria would be needed. Otherwise, either criteria c or d (below) would be required to justify the particular investment and/or timing of investment.

    c. De-synchronising the project leads to an overall more efficient solution in terms of network design (costs, timely delivery and environmental impact) taking into account current and reasonably anticipated future generation demand.

d. The project would make a significant contribution to the promotion of renewable energy, the achievement of climate change objectives, to the maintenance of an appropriate level of security of electricity supply, or other energy policy objective.

Annex A

ENSG Planning Project Working Group Terms of Reference

Tasks of the Working Group

To consider:

- how the findings of the ENSG Report '*Our Electricity Transmission Network: A Vision for 2020*' might be related to the NPS; and
- In the absence of firm generator commitment, the main elements/criteria against which the IPC might consider the need case for an individual network project application.

Main Activities

The Group will consider the process that must be gone through by a company in reaching the various decision points, from starting work on a planning application through to its submission of a planning application. In doing so, the group will prepare two case studies of possible network development, based on findings of the ENSG 2020 Report. These will include consideration of the following:

- when and how the corporate decision process starts for those projects;
- the development process, timetable and evidence of need available at each stage;
- how the findings are used in making a final decision to invest;
- How an individual project could be demonstrated as helping to meet the national strategic need.

From this it should be possible to identify the triggers/measures for defining a need case for the company and its investment decision.

The Group will then consider the criteria that might be applied by the IPC to satisfy itself that a specific application had adequately demonstrated that it met the need case and the evidence that may be required to meet those criteria.

The Group is also invited to consider alternative approaches to achieving the objectives to that set out above.

Outputs

- Two case studies examining key features of network development.
- Suggestions for a framework, perhaps criteria, for the IPC to apply that will provide clear advice on the need for network infrastructure. This would include an explanation of how the strategic need for investment could be translated into individual project applications.

Annex B

Membership of the ENSG Planning Project Working Group

Amanda Eden	DECC
Steven Edwards	Scottish Power
Phil Hicken	DECC
Andrew Hiorns	National Grid
Danielle Lane	The Crown Estate
Ian Lomas	DECC
Mike McElhinney	Scottish Government
Iain Miller	CE Electric
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Alex Tindall	RWE Npower