

Transmission Access Review – Final Report

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Target audience: Generators, transmission owners, distribution owners, suppliers, traders and developers

Overview:

This is the final report of the Transmission Access Review. The review was announced by the Government in its Energy White Paper 2007. Grid access is currently a major barrier to the deployment of new renewable (and other low carbon) generation. The measures set out in this report, when taken together will remove, or significantly reducing, grid-related access barriers. The report includes actions that will allow faster connection of some renewable generation to the Grid in the short-term, steps to introduce new, enduring grid access arrangements that allow faster connection and expansion of Grid capacity and measures to identify the new transmission infrastructure necessary to meet the UK share of the 2020 EU renewable energy targets and new financial incentives on the transmission companies to deliver that capacity.

Contact name and details:

David Hunt, Senior Manager - Electricity Transmission Policy, Ofgem, 9 Millbank, London, SW1P 3GE

Phil Hicken, Assistant Director, Renewables Deployment Team, BERR, 1 Victoria Street, London, SW1H 0ET

Please send responses by email to transmissionaccessreview@ofgem.gov.uk and transmission-access-review@berr.gsi.gov.uk

Tel: David Hunt 020 7901 7429, Phil Hicken 020 7215 3936

Context

Energy is a vital part of continued economic prosperity in Great Britain. The Energy White Paper 2007 set out the Government's international and domestic energy strategy to meet the long-term challenges we face in addressing climate change and maintaining the security of our energy supplies.

Increasing the contribution that renewable generation makes to meeting electricity demand in GB is a critical part of achieving Government's energy policy goals. In the Energy White Paper, the Government announced a review to be undertaken jointly between DTI (now BERR) and Ofgem of the framework for the delivery of new transmission infrastructure and the management and operation of existing grid capacity and the operation of the existing grid to ensure that they remain fit for purpose as the proportion of renewable generation grows.

The need to consider changes to this framework is driven by the current delays that the large volume of renewable generation and other forms of generation seeking connection to the transmission system is facing and the potential effects these delays will have, if not achieved, on achieving the Government's climate change targets.

Ofgem and BERR have produced an initial Call for Evidence consultation document, an Interim Report to the Secretary of State, an Analytical Discussion Document, held several industry seminars, and produced separate reports on delivering and operating infrastructure and shorter term initiatives. This document is our Final Report to the Secretary of State.

There is already considerable work progressing in this area through current industry governance arrangements as well as the measures announced in the Planning and Energy White Papers. All these activities will support the delivery of the objectives of the review.

Associated Documents

Transmission Access and Losses Under NETA. May 2001.

<http://www.ofgem.gov.uk/Markets/WhIMkts/Archive/101-22may01.pdf>

A framework for considering reforms to how generators gain access to the GB electricity transmission system - A report by the Access Reform Options Development Group. April 2006.

<http://www.ofgem.gov.uk/Networks/Trans/PriceControls/TPCR4/Consultation/DecisionsResponses/Documents1/14044-8306b.pdf>

Meeting the Energy Challenge - A White Paper on Energy. May 2007.

<http://www.berr.gov.uk/files/file39387.pdf>

Final Conclusions Report - GB Queue Management. July 2007.

<http://www.nationalgrid.com/NR/rdonlyres/47B95865-0225-45C2-B3BE-F753821B1E1B/18039/FinalConclusionpaper.pdf>

Transmission Access Review - A Call for Evidence for a Review of Transmission Access. August 2007.

http://www.ofgem.gov.uk/Networks/Trans/ElecTransPolicy/tar/Documents1/070816_Ex_TAR%20Call%20for%20Evidence_FINAL.pdf

Transmission Access Review – Interim Report to the Secretary of State. January 2008.

http://www.ofgem.gov.uk/Networks/Trans/ElecTransPolicy/tar/Documents1/080131_TAR%20Interim%20Report_Consultation_FINAL.pdf

Transmission Access Review – Analytical Discussion Document. April 2008.

http://www.ofgem.gov.uk/Networks/Trans/ElecTransPolicy/tar/Documents1/080416%20TAR%20Access%20Discussion%20Document_FINAL.pdf

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Summary

Introduction

Enabling renewable and other low carbon generators to secure timely access to the electricity transmission network (the “grid”) is critical if we are to meet our climate change and renewable energy targets. To achieve this, we need access rules and commercial incentives on the Grid companies to make the best use of the existing transmission capacity and to invest as quickly as possible to deliver more capacity when it is required.

The existing access arrangements are clearly acting as a significant barrier and preventing new renewable and low carbon generation accessing the generation market. Fundamental changes are required to allow significant volumes of new renewable electricity generation capacity to connect to meet the UK’s EU 2020 renewable energy target. These changes are also necessary to allow other essential low carbon and conventional generation to connect. Whilst these changes are being made short-term steps need to be taken to connect projects that are ready. The new access regime and faster delivery of infrastructure will support the timely connection of new generation of all types and when taken together will remove, or significantly reduce, the grid access barrier.

Background

The Energy White Paper published in May 2007 announced a joint review by Ofgem and BERR of the access regime for electricity transmission networks in Great Britain – the Transmission Access Review (TAR). The objective of the review was to deal with the large (and growing) queue of electricity generators that have been unable to gain access to the transmission system for a number of years. This report sets out the conclusions of the review

The Government believes that there is a greater need to use more renewable energy, given the urgency of tackling climate change and the need to maintain secure domestic energy supplies. The European Union has recently agreed that by 2020 one-fifth of all Europe’s energy should come from renewable sources. In line with this agreement, the European Commission has proposed a target whereby 15% of UK energy will be supplied from renewable sources. Achieving this target could require renewable generators to provide between 30 and 40% of our electricity supplies. Over the same period, a significant proportion of our existing conventional and nuclear generation capacity will need to be replaced with new, lower carbon generation.

The UK Government has stated its firm commitment to meeting its fair share of the European target. This sets an unprecedented challenge for our electricity networks, creating an urgent need to have in place grid access arrangements that allow large volumes of new renewable and other essential low carbon and conventional generation to connect quickly. It requires generators to be offered connection dates, which are reasonably consistent with their project development timetables and for early steps to be taken to deliver essential investment in the grid.

Transmission Access Review Conclusions

Enduring access arrangements

The industry, led by National Grid, is now developing proposals for a new access regime as quickly as possible. The industry is assessing a number of different models of access reform. Each of the models is capable of delivering a better outcome for new generation than the status quo, but each model has different implications, for example, in terms of costs and the impact on incumbent and new generators. Longer term changes to access arrangements and development of the grid are likely to add to consumer costs, and this will be an important consideration in decisions by Ofgem on the approach to be taken in the light of industry's proposals. An initial estimate of these costs has been included in the estimates of the overall costs of the Renewable Energy Strategy.

Ofgem and BERR think that the enduring access arrangements should be based on a clear set of high level principles:

- New generation projects should be offered firm connection dates, reasonably consistent with the development time of their project.
- Generators wanting long term, financially firm access to the system need to make long term financial commitments.
- Transmission companies need to have appropriate incentives to respond to the long term demand for access signalled by generators. They need the freedom and incentives to invest ahead of full user commitment. They also require appropriate incentives to deliver new connections on time and to innovate so that they can deliver as much capacity as possible from existing assets.
- Access rights need to be more clearly defined and all generators need to be offered choice about how they access the system. This choice will need to include long term fixed price access rights that guarantee long term access in return for a commitment to pay for capacity, and shorter term, variable priced access rights.
- In order to make more efficient use of existing and new capacity there needs to be better arrangements for sharing of transmission capacity. One way to achieve this is by making access rights tradable between generators.

These proposals for reform will be presented to Ofgem in October. The GBSQSS review group will work alongside the access reform process, and aim to provide recommendations to the Authority for necessary changes along the same timetable. Where appropriate, Ofgem will then conduct an impact assessment before deciding which model to implement, in accordance with its statutory duties. These assessments will include analysis of the impact of the proposals on costs and benefits (including carbon abatement) to consumers. But this process, including the time needed to develop the necessary systems for the new arrangements, is still likely to take at least 18 months.

The proposed EU Directive includes an obligation on Member States to ensure network owners provide priority access to the grid for renewables projects. The Government's initial view is that the approaches set out in this report are capable of delivering significant improvements in grid access for renewable generators without giving preference over other essential generation technologies.

Short Term Measures

Given the current delays in connection, Ofgem and BERR believe that urgent steps should be taken to connect new generation more quickly, and ahead of implementation of the enduring access regime. This means that for an interim period there should be a form of “**connect and manage**” to accelerate new connections. This approach should mean that an early connection date can be offered to projects that currently have planning consent where this can be objectively justified. In practice this will involve better management of the existing connection queue, sharing of capacity, release of additional capacity by the System Operator and allowing some generation to connect ahead of system reinforcement.

We estimate that these measures are capable of bringing forward 1GW of new renewable connections including just under 600MW of projects that already have planning consent. The first projects likely to benefit from these measures are those projects that have requested an earlier connection date in 2008/09.

2020 Measures

We also think that further measures are necessary to help us prevent grid access and investment remaining a barrier to delivering our share of the EU 2020 renewable energy target. In particular potentially long lead times for expanding transmission capacity could prevent us meeting the targets.

We have therefore asked the three transmission companies to conduct ***transmission system investment studies*** to identify the likely scenarios and associated investment costs to deliver the transmission capacity required by 2020. This work will be brought together in the Electricity Networks Strategy Group (ENSG), which is jointly chaired by Ofgem and BERR, and which will support the development of credible network scenarios. These studies will be completed and published within six months.

In parallel, Ofgem will work with the transmission companies on ***new incentive arrangements*** for this transmission investment. These incentives will allow transmission companies to invest in capacity they believe will be required without firm, financial commitments from generators. The companies will be able to earn higher rates of return than under standard price control conditions if generators do book the additional capacity once constructed or lower rates of return if the capacity is not utilised. Transmission companies' shareholders will therefore take some of the risk of stranding of new investment from customers in return for greater reward. This will allow the transmission companies to invest much faster and with less involvement from Ofgem. The transmission companies have agreed to develop proposals and Ofgem will then consult on these proposals. We will work to implement the new investment incentives from April 2009 but this may be delayed by six months if we cannot reach agreement with the companies and an appeal is necessary.

Next Steps

BERR are satisfied that enduring grid access reforms are capable of being delivered through existing industry processes. But this will involve all industry parties engaging positively in developing and implementing solutions that will improve grid access.

Substantial progress in delivering access reform is expected by the end of 2008. Ofgem will be actively involved with and, together with BERR, closely monitoring the progress in the industry process to develop and deliver the enduring solution.

Government will consult on the outcomes of this review in its Renewable Energy Strategy consultation. The Government will also be consulting shortly on revised statutory social and environmental guidance for Ofgem, the gas and electricity markets regulator.

The Authority will provide a progress report to the Secretary of State by the end of December 2008. If positive and sufficient change cannot be delivered through the existing framework, then the Government will consider options for wider reform (including legislation) to bring about the necessary changes in the context of its Renewable Energy Strategy and wider energy policy goals.

Within six months Ofgem will publish on its website the transmission studies completed by the companies on the investment scenarios for meeting the 2020 targets. We will also consult on the companies proposals for the investment incentives and regulatory framework and develop and implement the new framework.

1. Background

Energy White Paper and the Transmission Access Review

1.1 The Energy White Paper published in May 2007 announced a joint review by Ofgem and BERR of the access regime for electricity transmission networks in Great Britain. The purpose of the Transmission Access Review is to consider the present regulatory, commercial and technical framework for transmission access and consider ways in which the framework can better support the connection of renewable generation and to help develop new access arrangements that would allow for much faster connection of generation, including low carbon and renewable generation.

1.2 The review is driven by three key factors:

- The pressing need to tackle climate change including delivering the Government's targets and aspirations for renewable electricity, at an efficient cost, without an unjustifiably detrimental effect on the security of supply.
- The time taken to deliver key infrastructure due to both planning and construction lead times, given the large amount of new renewable and conventional generation seeking to connect.
- The changing generation profile. With an increasing amount of intermittent¹ generation (principally wind) and the associated back up generation, the system needs to be built and operated on the basis of better sharing of transmission capacity between generators.

1.3 The Government has said that there is a strong case for increased use of renewable energy, given the urgency of tackling climate change and the need to maintain secure domestic energy supplies. The European Union has recently agreed that by 2020 one-fifth of all Europe's energy should come from renewable sources. The European Commission has proposed a target whereby 15% of UK energy will be supplied from renewable sources. Achieving this target could require renewable generators to provide between 30 and 40% of our electricity supplies. Over the same period, a significant proportion of our existing conventional and nuclear generation capacity will need to be replaced with new, lower carbon generation.

1.4 The UK Government has stated its firm commitment to meeting its share of the target agreed by the European Commission. This sets an unprecedented challenge for our electricity networks, creating an urgent need to have in place grid access arrangements that allow large volumes of new renewable and low carbon generation to connect as quickly as possible. In conjunction with the Transmission Access Review, the Government will publish a consultation document on its Renewable Energy Strategy in summer 2008 with a view to publishing its strategy in spring 2009.

1.5 The EU renewable energy targets set an unprecedented challenge for our electricity networks. We need to be sure that steps identified now do not preclude further necessary measures as the government's Renewable Energy Strategy is developed; transmission access reform needs to provide 'no regrets'

¹ The output of generating stations such as wind power is both intermittent and variable. We have used 'intermittent' to describe these characteristics of these power stations.

measures that are robust for the high levels of renewable penetration now envisaged.

1.6 The Government's main objective for the TAR is to enable the connection of renewable (and other low carbon and conventional) generation to the transmission network quickly and cost effectively thereby contributing to meeting targets for the proportion of electricity and ultimately energy supplied from renewable sources. This means that, once planning consent is given, a project has a grid connection offer, with appropriately defined and bankable transmission rights, reasonably consistent with its likely development programme. Such certainty will allow projects to seek relevant consents in the knowledge that grid access will be available.

1.7 The solution that best delivers this objective needs to support the delivery of the Government's targets and aspirations for renewable and other forms of low carbon electricity generation at least cost to consumers. It also needs to recognise the value of system reliability (including the connection of essential conventional generation), the physical limits of the transmission system, and must work towards improving investor confidence.

1.8 This report sets out the conclusions of the review into the access regime for electricity transmission networks. We have identified a number of actions that will significantly reduce the existing queue and allow much faster connection of new generation.

Scope of the Transmission Access Review

1.9 The Transmission Access Review considers the arrangements for planning new grid infrastructure, the technical standards used to determine the need for reinforcements, operational standards, the scope for innovation in grid operation and infrastructure, and the commercial arrangements for access to the grid and system balancing.

1.10 We have excluded from the scope of the review:

- Short term GB generation queue issues - this issue was addressed in the STAG report;
- Planning - in the recently published Planning Bill, proposals were brought forward to reform the planning process. It is important that the outcomes from TAR are consistent with the revised planning regime, and
- Solutions to grid that were under development in industry governance bodies at the outset of this review. As a consequence of the review, further proposals have now been raised.

1.11 At the outset of TAR, we were clear that the existing transmission charging methodology was not a major area of review in isolation. However, we were also clear that any material change to the underlying access arrangements will have implications for the charging methodology and arrangements.

1.12 We still think that the implications for transmission charging as a result of access changes need to be considered in detail in an appropriate forum. We welcome National Grid's approach of conducting assessment of potential CUSC change with associated transmission charging issues in a more holistic manner.

TAR Publications

1.13 During the course of the review Ofgem and BERR have published the following documents:

- **A Call for Evidence for a Review of Transmission Access** – this document was published in August 2007, and sought views on the issues to be considered over the course of the TAR project, and included initial thoughts on access models, delivering and operating infrastructure and incentivising efficient system operation;
- **Transmission Access Review - Interim Report to the Secretary of State** - Ofgem and BERR published its Interim Report to the Secretary of State in January 2008, and set out our key conclusions for transmission access which are:
 - Funding is available for significant transmission investment but other problems with the arrangements (for example the uncertainty regarding the future need for transmission capacity) are preventing transmission companies identifying and making the necessary investment quickly.
 - In the short-term, National Grid as GB system operator (SO) should make sure that available capacity is allocated to projects currently in the connection queue that are able to use it. In practice, this means prioritising projects with consents and financing in place. This should be supported by appropriate information on generation projects wishing to connect so that decisions by generators on where to connect can be taken in full knowledge of what the relevant issues are.
 - Given the challenges associated with building new transmission infrastructure, we must look at how efficiently existing capacity is being used. Sharing transmission capacity will become increasingly important as we move towards 2020. The growth in intermittent generation should enable the SO to connect more generating capacity for a given amount of transmission capacity. In the longer term, a package of measures (some elements of which could be put in place relatively soon, subject to the progress of the CUSC working group and any decision by the Authority) is likely to provide a new and enduring access regime that allows sharing of capacity to enable more efficient use of transmission infrastructure.
 - In the short to medium term, renewable (as well as new conventional and low carbon generation) projects need to have more confidence that, if they achieve planning consent, they will have a grid connection offer with appropriate defined and enforceable transmission rights that are reasonably consistent with their likely development programme. One way to achieve this is by putting stronger commercial incentives on the transmission companies to deliver on time firm connection dates to developers who have made appropriate financial commitment.
- **Transmission Access Review – Analytical Discussion Document**

To help in the delivery of the TAR project, we commissioned work to help identify and analyse the constituent building blocks of viable transmission access models or "strawmen".

The Analytical Discussion Document explored the full range of building blocks to identify feasible end-to-end transmission access straw men. The

discussion document also considers key drivers and the way in which building blocks could fit together to form strawmen models.

Running in parallel to this process we have commissioned further Cost Benefit Analysis of the strawmen identified in the Analytical Discussion document. The findings of this work are presented in attachments to this document. It is important to recognise that the Cost Benefit Analysis work that has been produced by our consultants represents their independent views of the issues, and not necessarily the views of Ofgem or BERR.

1.14 Ofgem has also published the following supporting documents:

- **Transmission System Operation Review Group (TSORG) Report** - the TSORG working group was established and chaired by Ofgem, and was attended by all three transmission licensees to discuss a range of issues relating to the way the transmission system is currently operated under existing planning and operating criteria. The purpose of the review was to improve industry understanding of the current framework, but also to assess the capability limits used when operating and planning the system. As mentioned in the Interim Report, Ofgem wrote to the Transmission Licensees requesting additional analysis to be undertaken on a number of areas relating to enhancing capability of the transmission system. The results of this work are addressed in section [3] of this report.
- **Short Term Access Governance (STAG) report** – this related to the TSORG work, in the Energy White Paper in May 2007, Ofgem was asked to produce a report to the Secretary of State on the current status and progress of initiatives aimed at addressing the GB Queue. Ofgem published the STAG report to the Secretary of State in October 2007. In addition to serving as a progress report, the STAG report also provided Ofgem's views on further areas that could be explored. The areas described in this report include:
 - GB Queue management initiatives, related to contractual arrangements between the GB system operator (GBSO) and users;
 - Commercial framework development, relating primarily to work brought forward under the industry code processes;
 - Review of system operation, which has the potential to identify alternative means of managing the system in operational timeframes to potentially free up capacity, and
 - Review of the GB Security and Quality of Supply Standards (GB SQSS), which looks at whether the existing planning and operational criteria remain appropriate going forward.

1.15 All these documents can be found on Ofgem's website at www.ofgem.gov.uk. Links can be found in the "Associated Documents" section of this document.

Stakeholder engagement

1.16 Since publication of our Call for Evidence document, Ofgem and BERR have held three public seminars to discuss issues in relation to transmission access. The first two seminars focused on the principles of transmission access, whilst the third seminar focused on the regime for delivering and operating transmission infrastructure.

1.17 Continuing industry engagement is vital in ensuring reform of the transmission access arrangements. We have met with several industry parties to discuss their issues and concerns with the existing arrangements, as well as potential future developments. We continue to welcome views from industry participants and consumer bodies.

1.18 We were also recently involved in two industry seminars held by National Grid in which it set out its views of potential approaches to deal with the energy challenges. We welcome the effort made by the industry to engage constructively in this debate, and continue to believe that the impetus for change should lie with industry. However, as stated in the TAR Interim Report the Government has not ruled out considering proposing legislation as a means of implementing the conclusions of the TAR in the event that industry processes do not progress the necessary reforms in a timely manner.

2. Enduring measures

→ Chapter summary

- Given the scale of the challenge the UK faces in meeting its renewable energy targets, there needs to be significant reform to the existing grid access arrangements.
- Connections to the system need to be consistent with generators' requirements and be delivered as quickly and efficiently as possible.
- We have previously set out what a reformed access regime should offer. Allowing generation projects to connect to the transmission system and acquire suitable financially firm transmission rights when they are ready to do so will significantly reduce the grid connection barrier.
- There are a number of access models that could deliver these reforms. It is for industry to work up the detailed analysis to decide which approach, on balance, delivers the most efficient outcome. We believe that these critical changes can be delivered through the industry processes that already exist.
- It is therefore vitally important that all industry parties engage positively in developing and implementing new access arrangements that will improve grid access. If positive change cannot be delivered through the existing framework, then the Government will consider the options (including legislation) to bring about the necessary changes in the context of its wider Renewable Energy Strategy.
- Any reformed access regime will take time to develop and implement. Chapter 3 sets out our view on short term measures to improve grid access whilst the new enduring arrangements are worked up.

Introduction

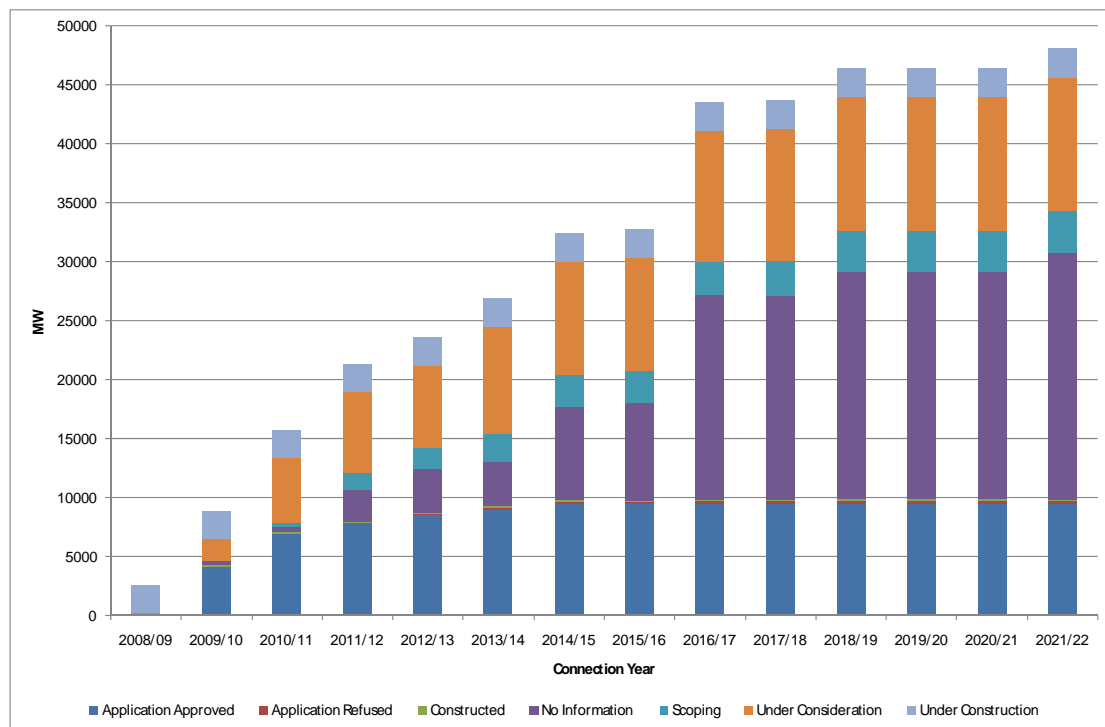
2.1. There needs to be significant change to the current arrangements for connection and use of the transmission network. Given the pace with which renewable generation projects are coming forward and considering the Government's renewable energy targets, it is not tenable that projects seeking to connect today are being offered connection dates 10 years or more away. Developers must have confidence that, if they bring a project forward and achieve consent, a reasonable connection date will be available. The key challenge in access reform is to bring together the need for the generators to gain timely and efficient access to the transmission system and the need for the transmission system to be developed and used in the most efficient manner. Any reformed regime needs to benefit other forms of low carbon generation and to ensure that essential conventional generating capacity is able to have access to the network.

2.2. To meet the Government's renewable energy targets for 2020, an unprecedented volume of new renewable electricity generation, much of which will have intermittent output, needs to be provided with access to the GB transmission system. Work undertaken for BERR in support of its Renewable Energy Strategy suggests that in excess of 35GW of renewable generation capacity will need to be commissioned, supported by a significantly higher plant margin. Depending on the plans of existing generation, there will be a

considerable increase in the amount of installed capacity required to meet a relatively stable level of demand.

2.3. Figure 1 below shows the current status of contracted new generation, which has become known as the GB Queue due to the delays in contracted connection dates. The figure shows substantial amounts of new generation at various stages of development. There is a great deal of uncertainty over which projects will connect and for existing generators which will disconnect.

Figure 1 – status of contracted new generation in GB



Source: National Grid

2.4. To minimise inefficiency and to enhance investor confidence, the industry needs better access arrangements that determine how projects connect to and use the transmission system. New infrastructure needs to be delivered on time to viable generators and the Transmission Owners (“TOs”) need to be incentivised to make more efficient use of limited transmission system capacity.

2.5. This chapter considers the work that has already taken place on identifying and analysing illustrative strawmen models of access reform, and discusses the issues as we see them. It also sets out our views on what the appropriate principles for an efficiently functioning system should be.

Access strawmen

2.6. The Call for Evidence set out three high-level models of access reform to illustrate the spectrum of approaches that could be taken to the GB transmission access arrangements. It also set out the criteria for assessing potential models. Since the Call for Evidence was published, we have discussed these and other feasible models with the industry in our publications, through open seminars and bilateral meetings.

2.7. In the subsequent Interim Report we set out a 'building block' approach to access reform that enabled a view to be taken as to which components of an access regime could work effectively together. We subsequently set out in our Analytical Discussion Document a number of access models, based on the building block approach that may be suitable for further development. These models were developed with our advisers (Poyry and IPA) and were not intended to be a definitive statement on the models that should be taken forward by industry.

2.8. This work demonstrates that, subject to further quantitative and qualitative analysis, there are access solutions that can meet our objectives and allow new generators to connect earlier. We have been clear that it is up to industry to develop proposals for reviewing the transmission access arrangements, and as such they may raise amendments to the CUSC in the manner it sees fit. We note that since publication of the interim report, National Grid has raised a suite of CUSC amendments relating to transmission access. The Government will review progress by the end of 2008 and will consider what further steps (including legislation) may be needed to deliver the necessary reforms.

2.9. National Grid's recent CUSC amendments, which are discussed in more detail in chapter 5, can be assembled in ways which could resemble the models of access reform we have previously identified. The following sections recap on the strawmen we have used to stimulate debate, and the assessment work we have produced. We also discuss the characteristics that any revised access regime is likely to need to demonstrate.

The Characteristics of Efficient Access Regimes

2.10. In our Interim Report, we set out our key principles for an efficient set of transmission access arrangements. Since production of the Interim Report, our views of the desirable characteristics for the regime have evolved as follows:

New generation projects should be offered firm connection dates, reasonably consistent with the development time of their project.

2.11. Timely access to the grid is essential to tackle climate change, increase competition and enhance security of supply. Firm connection dates are likely to provide increased confidence in the connection process, and attract viable projects. Whilst the exact mechanism for creating incentives for timely delivery is in development, our view is that financial instruments should be used to incentivise timely delivery. Generators should have a reciprocal obligation to pay transmission charges whether or not they have completed their power station.

Generators wanting long term financially firm access to the system need to make long term financial commitments.

2.12. Given constraints in certain parts of the network and the time and costs needed to deliver new infrastructure, it is critical that there are clear signals of the generators' intentions to start and cease its use of the network, so that resources can be targeted at investment at the appropriate location, timing and quantity to match the needs of generators.

Transmission companies need to have appropriate incentives to respond to the long term demand for access signalled by generators. They need the freedom and incentives to invest ahead of full user commitment. They also require appropriate incentives to deliver new

connections on time and to innovate so that they can deliver as much capacity as possible from existing assets.

Firm connection dates and appropriate incentives are vital in addressing the defects in the transmission access regime. Ofgem intends to convene a workstream on Transmission Operator/SO incentives with the aim of developing a reward and penalty incentive scheme for the TOs and GBSO. These reforms will be delivered to support the implementation of a revised enduring access regime. Some elements e.g. in relation to the incentive package for timely delivery and work on enhancing the balance of risk and reward faced by the TOs and GBSO could potentially begin earlier, and run along the same timetable as Ofgem's annual GBSO external incentive scheme, which is due to be implemented in April 2009. However, if the incentive package relating to timely delivery can not be agreed with the transmission licensees and GBSO, there is the potential for delay.

2.13. The timely delivery of essential infrastructure remains of critical importance. The costs of providing grid access ahead of investment are mitigated by the timely delivery of new physical capacity. Chapter 3 of this report sets out the process we intend to adopt to bring forward the appropriate suite of incentives, which includes the need for more studies and preparatory work ahead of user commitment.

Access rights need to be more clearly defined and all generators need to be offered choice about how they access the system. This choice will need to include long term fixed price access rights that guarantee long term access in return for a commitment to pay for capacity, and shorter term, more flexible access rights

2.14. Each generating station has different requirements in terms of transmission access. Issues such as technology, age of plant and location will govern when a generator may wish to operate a plant and at what proportion of its capacity. Weather conditions are a key determinant of the operation of wind generation.

2.15. Currently there is very limited flexibility in the type of transmission rights generators can obtain, and as such, at certain times of the year, and in certain locations, there is spare capacity on the system that could theoretically be used by others, but is not being used because of the lack of flexibility.

2.16. We consider that in addition to access rights not being flexible, the duration of the rights associated with them is not sufficiently well defined. Ofgem has set out its view on the nature of transmission rights that incumbent generators hold, which is based largely on transmission access rights being defined in a modifiable document. Many generators have expressed a different view. This is an issue that will be addressed through the industry code amendment process should any proposed amendment seek to alter the current drafting of the provisions relating to access rights.

Transmission capacity should be 'shared', particularly as the amount of connected generating capacity increases in relation to transmission network capacity. This will lead to more efficient use of both existing and future capacity.

2.17. In broad terms, the current market rules are designed to allow all generators to contribute towards meeting peak demand without undue restriction by the physical reality of the transmission system. With the anticipated higher level of plant margin needed to support variable and intermittent renewable generation there will be a significantly higher level of connected generation relative to demand.

2.18. Whilst significant infrastructure developments will still be required to support this growth in generating capacity, arrangements that more efficiently allocate transmission capacity on the interconnected transmission system will lower the total investment needed and speed up renewable deployment.

Access Models - Illustrative strawmen

2.19. In the TAR Analytical Discussion Document² published in April 2008, we set out details of three strawmen that have been identified by our consultants, Poyry Energy Consulting and further developed by IPA. Detailed descriptions and an explanation of how the access building block approach has been used are provided in the Analytical Discussion Document. The models identified by our consultants were:

- **Model A** - adopts a 'connect and manage' approach to transmission access in which the right to access the system is driven by the requirements of a connecting party. This reflects the model's primary focus of facilitating increased generation deployment.
- **Model B** - uses market-based mechanisms to deliver access to the party that values it most at any given time. This is done through the initial allocation and secondary trading of a range of access products. This includes firm access rights of different duration and the provision of a facility for generators to access the system through overrun arrangements.
- **Model C** - is based on a locational marginal pricing approach, which exposes all participants to the short run costs of transmission access in each half hour. The model maintains the separation of energy and capacity markets.

2.20. Following the publication of the Analytical Discussion Document in April 2008, Poyry Energy Consulting and the Centre for Sustainable Electricity and Distributed Generation (SEDG) have undertaken further cost benefit analysis of the strawmen models that have been identified. This work is published as an annex to this report.

2.21. The models offer choices, for example in relation to whether the volume of access rights is system-driven or user-driven, and whether costs are socialised or met by the party that gives rise to them. If implemented, each is likely to have advantages and disadvantages. We do, however, consider that each is potentially an improvement in relation to the status quo and could potentially deliver the objectives of the review in terms of enhancing access to the transmission system for low carbon generation. We would emphasise, however, that the models are purely indicative; their purpose was to stimulate debate rather than reflecting our views on the nature of the optimal set of access arrangements.

Key issues with illustrative strawmen

2.22. We have identified a number of key issues associated with each of the illustrative strawmen which have been identified by Poyry. These issues relate to the main areas of impact, including the environment, competition, security of supply, network investment, costs to consumers, implementation issues, and risks and unintended consequences. We have set out our view of the Poyry

² For more information on Poyry's description of the strawmen, please see the link below:
<http://www.ofgem.gov.uk/Networks/Trans/ElecTransPolicy/tar/Documents/1/Poyry%20TAR%20Strawmen%20Report%20FINAL.pdf>

strawmen according to these criteria below, which broadly map to the assessment criteria included in the TAR Call for Evidence document.

Model A

Environment

2.23. Model A does not require the system to be fully secure before new generation is granted access. This means that viable generators that would have been unable to access the system because of delays in the development of infrastructure will be able to access the system quicker. In theory, Model A facilitates new connections quickly, which will help to deliver greater renewable generation deployment..

2.24. The benefits of Model A principally relate to the scope to increase the level of renewable generation output. However, the scale of these benefits depends on the actions of generators wishing to access the system – i.e. there would be no benefits if generators themselves are not ready to generate. In the short term, the model may only have a limited impact as, in the next one to two years, the amount of renewable generation that currently has planning consents and, therefore, would be able to make use of such arrangements is relatively small.

2.25. In assessing benefits it will also be important to understand what generation will be displaced by plant which would be granted access under this model. Wind generation has zero fuel costs, which means that they are likely to run in preference to conventional generation in the merit order. Wind generation is also likely to be constrained-off last because its inflexibility is reflected in high bid-offer prices.

2.26. However, there may be circumstances where there is a binding constraint that requires a renewable generator to constrain off other renewables. If this occurs, then the carbon benefit would be reduced.

Competition

2.27. One argument in favour of Model A would be that by opening the transmission system to anyone that is able to use it, regardless of whether the system needs reinforcing or not, the pool of generation participating in the market and able to compete for the supply of a limited level of demand may increase competitive pressures on prices.

2.28. Model A is also not fully cost reflective as constraint costs continue to be socialised. This may discriminate in favour of generators connecting to heavily congested parts of the system, which may act to reduce the competition benefit from additional connected generation. Under this Model, a generator connecting at a point on the system that is already heavily constrained will impose costs which will be smeared across all users via BSUoS. This generator will on a £/MWh basis be exposed to the same level of costs as another generator connecting in an unconstrained point on the system whose connection benefits others by reducing constraint payments.

Security of supply

2.29. If Model A results in a substantial increase in new generation over the status quo, then the pool of available generation on the system should increase, thereby resulting in more free headroom, and potentially a higher capacity margin. However, if the majority of this new generation is intermittent, the

security of supply benefit of the additional capacity will be relatively low - output depends on weather conditions, and cannot easily be manipulated by the GBSO in the event it needs additional output to maintain system integrity. Similarly where large deployment of intermittent generation occurs, additional reserves of responsive (largely conventional) generation will need to be procured to cover unpredictable loss of output, which may result in higher risk of failure. However, if Model A applies to all types of generation, the impact of intermittency on system reliability would be diminished.

Network investment

2.30. In the event that Model A results in significant volumes of new generation being granted access to the system, it will lead to additional constraint costs. If Model A results in an increase in constraints at a particular location, this will serve as a strong signal for that part of the transmission system to be reinforced. Whilst this is useful, the generation will be connected before wider system works are complete. The approach of letting all generation on and constraining off surplus generation until this system is secured, is less efficient in terms of network investment than providing early signals of transmission requirements via an appropriate form of user commitment with the aim of matching generators' aspirational connection dates with completion of the associated works.

Costs to consumers

2.31. The key feature of Model A is that it would allocate more transmission access rights than the system can accommodate. As a result there could be a significant increase in constraint costs, depending on the amount of generation coming forward, system capability and market pricing behaviour. These costs ultimately feed through to consumers as generators would pass on the increase in BSUoS costs to suppliers. We have set out elsewhere in this report steps to ensure early delivery of infrastructure which will reduce these costs relative to the status quo.

2.32. However, under Model A there may be downward pressure on costs if the Model results in the accelerated deployment of zero fuel cost wind generation. However, these benefits may be offset by higher costs through the Renewable Obligation.

Implementation issues

2.33. Whilst potentially Model A is the quickest to implement, there are a number of detailed implementation issues that arise from this Model. They include:

- The time within, and conditions under which, the TO has to provide access (and hence connection). This will determine the balance of exposure to risks, such as planning delays. Typically, the length of the construction periods for generation and transmission assets is similar. Thus, the TO may not face an increase in risk. However, the TO will face risks if the planning process results in a disproportionate delay to the construction of transmission assets.

2.34. The incentives on the TO with respect to network investment and the interaction with the balancing cost incentives placed on the SO³. In broad terms

³ Ofgem has recently announced the launch of a two-year review of the network regulation regime. This is expected to inform the next transmission price control review, which will take effect from April 2012.

this means that other things being equal, an increase in the capacity of generation on the system without associated new transmission build will result in an increase in constraint costs.

Model B

Environment

2.35. In the case of Model B, flexible access, trading and overrun may encourage connection of greater levels of renewable generation either because they will find it significantly easier to gain transmission capacity, or, if they do not choose to purchase ahead of time, because they have the ability to spill energy onto the system above their capacity holdings.

2.36. When generators wish to access the system they would have the ability to purchase capacity ahead of time on a long or short-term basis, at a visible price, and will know their exposure to charges. The amount of long-term capacity rights released will depend on system capabilities. The amount of short-term capacity will depend on the extent to which those holding long-term rights wish to trade them, and the system operator's ability to make further access available through operational measures. The amount of renewable generation that chooses to connect may, therefore, be dependent both on the amount of long-term access available and on the extent to which the short-term market has developed to facilitate trading.

2.37. Alternatively, any generator that could not purchase capacity for their full output would be able to overrun. In these circumstances, they would face uncertain charges as these would be calculated ex-post. It may be the case that overrun may deter some generators who are risk averse, or unable to reasonably forecast their likely level of charges. Therefore, the benefit of overrun to some generators may be limited. This could potentially be the case with smaller renewable generators who are less able to predict market conditions and likely overrun exposure. If this does deter renewable generators from participating, the environmental benefit in terms of carbon abatement would not be as high as with predictable prices.

Competition

2.38. Model B enables market participants to choose their primary and secondary access allocation holdings. Providing there is sufficient liquidity and anti-hoarding measures the model should encourage the efficient allocation and reallocation of transmission access rights. Model B should have a positive effect on competition.

2.39. However, Model B may have a potential negative effect on competition if the set of arrangements that are delivered are so complicated that some parties are unable to participate.

Security of supply

2.40. The security of supply implications of Model B may only differ slightly from those that result under Model A. Whilst Model A may speed up the deployment of generation, the time it shaves off the process would be limited for consented generation, but may be considerably more so for generation dependent on significantly delayed transmission infrastructure. Given there is only a small amount of generation that is consented and unable to presently access the system due to delays in system reinforcement, the differential impact on the security of supply would be small.

2.41. If Model B encourages connection of greater levels of predictable and flexible generation, there may be a positive effect on supply security. However, if uncertainty discourages the connection of new generation, then the pool of generation available to provide headroom or margin may not increase.

Network investment

2.42. Model B on the other hand would allocate primary and secondary capacity on the assumption that the system remains secured. This would provide a clear need for transmission system reinforcement, but in certain cases would see generation potentially delayed until those reinforcements take place. If, however, a generator wishes to overrun, the costs of running the transmission system in a potentially non-secure state will be reflected back onto that party such that efficient decisions are made by generators in choosing whether or not to procure capacity ahead of time.

2.43. Model B potentially results in delays in delivering additional network reinforcement relative to Model A, as signals from generators must be delivered consistently to stimulate a response from the transmission licensee. However, Model B is less likely than Model A to result in stranded transmission assets as the length and nature of commitment to use the transmission system will be indicated by the procurement of primary and secondary access rights. However, in the event that Model A included an appropriate user commitment, the risk of stranding would not necessarily be any different to Model B.

Costs to consumers

2.44. Relative to Model A, the costs to consumers under Model B will be considerably lower. This is because the allocation of access rights will not exceed transmission system capability, except where overrun is used. The efficient network investment signals and potentially lower stranded asset risk (if Model A has a lesser form of user commitment) associated with Model B would similarly yield benefit to consumers in lower costs.

Implementation issues

2.45. This model requires some degree of reallocation of long-term rights in order to support increased deployment of renewable generation. Therefore, a key question is whether it is feasible to develop a liquid market in close to real time access trading.

2.46. The use of prices from secondary trading as a potential trigger for network investment may lead to perverse incentives. A generator may be reluctant to pay a high price for a right to access in a particular zone if that leads to investment in increased system capability in a particular zone. The lumpy nature of network investment means that this could lead to the undermining of the value of the right that had been bought.

Model C

Environment

2.47. Model C requires all generators to be exposed to the Short Run Marginal Cost of generation, which could be hedged by purchasing a Financial TEC (FTEC) product. This would generate similar incentive properties on renewable generation as Model B. Renewable generators would be able to access the

system through over-run arrangements if prepared to face SRMC exposure. In most guises, it would therefore not be as permissive as Model A in connecting renewable generation.

2.48. As with Model B, this model is complicated and would require a considerable amount of development time, including creation of a new financial instrument, FTEC. Model C would therefore not be a particularly timely way of bringing on new generation.

Competition

2.49. Model C would have a similarly beneficial impact on competition to Model B in that it would result in an efficient allocation of resources by ensuring that all parties are exposed to the marginal cost of access. Whilst efficiency in allocation does not necessarily have a positive effect on competition in its purest sense, by having accurate price signals, there will be fewer market distortions.

2.50. Model C may also result in competition benefits because it would allow the competitive allocation of access without the need for a liquid market in short term access products. Whilst in reality Model C and Model B collapse to the same thing when the market functions perfectly, Model C does not require the market to function perfectly to deliver a competitive outcome.

2.51. However, the complexity of the arrangements and uncertainty surrounding exposure to SRMC on an ex-post basis, may prevent certain participants from entering the market, which would reduce the number and diversity of market players.

Security of supply

2.52. As with Models A and B, the impact of Model C on the security of supply would be limited, as it would not result in significantly different incentives to connect new generation in the longer term.

Network investment

2.53. As with model B, overrun prices would provide a useful data series in relation to the value of network access and strong locational signals. However, overrun by its nature means that it is unlikely that a generator would be using the transmission system for a sustained period of time to trigger investment. Therefore the value of these signals in efficient network development may be limited.

2.54. The main issue arising from this model is whether investment requirements are signalled in a timely manner. Given the lead times associated with network investment, it would be more helpful for there to be signals of future constraints rather than current constraints. There may be a role for price signals from FTEC allocation and secondary trading mechanisms. However, the value of FTEC may be driven by expectations about the volatility of physical access costs as much as their level.

Costs to consumers

2.55. Model C would essentially offer the same lower cost regime relative to Model A as a result of lower constraint costs, and potentially more efficient network investment and lower stranded asset risk.

Implementation issues

2.56. Model C would similarly require a degree of reallocation of long-term rights to support additional generation connection, particularly if the market is reluctant to overrun at times of peak demand.

Risks and unintended consequences

2.57. The renewable deployment scenarios tested by Poyry have all been around a base capacity that could deliver 38% renewables by 2020. Only to the extent that profiles of deployment differ and/or renewable generation is constrained do we get variations in the overall level of renewable generation. In reality, there is a risk that the capacity modelled in these scenarios is not equally likely to turn up under each TAR model.

2.58. Any decision on the impact of the TAR models will need to consider whether there are material differences in the volume of generation connection that is likely to be forthcoming under each model and, if this is anticipated, the extent to which the ultimate objective relates to renewable energy capacity connections. More detailed analysis on specific proposals to implement TAR options will also need to be conducted in line with CUSC procedures.

2.59. It is likely that operating costs would be higher under Model A because of the lack of efficient signalling through charges. The model provides only weak signals of the cost (or benefit) of locating where there are (or are no) existing constraints. However, some of these additional costs may be offset by a combination of greater renewable generation and lower total generation costs (due to a bias towards less capital intensive onshore wind as opposed to offshore wind).

2.60. For Model A to be able to deliver this cost effective outcome, it must be combined with a timely network investment regime, otherwise constraint costs will escalate without delivering the benefit of additional generation.

2.61. Poyry considers that Model C has the lowest cost and, arguably, the most efficient short-run signals for network utilisation and connection decisions. However, this is likely to be offset by lower overall renewable generation volumes if the additional volatility and uncertainty in charges faced by generators increases the risk of connection, thereby reducing the delivery of renewable generation.

2.62. The materiality of this risk is hard to quantify accurately. If it is present then it may manifest itself in one of several ways:

- Lower actual generation connection and therefore, by implication, lower renewable output;
- Slower generation connection, or
- Higher cost of generation or of renewable support (reflecting higher cost of capital) and, by implication, an increase in the cost to consumers relative to the same volume and mix of capacity being delivered under Model A.

2.63. Model B, represented as it is as a hybrid of the other two models, represents a balance between the two. However, the extent to which this diversification mitigates or exacerbates the issues identified with both Model A and C would depend on a more detailed assessment of a specific proposal.

Strawmen models and code objectives

2.64. The approach set out in some of the models raises the issue of the treatment of existing generators transmission access rights. The existing statutes, licences conditions and relevant code objectives broadly require arrangements that promote competition in the generation market and to that end to avoid any undue discrimination between generators on the terms on which they connect to and access the transmission system. A difference in treatment between different classes of generator will be permissible if they are not in comparable positions, or where the generators concerned are in comparable positions but the difference in treatment can be objectively justified. Ofgem will carefully consider any proposals that are brought forward against the relevant legal and regulatory framework. There can be no guarantee that a measure, which is in whole or in part discriminatory, will be approved by the Authority when it is considered by reference to the relevant legal and regulatory framework.

2.65. Straw men models that envisage different access regimes for different generators (even for a transitional period), and specifically where existing generators and new generators gain access to the system on different terms will need to be assessed carefully to see whether the generators are in a comparable position and, if they are, whether the difference in treatment is objectively justified.

3. Short term measures

→ Chapter summary

- Given the current delays in connection, Ofgem and BERR believe that there should be urgent steps taken to connect new generation more quickly, and ahead of implementation of the enduring access regime. This means that for an interim period there should be a form of “connect and manage” to accelerate new connections.
- Appropriate GB Queue management is vital to enable viable generators to access the transmission system, and Ofgem will work with National Grid to ensure its revised methodology works appropriately.
- Time-limited GBSQSS derogations will be assessed by Ofgem and the TOs to help connect more generators in the short-term, ahead of reform of the enduring access arrangements.
- In circumstances where the benefits do not justify the costs of derogations from the GBSQSS access sharing may prove to be the best way to accelerate connection. Existing CUSC modifications that support this proposal should be advanced more quickly by the relevant working group to enable early decisions by the Authority. This is particularly the position in the case of capacity sharing (i.e. CAP163).
- These measures could allow around 1GW of new renewable connections including just under 600MW of projects that already have planning consent.
- The GBSQSS review should apply its findings to a wider review of the SQSS in light of the TAR amendment proposals, and round 3 of offshore wind.
- There is a further range of operational measures that are in progress or are being developed which could have a significant effect on transmission system capability, and ultimately in connecting new MW.

Introduction

3.1. As we have set out in the interim report, there is a range of measures that can be adopted in the short term which could enhance the ability of generators to connect to, and use, the transmission system.

Interim Steps to Accelerate Grid access

3.2. Early steps to develop enhanced enduring access arrangements through industry governance arrangements are welcome. It is likely, however, that the introduction of any reformed access regime will take some time given the need for detailed design and carefully managed implementation. It is conceivable given the need for proper process that a new regime may not be delivered until April 2010. This could be further delayed if any decision taken by Ofgem is subject to legal challenge.

3.3. Given the current delays in connection, Ofgem and BERR believe that urgent steps should be taken to connect new generation more quickly, and ahead of implementation of the enduring access regime. This means that for an interim

period there should be a form of “connect and manage” to accelerate new connections, which is comprised of a range of separate measures, which when taken together will yield real benefit in the short term. This approach should mean that an early connection date can be offered to projects that currently have planning consent where this can be objectively justified.

3.4. The form of connect and manage that we have identified to improve access in the short term includes the following measures:

- **Better Queue Management:** National Grid has already identified a range of improvements to the way in which it manages the queue of generation waiting to connect to the grid. Under its current licence provisions, National Grid is taking a more robust approach to removing speculative parties from the queue if it is obvious that they will not be in a position to use the system by the backstop date in their connection agreements. National Grid has also implemented a revised methodology on how to fill gaps in the GB queue. Ofgem will be working with National Grid in the coming months to ensure its methodology enables faster connection of new generation, by removing unviable projects and reassigning connection dates according to clear, objective criteria. Ofgem has also recently approved CAP150 which gives National Grid more discretion in reducing the capacity offered to unviable projects. This represents a major step forward in enabling space to be freed up in the queue which can then be used by others. It is therefore vital that an appropriate methodology applies to ensure these spaces are filled by those generators best able to use them. If there is any more that National Grid feels could be achieved in relation to GB Queue management, we would urge them to discuss its thoughts with Ofgem as soon as possible.

As we set out in the interim report, we consider that those generators that are best able to make use of the transmission system, as a result of achieving planning consents and having appropriate financing in place, should be advanced. Similarly those projects that are yet to achieve planning consents and are close to their backstop dates should be removed from the queue. It is important that there are appropriate measures in place to ensure that information about generators applying for a connection are accurate, both in terms of the amount of entry capacity they wish to acquire, and when they anticipate connecting to the transmission system. There needs to be more timely update of each project’s consent status, in particular if planning consent is refused this should be reflected in the information made available by the GBSO. At present it is questionable whether the information on plant status in the TEC register is as up to date as it can be. We would like National Grid to explore the option of making it mandatory for generators to provide a near real-time update of any change in project status.

- **Derogations from the GBSQSS.** National Grid, as GB System Operator, will work with its own transmission business and the Scottish transmission companies to identify opportunities to use derogations from minimum standards in the GBSQSS to achieve earlier connection of projects where the expectation is that a generator will be operational prior to completion of transmission system reinforcements. The assessment of each possible derogation, by Ofgem, will take into account the Authority’s statutory duties and will consider appropriate costs and benefits including the benefits of reduced carbon emissions. We believe this approach will lead to the connection of additional renewable generation ahead of introduction of reformed enduring access arrangements. The first derogations to be considered could bring forward projects that have requested an earlier

connection date in 2008/09. This approach is intended to be an interim solution pending enduring reform.

- **Access Sharing.** National Grid has already submitted a CUSC amendment in order to facilitate access sharing between existing and new generators. In circumstances where the benefits do not justify the costs of derogations from the GBSQSS, in particular where new connections will lead to constraining off existing renewable generation, access sharing may prove to be the best way to accelerate connection. We will ask the working group to expedite CAP163 through the CUSC process in order to allow Ofgem to make a decision by April 2009. We note that some variants of CAP163 are more complicated than others, but there may be practical solutions that can be delivered more quickly than others, and consider these should be explored. The first projects that may benefit from access sharing will be those that have asked for an advanced connection date in 2009/10.
- **SO Release.** As with access sharing, National Grid has raised a CUSC amendment that would entitle the GBSO to release more transmission capacity if it became available in the short term. We are therefore asking that CAP161 be brought to the Authority for a decision by April 2009 where practicable. However, we note that there may be permutations of CAP161 that are more complex and harder to push forward than others. We also recognise supporting changes to other documents have the potential to delay the timetable.

3.5. A combination of sharing capacity and exploration of the benefit of limited derogation has the potential to be of significant benefit in accelerating connection of those renewable generators that currently have planning consents. Data from NGET shows that there is in excess of 1GW of new renewable generation, of which 600MW has planning consents and is due to connect within the next two years that could potentially benefit from being granted earlier connection dates. However, Ofgem needs to be satisfied, particularly in the case of derogations, that the early connection of this generation can be objectively justified.

3.6. In coming to a decision as to whether derogations are justified, Ofgem will assess the costs, which are largely constraint costs (comprised of volume and price elements) and benefits mainly from lower carbon emissions, as well as other relevant factors. Given the concentration of generation ownership in Scotland, there may be legitimate concerns over market power if more capacity is released, as would occur if we allow derogations away from the GBSQSS. However, one option Ofgem would be willing to explore is where the dominant incumbent generators want to advance connection of new capacity, Ofgem may agree to connect more capacity if they auction some of their existing TEC on a daily or monthly basis in an open process in which they and any other generators could bid to acquire the rights.

GBSQSS

3.7. Given the specific characteristics of wind generation, a review of the GB SQSS was initiated to develop more appropriate provisions to accommodate its intermittency. The analysis that the transmission licensees have been undertaking seek to establish a more appropriate relationship between renewable generation capacity and required transmission capacity. On 9 January 2008, National Grid published a GB SQSS consultation document on the 'Review for Onshore Intermittent Generation'⁴. The purpose of this review was to ensure the

⁴ This document can be found at the following link:

security requirements of the transmission system appropriately takes into account the intermittency of generation against a background of increasing wind penetration in the GB transmission system.

3.8. The current approach to the treatment of wind generation in transmission planning was developed in response to significantly high wind project applications in Scotland. At the time it was developed, the transmission licensees recognised that wind generation was different from conventional generation and accordingly, had to be treated differently. The objective in developing the current approach was to ensure that the transmission licensees continued to provide an economic and efficient amount of transmission infrastructure.

3.9. We are yet to see the final report from the GBSQSS review group on accommodating onshore intermittent generation, and note that the review has not yet concluded. We therefore agree with the GBSQSS review group that given the potential for there to be significant change as a result of proposals to amend the CUSC, it should learn from the work it has already undertaken and move on to considering more appropriate changes in the long term. The GBSQSS review group should work alongside the current CUSC process, and aim to provide recommendations to the Authority for necessary changes as a result of the current CUSC process along the same timetable. We understand the GBSQSS review group aims to submit a new SQSS for approval by the Authority in December 2009.

3.10. It may also be beneficial for the GBSQSS review group to assess the extent of any impact of round 3 of offshore windfarm development when looking at the wider review of the GBSQSS. A high level of industry engagement in this process will be essential to ensure that access arrangements and transmission system security standards work together to support the connection of new generation.

Delivering and operating infrastructure – short term follow up actions from TSORG

3.11. As we set out in the interim report, Ofgem has written to the licensees to initiate further work on enhancing system operation, and requested responses on a range of actions. The licensees' submissions identify a range of relatively quick wins that can be instigated in operating the system.

3.12. Following requests for further clarification of the submissions by the transmission licensees, Ofgem now has the complete suite of responses to our request. To assist in understanding the large volume of information Ofgem has received, Ofgem commissioned KEMA Consulting Group to pull together the findings of the transmission licensees' submissions, and have attached a summary in Appendix 4. We have also published KEMA's full report in conjunction with this document.

3.13. The licensees have identified improvements in the four main areas⁵ as follows:

http://www.nationalgrid.com/NR/ronlyres/B6B8CABD-6D2C-4D1E-A48F-51789CA93484/22516/GBSQSS_Review_for_Onshore_Intermittent_Generation_.pdf

⁵ For more information on our request to the transmission licensees, please see the Interim Report – a link to which can be found in the "Associated Documents" section of this document.

- **Transmission system capability** – the licensees responded that there was scope for increasing the capability of the GB network through wider application of ratings based on short term, local weather forecasts. Hot-wiring of transmission lines to operate at a higher temperature than the assets' original design capability could also potentially yield benefits, and all three transmission licensees are either continuing their existing programme looking at improvements, or are initiating such a programme. One of the licensees quantified the potential benefits of hot-wiring at between 11% and 15%. Whilst generally detailed short term rating information is available for the 275kV/400kV transmission system, work is ongoing to extend this approach to the 132kV interconnected network.
- **Transmission system utilisation** – the concept of measuring utilisation enables assessment of the degree to which a generator that is dependent on the reinforcement of a boundary before it is allowed to connect could be accommodated within the existing capacity. Measures of utilisation help to inform the transmission licensees of the need to reinforce the transmission system in particular areas. The GBSO presented a methodology to calculate an ex-ante measure of boundary utilisation, but did not cover an ex-post assessment.
- **Limiting factors in current regulatory framework** – the licensees suggested a programme for review of the GBSQSS which included exploring removing regional differences, probabilistic approaches to security, different (lower) standards of security, e.g. N-1, and allowing the use of intertrips in planning timescales. In addition, the licensees assessed reducing the most onerous fault condition that should be catered for in the assessment of security. It was shown that through a simplified example, that this could increase the capacity of a transmission boundary by something of the order of 8-17%. However, when considering a high impact fault, the calculations showed the potential consequences outweighed the benefits. Therefore the licensees all suggested that the most onerous fault conditions against which security should be assessed should remain unchanged at this time, pending the outcome of the review programme.

The licensees agreed that the current information exchange as set out in the STC, which basically prescribes the information that the GBSO is required to provide to the TOs may not be sufficient. The current provisions apply the concept of the Boundary of Influence whereby outside of this boundary, there would only be minimal impact from one TO to another. As such, this allowed a limited dataset to be exchanged between the GBSO and the TOs for investment planning. As a consequence, the licensees have proposed changes to the STC that would seek to alleviate the potential for inefficient investment decisions.

- **Development** – the licensees are exploring new monitoring and protection solutions that would allow faster disconnection of faults and predictive systems that seek to prevent a wider area system collapse. If proven, these developments would allow the transmission system to be operated much closer to the limit of its capability, potentially without increasing the risk to security of supply. There is, however, a risk that the transmission system is made more brittle and whilst the likelihood of a severe event occurring would remain unchanged, the impact may be more substantial as it may spread more quickly and with less chance of successful intervention. It will be important for a strategic risk assessment process to be undertaken if the incentives on network operators increasingly address maximum utilisation in the short term.

The licensees are also embarking on a benchmarking exercise to assess the security standards used in countries with similar societal, political and economic backgrounds to the UK and that reflect other similar characteristics, such e.g. island networks with limited interconnection. The questionnaire based benchmarking study aims to complete by 31 March 2009 and provide insight in to the balance of risk, cost and security of supply across the differing approaches.

Ofgem's view

3.14. We are pleased that there is scope for real improvement in the levels of capability enhancement that can be achieved. We consider that wider application of short term weather ratings, in particular on the 132kV transmission system should be progressed as a priority, along with developing an enduring methodology in relation to boundary utilisation. We also consider that a further review of the GBSQSS in relation to limiting factors in the current regulatory framework should be progressed, taking into consideration the CUSC amendment proposals that are on the table, as well as considering interactions with the offshore wind regime in the light of round 3.

3.15. We are also receptive to proposals from the TOs in relation to new monitoring and protection solutions, but suspect that there would be a significant cost involved which would ultimately be recovered from users of the transmission system and consequently consumers. We are therefore interested to explore with the TOs in more detail what the potential benefits and costs would be associated with the schemes that have been identified.

3.16. The benchmarking exercise on security standards may be useful, but given it is questionnaire-based, it would appear that the time frame identified could be reduced so that proposals could be developed more rapidly.

3.17. Ofgem will liaise with the TOs in the next two months to develop a programme of work which will set out proposals in the above areas by April 2009 where appropriate.

4. Long term measures – facilitating the achievement of the 2020 targets

→ Chapter summary

- In addition to the significant amount of work that needs to be taken forward to revise the grid access arrangements and how capacity is acquired and used, the way in which new grid infrastructure is planned and developed also needs to be accelerated.
- Ofgem will initiate a workstream to consider the appropriate incentives on the TOs and GBSO to deliver new grid infrastructure on time so that new arrangements can be put in place alongside the revised access regime.
- Alternative funding arrangements for building new infrastructure projects such as opening them up to competition may yield benefit to generators and consumers.
- A significant system study setting out the necessary system capability to meet the 2020 targets will begin shortly and will conclude by the end of 2008. The Electricity Networks Strategy Group will have oversight of this study.

Introduction

4.1. It is clear that the challenges for the grid in accommodating the UK's 2020 renewables targets are considerable. In addition to the significant amount of work that needs to be taken forward to revise the grid access arrangements, and how capacity is acquired and used, the way in which new grid infrastructure is planned and developed also needs to be accelerated if we are to reach our targets. In meeting the targets, what will be important is for generators to know they will have a connection in a reasonable time period, whilst the transmission licensees should be incentivised to deliver this connection on time.

Incentive mechanisms and timely delivery

4.2. We have questioned whether the three TOs and GBSO have the right commercial incentives to help address the challenges that government and EU renewable energy policy is placing on the transmission networks. Without there being suitable reward for taking on risk, it is unlikely that the TOs will have sufficient incentive to rise to the challenge of government and EU policy on renewables.

4.3. Getting the right commercial incentives on the TOs and GBSO is vital in improving transmission access. Under the SO incentive scheme, National Grid is exposed to the short term operational costs of constraints which ultimately arise from a surplus/deficit of generation/demand over the capacity of the network. Therefore, any additional connection of generation without a commensurate increase in transmission system capability potentially exposes National Grid to higher costs via the SO incentive scheme. Similarly it can be questioned whether National Grid, acting as GBSO, has the correct set of incentives to trade off long term investment in the system with the operational costs of constraints.

4.4. When connecting new generation, the TOs do not provide firm connection dates or provide compensation if delivery of infrastructure is delayed. Therefore there is no incentive on the licensees to deliver on time or early. Instead, the generator bears any risk of delay.

4.5. Firm connection dates and appropriate incentives are vital in addressing the defects in the transmission access regime. Ofgem therefore intends to convene a workstream on TO/SO incentives with the aim of developing a reward and penalty incentive scheme for the TOs and GBSO delivering capacity on time. These reforms will be delivered to support the implementation of a revised enduring access regime. Some elements, e.g. in relation to the incentive package for timely delivery and work on enhancing the balance of risk and reward faced by the TOs could potentially begin earlier, and run along the same timetable as Ofgem's annual GBSO external incentive scheme, which is due to be implemented in April 2009.

4.6. Ofgem has sought initial views from the companies on their willingness to accept a "different" incentive package for any investment without user commitment to meet 2020 targets, i.e. to take on some risk of stranding and receive a higher reward than the standard price control cost of capital. Ofgem expects that this will mean that the companies will be able to earn a higher rate of return than under standard price control conditions if generators do book additional capacity once constructed or lower rates of return if the capacity is not utilised. Ofgem anticipates this will allow the transmission licensees to invest much faster and with less regulatory involvement. Ofgem expects to be able to consider proposals from the TOs before the end of July, for consideration alongside the GBSO external incentive scheme, which is due for implementation in April 2009. However, there is the potential for the transmission licensees and the GBSO to not agree with Ofgem on the incentive package. In this event there may be a delay to implementation.

4.7. Where appropriate, Ofgem will look to align the regime with that proposed for offshore transmission. In the case of offshore, early delivery of assets may not yield any benefit if there is only one generator that wishes to connect, and the generator itself is delayed. These and other properties will require a tailored approach to delivery incentives.

4.8. Ofgem is also considering whether there would potentially be benefit in some significant new projects being opened up to competition, or subject to new incentive arrangements. Ofgem has already published its view that one of the options for building the connection infrastructure to the Scottish Islands is via a competitive tender. Similar approaches for discrete projects may yield benefits to the consumers.

4.9. SHETL is developing proposals to build transmission connections out to the Western Isles and Shetland in order to connect planned renewable generation in those locations to the mainland network via submarine cables. As part of TPCR, it was agreed that SHETL could recover the efficient cost of pre-construction works (in the period leading up to the application for consents) for these proposed connections. Separately, Ofgem set out its initial views in June 2007 that it may ultimately be appropriate to adopt a competitive approach, similar to the offshore transmission regime, for delivering transmission connections to the Scottish islands. Ofgem is continuing to give consideration to what is the best approach to deliver such connections at the most efficient cost to consumers. We currently anticipate publishing a further document on this issue in autumn 2008.

System study for 2020

4.10. The scale of the network investment that will be needed to meet our renewable energy targets is substantial; the potential for 30 to 40% of GB's electricity requirements coming from renewables sources will require widespread system reinforcement. The extent of the system reinforcement likely to be needed, and the lead times associated with major works mean that we must establish an optimum regime for delivering infrastructure as soon as possible.

4.11. We consider that work should be undertaken setting out the likely programme of investment now. We also consider it is appropriate to begin the (relatively low cost) initial design and preparatory work up to and including, where appropriate, submitting planning applications early. The three transmission companies, led by the GBSO, will undertake studies to look at investment scenarios/requirements to meet the 2020 target. The companies are committed to carrying out these studies and delivering a report in six months. The Electricity Networks Strategy Group, which is jointly chaired by Ofgem and BERR and with senior industry representation, will have oversight of this process, in particular supporting the development of credible network scenarios. These scenarios will include proposals for the development of up to 25GW of additional offshore wind capacity, and the possible requirement for further inter-connection with other European countries.

5. Industry code modifications

National Grid's CUSC Amendments

5.1. At the end of April 2008, in response to our Transmission Access Review, National Grid raised a range of CUSC amendments that are designed to cover all of the features of the key access strawmen that we have identified. National Grid has embarked on an innovative approach for this range of amendments than previously attempted, by forming sub-groups that consider issues such as transmission charging and related code changes in a more holistic fashion. So that process is more manageable, they have split the work into short term and long term changes, plus enabling changes, rather than individual working groups for each of the six amendment proposals they have raised.

5.2. The key amendment proposals are as follows:

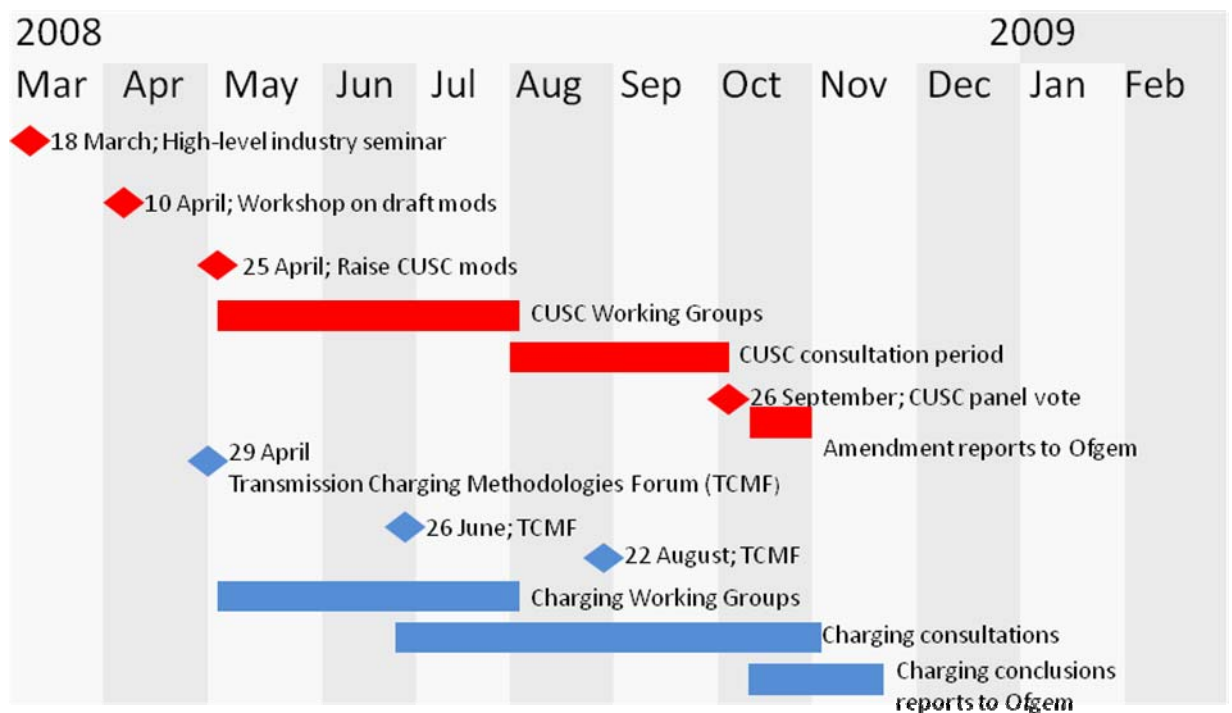
- CAP161: Transmission Access - System Operator Release of Short-term Entry Rights
- CAP162: Transmission Access - Entry Overrun
- CAP163: Transmission Access - Entry Capacity Sharing
- CAP164: Transmission Access - Connect and Manage
- CAP165: Transmission Access - Finite Long-term Entry Rights
- CAP166: Transmission Access - Long-term Entry Capacity Auctions

5.3. These CUSC amendments⁶ were designed on a modular basis so that they are capable of accommodating a wide range of transmission access strawmen. The amendments above could be fit together to provide options for transmission access reform that can cover the strawmen models. For example, CAP164 could be tailored to represent the Connect and Manage Model A that Poyry has identified. CAP162, CAP165 and CAP166 would look very much like Model B, and could be augmented with CAP161. Similarly Model C would require CAP165 and an amendment to the definition of TEC to introduce FTEC.

5.4. The industry process is facing a critical test: to see if it can cope with the challenging suite of amendments that have been presented by National Grid. BERR has made it known that if it becomes clear the industry governance process is not making sufficient progress, it will consider all its options, including legislation.

5.5. The timetable for these amendment proposals is necessarily challenging so that we can be clear that real progress is being made as a result of the TAR project. The CUSC working groups will embark upon a three month process between May and July 2008 to consider and develop reports for publication. The expectation is that this will culminate in a report to Ofgem by November 2008, as set out in the figure below. In addition, as described in Section 3, Ofgem will be considering the scope to accelerate work on CAP163.

⁶ Details of which can be found on National Grid's website in the following location:

Figure 2 – timetable for progression of National Grid’s CUSC Amendments

Related CUSC Amendments

5.6. There are currently two major CUSC amendment proposals that are with us for a decision that relate to potential reforms to the existing access arrangements:

- CAP148 “Deemed Access Rights to the GB Transmission System for Renewable Generators”, which would allow a renewable generator firm access to the system regardless of whether required wider transmission system reinforcements are in place;
- CAP131 “User Commitment”, which proposes to replace the existing arrangements for financial securities for new users with a generic, predictable level of financial commitment provided by new and existing generators. Ofgem has recently published its Impact Assessment on CAP131, which can be found on its website at www.ofgem.gov.uk, and
- In addition, there are ongoing discussions between National Grid and the industry to clarify their working arrangements following the implementation of CAP97 which requires the DNOs to ensure relevant transmission infrastructure works are completed before energising the connections to distributed generators (DG). CAP167 “Definition of a threshold(s) associated with the request for a Statement of Works” which was raised by National Grid on 12 May 2008 is designed to provide definitive clarification in the assessment of whether a small power station has a significant impact on the GB transmission system, and picks up where CAP097 left off.

5.7. Clearly there are important overlapping issues and interactions between the TAR project, which considers medium to long-term arrangements, and these on-going change proposals. Under the current governance arrangements, the Authority is required to assess each change proposal against relevant codes objectives, taking into account the Authority’s wider statutory duties, in making

its decision of approval or rejection. However, instead of considering these proposals in an isolated fashion, it is important that we take a strategic view to ensure that changes deliver not just incremental improvements, but work as a coherent package and bring about enduring benefits.

6. Conclusions

Discharging the objectives of the Transmission Access Review

6.1. We have set out our clear policy position that change to the current grid access arrangements are necessary to deliver the UK's renewable energy targets. We have identified a range of options in relation to access reform which we believe will yield a substantial improvement to the prospects of connecting new generation in a timely manner, at efficient cost, whilst recognising the importance of achieving a low-carbon generation sector. The recommendations we make in this document deal not only with enduring access and facilitating the 2020 targets, but also ensuring that real progress is made in the short term by looking at innovative practices in connecting generators and operating the transmission system.

6.2. To deliver on the objectives of the Transmission Access Review, we have identified a range of key actions for Government, Ofgem and the industry that should be taken. These are set out below:

Government will:

- Consult on its Renewable Energy Strategy in summer 2008.
- Support the ENSG in bringing together the work to identify the transmission reinforcements needed to support the 2020 targets.
- Review progress of access reform and take that progress into account in developing its Renewable Energy Strategy.
- Issue for consultation revised Environmental guidance to Ofgem.
- Keep under review the progress being made by industry and consider all its options (including legislation) should it become clear that the industry governance processes are not progressing the necessary change in a timely way.

Ofgem will:

- Assist the ENSG in bringing together the work to identify the transmission reinforcements needed to support the 2020 targets.
- Work with the GBSO to ensure its revised GB Queue management methodology works appropriately.
- Agree with the TOs whether there is benefit for adopting alternative approaches in the short term to connect additional generation as soon as possible. Ofgem will have regard to the balance of costs and benefits for existing and future consumers, including the benefits of reduced carbon emissions, when considering these issues.
- Undertake work on enhancing the incentive regime that the GBSO and TOs are subject to in meeting firm connection dates.
- Ensure timely decisions on industry modification proposals consistent with its statutory duties.
- Consider the merits of proposals brought forward through the industry governance process.

National Grid as GBSO will:

- Make real progress on the GB Queue ensuring consented projects are able to move ahead at the earliest opportunity.
- Through chairmanship of CUSC ensure modification proposals are co-ordinated across codes and focussed on delivering appropriate amendment reports to the Authority in a timely manner.
- Engage with Ofgem in its work on designing appropriate TO/SO incentive packages.

TOs will:

- Enhance the visibility of the connection and transmission reinforcement work that is taking place to give the industry an accurate picture of how quickly, and where, progress is being made in connecting new generation.
- Work with the GBSO to agree a timetable for a study by the three transmission companies, coordinated and led by the GBSO, to look at investment scenarios/requirements to meet the 2020 target. The companies have already met and together are committed to carry out these studies and deliver a report in six months.
- Engage with Ofgem in its work on designing appropriate TO/SO incentive packages, putting proposals forward by the end of July 2008.

Industry will:

- Engage positively in the modification process and related workstreams, recognising the need for significant change from the status quo in line with the timetable set out in this document.

7. Way forward

7.1. This is Ofgem and BERR's Final Report to the Secretary of State.

7.2. Alongside this report, the Government has published its Renewables Energy Strategy Consultation document. This consultation exercise provides an opportunity to respond to the issues covered in this report as well as on wider renewable energy policy issues.

Appendices

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Appendix 1 - TAR assessment criteria

1.1. The TAR assessment criteria which covers the elements we consider need to be considered when assessing models of transmission access, are detailed below:

- Promoting social and environmental objectives. Any proposals should be consistent with Ofgem's and BERR's statutory duties, reflecting the direct impacts that the transmission systems have on the environment, as well as the role the transmission systems play in facilitating broader social and environmental objectives. Proposals should also be consistent with the Government's climate change targets and should better support accommodation of renewable generation through timely connection and appropriate access products that provide certainty for developers;
- Promotion of competition. The arrangements should promote competition between industry participants, facilitating market entry and preventing undue discrimination between classes of users;
- Efficient network development. Transmission companies should have incentives to optimise the use of existing capacity, including release of unused capacity. In addition, demands for capacity should be appropriately signalled, ensuring that transmission licensees have sufficient information to efficiently allocate and provide capacity. Licensees should be rewarded for responding dynamically to changing circumstances to develop their networks in an economic, efficient and coordinated manner;
- Appropriate allocation of risk. Risk should be allocated appropriately between transmission companies, network users and consumers, which should be reflected in the charges levied on and/or payments made to relevant parties;
- Simplicity, transparency and minimising implementation and operational costs. Access arrangements and associated incentives should form a coherent whole, recognising interactions between different aspects of transmission policy, and should be capable of being implemented as simply and transparently as practicable so as not to disadvantage any class of user. The arrangements should not impose undue implementation or administrative costs on industry participants, recognising that such costs might be expected ultimately to be passed on to consumers;
- Security of supply. The mechanisms developed should not have a negative impact on the security of supply;
- Costs to consumers. Costs that are paid by users and consumers should be appropriate and proportionate. There is a need to strike the right balance between short-term costs and long-term benefits of accommodating more renewable generation, and
- Compliance with applicable legal requirements. Including the Electricity Act 1989, the Energy Act 2004 and relevant European law.

Appendix 2 - The Authority's powers and duties

1.1. Ofgem is the Office of Gas and Electricity Markets which supports the Gas and Electricity Markets Authority ("the Authority"), the regulator of the gas and electricity industries in Great Britain. This Appendix summarises the primary powers and duties of the Authority. It is not comprehensive and is not a substitute to reference to the relevant legal instruments (including, but not limited to, those referred to below).

1.2. The Authority's powers and duties are largely provided for in statute, principally the Gas Act 1986, the Electricity Act 1989, the Utilities Act 2000, the Competition Act 1998, the Enterprise Act 2002 and the Energy Act 2004, as well as arising from directly effective European Community legislation. References to the Gas Act and the Electricity Act in this Appendix are to Part 1 of each of those Acts.⁷

1.3. Duties and functions relating to gas are set out in the Gas Act and those relating to electricity are set out in the Electricity Act. This Appendix must be read accordingly⁸.

1.4. The Authority's principal objective when carrying out certain of its functions under each of the Gas Act and the Electricity Act is to protect the interests of consumers, present and future, wherever appropriate by promoting effective competition between persons engaged in, or in commercial activities connected with, the shipping, transportation or supply of gas conveyed through pipes, and the generation, transmission, distribution or supply of electricity or the provision or use of electricity interconnectors.

1.5. The Authority must when carrying out those functions have regard to:

- The need to secure that, so far as it is economical to meet them, all reasonable demands in Great Britain for gas conveyed through pipes are met;
- The need to secure that all reasonable demands for electricity are met;
- The need to secure that licence holders are able to finance the activities which are the subject of obligations on them⁹, and
- The interests of individuals who are disabled or chronically sick, of pensionable age, with low incomes, or residing in rural areas.¹⁰

1.6. Subject to the above, the Authority is required to carry out the functions referred to in the manner which it considers is best calculated to:

- Promote efficiency and economy on the part of those licensed¹¹ under the relevant Act and the efficient use of gas conveyed through pipes and electricity conveyed by distribution systems or transmission systems;

⁷ Entitled "Gas Supply" and "Electricity Supply" respectively.

⁸ However, in exercising a function under the Electricity Act the Authority may have regard to the interests of consumers in relation to gas conveyed through pipes and vice versa in the case of it exercising a function under the Gas Act.

⁹ Under the Gas Act and the Utilities Act, in the case of Gas Act functions, or the Electricity Act, the Utilities Act and certain parts of the Energy Act in the case of Electricity Act functions.

¹⁰ The Authority may have regard to other descriptions of consumers.

¹¹ Or persons authorised by exemptions to carry on any activity.

-
- Protect the public from dangers arising from the conveyance of gas through pipes or the use of gas conveyed through pipes and from the generation, transmission, distribution or supply of electricity;
 - Contribute to the achievement of sustainable development, and
 - Secure a diverse and viable long-term energy supply.

1.7. In carrying out the functions referred to, the Authority must also have regard, to:

- The effect on the environment of activities connected with the conveyance of gas through pipes or with the generation, transmission, distribution or supply of electricity;
- The principles under which regulatory activities should be transparent, accountable, proportionate, consistent and targeted only at cases in which action is needed and any other principles that appear to it to represent the best regulatory practice, and
- Certain statutory guidance on social and environmental matters issued by the Secretary of State.

1.8. The Authority has powers under the Competition Act to investigate suspected anti-competitive activity and take action for breaches of the prohibitions in the legislation in respect of the gas and electricity sectors in Great Britain and is a designated National Competition Authority under the EC Modernisation Regulation¹² and therefore part of the European Competition Network. The Authority also has concurrent powers with the Office of Fair Trading in respect of market investigation references to the Competition Commission.

¹² Council Regulation (EC) 1/2003

Appendix 3 – Glossary

A

Access Rights

The rights to flow specified volume of electricity, usually from a specified location (node or zone) to an explicitly or implicitly defined destination (e.g. market hub), and for a defined period. For firm access rights, a failure to deliver access due to insufficient network capacity is associated with financial compensation. For non-firm access rights, the flow is terminated without compensation when capacity is unavailable.

The Authority/ Ofgem

Ofgem is the Office of the Gas and Electricity Markets, which supports the Gas and Electricity Markets Authority (GEMA), the body established by section 1 of the Utilities Act 2000 to regulate the gas and electricity markets in GB.

B

Balancing Mechanism (BM)

The mechanism for the making and acceptance of offers and bids pursuant to the arrangements contained in the BSC.

Bid

In the context of the Balancing Mechanism, a bid is a tool used by the GBSO, whereby a user submits data representing its willingness to reduce generation or increase demand. National Grid then decides whether or not to accept the bid.

British Electricity Trading and Transmission Arrangements (BETTA)

The arrangements for the trading and transmission of electricity across Great Britain which are provided for by Chapter 1 of Part 3 of the Energy Act 2004, which have replaced the separate trading and transmission arrangements which existed prior to 1 April 2005 in Scotland and in England and Wales.

Balancing Services Use of System Charges (BSUoS)

The charges levied by National Grid in respect of the activities it undertakes to keep the transmission system in electrical balance at all time.

C

Connection Entry Capacity (CEC)

A measure of the maximum capability, expressed in MW, of a connection site and the associated generation units' connection to the transmission system.

Connection and Use of System Code (CUSC)

Multi-party document creating contractual obligations among and between all users of the GB transmission system, parties connected to the GB transmission

system and National Grid is relation to their connection to and use of the transmission system.

Consents

The process of obtaining Consents for the construction of a new overhead line to serve, for example, a wind farm can essentially be broken down into two distinct areas. Consents to be obtained from the Secretary of State/ Planning authorities etc in relation to permission allowing a line to be built and secondly, and more practically, consents from landowners who will be affected by the construction of the new line. For a new line consent under section 37 of the 1989 Act will be required.

In addition to section 37 consent, the DNO/TO must also obtain consent from the landowners over whose land the line will run. If a voluntary agreement cannot be struck, then either the land will have to be compulsorily purchased, under the provisions of section 10 and Schedule 3 (which is usually used for substations), or a Necessary Wayleave obtained over it, under the provisions of section 10 (Schedule 4 paragraphs 6-8).

Constraints

In the event that the pattern of generation may exceed the safe operational limits of a particular line or transmission system equipment, the GBSO will take actions to reduce the output of generators at specific locations on the system. At present these actions are taken in the Balancing Mechanism in the form of bids, and also via ancillary services, such as Pre-Gate Closure Balancing Mechanism Unit Transactions (PGBTs). Where a user's output is constrained down at a point on the system, the overall balance of energy will need to be retained, and costs will be incurred by the GBSO in bringing replacement energy onto the system.

Contracted background

This is the planning background against which National Grid assesses applications for connection and use of system. The contracted background includes all users that have entered into an (ongoing) agreement with National Grid for connection or use of system.

D

Deep reinforcement

Deep reinforcement refers to the works conducted on the wider transmission system in order to accommodate a change in the generation and demand pattern.

Department for Business, Enterprise and Regulatory Reform

The Department brings together functions from the former Department of Trade and Industry, including responsibilities for productivity, business relations, energy, competition and consumers, with the Better Regulation Executive (BRE), previously part of the Cabinet Office. The Department leads on making sustainable improvements in the economic performance of the regions. It is jointly responsible, with DfID and the FCO respectively, for trade policy, and trade promotion and inward investment.

Distributed Generation

A generator directly connected to a distribution system or the system of another user.

E

[Evergreen](#)

In the context of access rights, evergreen relates to access rights that do not have a finite end date.

F

[Final Sums Liabilities \(FSL\)](#)

The calculation of securities required for Users for their own works and for works that they will share with other Users.

G

[GB System Operator \(GBSO\)](#)

The entity responsible for operating the GB transmission system and for entering into contracts with those who want to connect to and/or use the GB transmission system. National Grid is the GB system operator.

[GB Transmission System](#)

The system of high voltage electric lines providing for the bulk transfer of electricity across Great Britain.

I

[Interruptible Products](#)

Products which allow National Grid to remove the right to generate prior to a given point at zero (or a reduced) cost.

K

[Kilowatt \(kW\)/Megawatt \(MW\)/Gigawatt \(GW\)](#)

A kW is the standard unit of electricity, roughly equivalent to the power output of a one-bar electric fire. A MW is a thousand kilowatts. A GW is a thousand megawatts.

[Kilowatt hour \(kWh\)/Megawatt hour \(MWh\)/Gigawatt hour \(GWh\)](#)

One kilowatt hour is the amount of electricity expended by a one kilowatt watt load drawing power for one hour. A MWh is a thousand kilowatt hours. A GWh is a thousand megawatt hours.

L

[Limited Duration Transmission Entry Capacity \(LDTEC\)](#)

LDTEC is a firm capacity product, which is provided within the financial year. It can provide access for a maximum of one financial year, and does not confer

additional rights beyond the end point of the product. The availability of LDTEC would be assessed against operational criteria according to a pre-defined timetable that would provide access within three weeks from National Grid's receipt of an application.

Long-run marginal costs (LRMC)

In the context of electricity transmission, long-run marginal costs are the marginal costs of establishing and using network capacity. They include, for example, marginal costs for network reinforcement, as well as resulting network losses and residual congestion costs.

Local works

Those works required to provide a generator with a connection to the transmission network that would enable it to export power.

O

Offer

In the context of the Balancing Mechanism, an offer is a tool used by the GBSO, whereby a user submits data parameterising its willingness to increase generation or reduce demand. National Grid then decides whether or not to accept the offer.

S

Short-run marginal costs (SRMC)

In the context of electricity transmission, short-run marginal costs are the marginal costs of using established network capacity. They include, for example, network losses and congestion costs.

Short Term Transmission Entry Capacity (STTEC)

STTEC is a firm capacity provided, provided within-year, in 4, 5 or 6 week blocks.

T

Transmission Asset Owner (TO)

There are three separate transmission systems in Great Britain, owned by three Transmission Asset Owners, National Grid Electricity Transmission plc, Scottish Hydro Electric Transmission Ltd and Scottish Power Transmission Ltd. National Grid also has the role of system across the whole of Great Britain.

Transmission Entry Capacity (TEC)

The contracted maximum amount of electricity that each user is permitted to export on to the GB transmission system at any given time.

Transmission Network Use of System (TNUoS) charges

Charges that allow National Grid to recover the costs of providing and maintaining the assets that constitute the GB transmission system.

Appendix 4 - Summary of KEMA Consulting TSORG follow up work

Background

1.9. Ofgem undertook with the three transmission licensees, National Grid Electricity Transmission (“NGET”), Scottish Hydro Electricity Transmission Limited (“SHETL”) and Scottish Power Transmission Limited (“SPTL”), a review of Transmission System Operation through the Transmission System Operation Review Group (“TSORG”) which sought to review operational measures to:

- Establish if the capacity and utilisation of the existing transmission system could be increased;
- Consider innovative approaches to network management and operation; and
- Highlight geographical areas where there may be scope to connect additional generation capacity using the existing transmission infrastructure.

1.10. This concluded with the publication of the TSORG report, which together with the Short Term Access Governance report and the joint Ofgem and BERR Transmission Access Review initiative led to recommendations for further work which included a number of actions on the transmission licensees.

1.11. The actions were split into four main categories:

- Transmission system capability
- Transmission system utilisation
- Limiting factors within the current regulatory framework
- Development

1.12. A summary and review of the responses to the actions in each of the four main categories is set out below.

Transmission system capability

1.13. The licensees were required to undertake analysis regarding the potential to introduce or extend techniques to increase the thermal ratings of circuits to maximise the utilisation of the existing infrastructure.

1.14. To enable a system operator to fully exploit the capability of a network, it must understand the ratings characteristics of each circuit comprising the

network. The most basic ratings are calculated using static assumptions, for example, standard loading profiles and seasonal average ambient temperatures. Improved utilisation of circuits is possible, however, where information is available that enables equipment ratings enhancement, whether this is dynamic information, such as weather forecasts, or the modelled thermal inertia of equipment. Such information can allow greater post-fault power flow based on contingency actions being undertaken within prescribed timescales to reduce circuit loadings.

1.15. Three main areas were considered: increased usage of weather informed ratings enhancements, the application of “hot wiring” circuits and the usage of short-term ratings in operational timescales.

Weather related ratings

1.16. Weather informed ratings enhancements seek to take advantage of forecast or current weather conditions to modify a circuit rating to reflect actual (or forecast actual) conditions, e.g. ambient temperature or wind speed, that may be markedly different from the seasonal average conditions that are used in calculating a circuit rating.

1.17. The licensees responded that there was scope for increasing the capability of the GB network through the wider application of ratings for overhead line circuits based on short term, local weather forecasts. One Scottish TO [SPTL] regarded the current application of the procedure by National Grid Electricity Transmission (“NGET”) to be “very conservative”, suggesting that the identified improvements in ratings of between 5-11% could be greater if a less conservative approach was adopted. It is clear that the worst case scenario from the Met Office Ratings Enhancement (MORE) process (Meteorological Office Ratings Enhancement) is used for up-rating of lines, e.g. taking the least favourable predicted weather conditions, with the adjustment factors that weight the forecast for historically recorded forecast error.

1.18. One Scottish TO [SPTL] outlined that they were in the process of reviewing and developing further their techniques for weather led dynamic ratings for their distribution network that includes the potential for integration with their control system using a state estimation engine to allow real-time ratings to be used on a business as usual basis. The two Scottish TOs saw benefit in moving the technique from a day-ahead prediction process to provide within-day ratings. They regard this as beneficial for the accommodation of more variable generation on the GB transmission system. The licensees suggested that implementation times would be dependent on the time needed to undertake survey work to calibrate and establish the local weather related input information to derive possible enhancements. An indicative timeline of 18 months was suggested by one Scottish TO [SPTL] to prepare the first circuit with five subsequent circuits being added within a further 12 month period. It was noted that the enhancement possible using the current techniques was lower than that available through hot wiring of circuits. One other development was highlighted by a Scottish TO [SHETL] that is seeking to use tension or sag monitoring equipment to provide better information in real-time to enable enhanced ratings to be accurately established.

KEMA's view

1.19. The application of the MORE process by NGET for calculating enhanced ratings, and the view of the Scottish TOs provides some suggestion that greater enhancement may be possible in excess of that which is currently achieved. The absence of action when the advice from the model suggests that the lines should be down-rated (compared to the standard seasonal rating) suggests that the model provides conservative estimates of possible rating enhancements. If this were not the case then the modelled de-ratings would be applied to reflect the same risk factors that apply e.g. public safety (safety distance clearance issues), greasing and fittings performance. This therefore suggests there is a potential opportunity to use higher ratings from this process, when the model suggests that the ratings can be increased, than are currently applied.

1.20. KEMA is aware of work that is well advanced in at least one another UK distribution company that will establish a dynamically rated overhead line route within its network to assist in managing loadings, demonstrating that some network operators are further advanced in these areas than others.

1.21. It would also appear beneficial to see increased information sharing regarding the potential of these innovative ideas to avoid repeating demonstration projects and duplicating research and development projects, either directly between the licensees or facilitated through a third party.

Hot wiring

1.22. Hot wiring is the ability to operate an existing circuit at a higher temperature than its original designed capability. The process exploits the ability to undertake a more precise assessment of the limiting factors, e.g. grease melting points, and safety clearance distances below the line. The development of Aerial Laser Survey (ALS) methods means that information is available to develop a precise understanding between conductor temperature and line sag and discover potential obstructions along the route. In addition, laser survey provides comprehensive information about an overhead line route that is likely to have ongoing value beyond simply hot wiring enhancement, for example it would be expected to assist wider asset management and future re-conductoring.

1.23. All of the licensees acknowledge that there are opportunities to increase network capability through hot wiring of circuits and are either continuing their existing programme of assessment of possible improvements or are initiating such a programme. One of the licensees [SHETL] did not include any hot wiring options but identified the potential for reconductoring with high temperature, low sag conductors to improve network capability on constrained circuits. One of the licensees [SPTL] quantified the potential benefit of hot wiring to be in the range 11-15%, and noted that this was a "firm" enhancement which could be utilised during planning assessments as opposed to an operational enhancement alone, i.e. not dependent on weather conditions. Two licensees [NGET & SHETL] also provided indications that they are currently undertaking research projects to identify new materials or constructions of overhead lines to increase route capacity, however, these projects were in the early stages of development and implementation timescales were not yet established.

KEMA's view

1.24. The Scottish TOs have not yet established a programme for hot wiring of circuits and therefore some investment will be required to gather the necessary information, for example, through aerial laser survey work, in order that circuit operating temperatures could be safely increased. NGET responses show that it is well advanced in this area and good progress has already been made to maximise the capability of circuits using this technique.

Short-term ratings

1.25. The approach to achieve short-term ratings for equipment requires the pre-fault loading of the limiting asset to be measured so that the magnitude and duration of the post-fault rating can be determined (e.g. a much higher loading is possible for a short-period, however, protection may operate before the theoretical maximum loading restricted by temperature is reached). This approach seeks to take advantage of the thermal inertia of the plant to avoid damage or unacceptable reductions in operating life.

1.26. NGET responded that detailed rating schedules are available for all new transmission circuits and all existing transmission circuits in England and Wales and most of the 400kV and 275kV network in Scotland. SPTL responded that the interconnected 400kV and 275kV network in Scotland had detailed rating schedules with work ongoing to extend this to the 132kV interconnected network (where currently generic ratings are more typically used). The collection of data on the specific circuit items, their capability over different loadings and time limits is ongoing and improvements in post-fault ratings may provide scope to improve the utilisation of the interconnected 132kV network in Scotland. Development work is underway by the licensees to improve the accuracy of ratings models across overhead lines and cables to further improve their utilisation and understand the impact of climate change, developments which are understood to be completed before 2011.

1.27. Other limitations on the ability to increase the capability of circuits, including stability and voltage constraint considerations can apply under specific circumstances (e.g. stability may be a particular problem for long length overhead lines). In addition to these limitations, one licensee [NGET] noted that its ability to use enhanced ratings is limited due to the warranty provided for new assets by suppliers, i.e. the warranty would be invalidated if the asset was used outside of the manufacturer's specified envelope of operation.

KEMA's view

1.28. Consideration should be given to reviewing plant specifications such that suppliers are encouraged to provide products and support arrangements that enable inherent short-term capabilities to be utilised.

Transmission system utilisation

1.29. To assist in understanding the use of the transmission network a measure of utilisation is being developed. In its role as System Operator, NGET was asked to bring forward a methodology for measuring the utilisation of capacity across

main system boundaries. Utilisation was defined as the anticipated boundary flow at a point in time divided by the corresponding boundary limit. The methodology utilised ex-ante information to establish two measures of utilisation, a purely market action based metric, that excluded all System Operator actions, and a pre-Gate Closure measure that included those actions. There was no ex-post measure considered in the licensee response for the measuring utilisation of transmission boundaries. Such an ex-post measure of utilisation was identified by one Scottish TO [SPTL] suggesting that it could help inform investment decisions.

KEMA's view

1.30. An ex-post measure could provide additional information that would complement the two measures identified. It could provide insight into the effectiveness of the market and the System Operator at maximising the use of the transmission system, within the limits of maintaining system security. An ex-post measure would appear to be a simpler measure to calculate (although does not necessarily capture itself any shortage of capacity), comprising metered data (extractable from operational systems) divided by the boundary limit calculated as part of normal operational planning process. There are clearly complexities in implementing the measures of utilisation, however, there appears the potential to take a first step based on information currently gathered by the System Operator, i.e. at cardinal points and for varying boundaries, to provide an indication of boundary and to test to the usefulness of this data.

Generation connection dependencies on boundary utilisation

1.31. The concept of measuring utilisation enables assessment of the degree to which a generator that is dependent on the reinforcement of a boundary before it is allowed to connect could be accommodated within the existing capacity. The licensees provided information on the generation projects that have dependencies on transmission reinforcements and any external dependencies, e.g. consents. The licensees outlined that the majority of generation projects in the GB queue are subject to one or more transmission reinforcements. The key risk to reinforcement programmes, highlighted by the licensees, is planning consents for new infrastructure. This issue is under consideration in the forthcoming Planning Bill. One licensee [SHETL] also suggested that uncertainty in which generation projects will actual come to fruition, the consequential need to undertake wide ranging design reviews (as upgrades are typically sequential) and the potential requirement to restart consents processes (to minimise stranded asset risk) are factors that introduce delays into the connections process. The percentage of projects that are dependent on transmission reinforcements ranges across the licensees from 70-90% (in MW capacity terms). Across GB approximately 12% of the MW capacity (15% by number of projects) seeking connection are not dependent on deeper transmission infrastructure upgrades.

Limiting factors in the current regulatory framework

1.32. The licensees were required to identify any factors in the current regulatory framework that had the potential to limit assessments or connections of new generation.

Limitations placed on licensees by GBSQSS

1.33. The Security and Quality of Supply Standard that applies in Great Britain, ("GBSQSS") places specific limits on the discretion of the transmission owners in sizing the transmission network in response to changes in generation and demand. The standards within the GBSQSS require the transmission system to be secure for a set of prescribed circumstances, e.g. a double-circuit overhead line fault, against a series of requirements, such as, no unacceptable overloading of equipment, staying within prescribed voltage limits, and maintaining stability of the system.

1.34. The licensees suggested a programme for review of the standards to review whether the limitations placed upon them by the GBSQSS should be changed. The review programme considered issues including: removing regional differences; probabilistic approaches to security; different (lower) standards of security e.g. "N-1"; and allowing the use of intertrips in planning timescales.

1.35. In addition, consideration was given to reducing the most onerous fault condition that should be catered for in the assessment of security. It was shown through a simplified example that this could increase the capacity of a transmission boundary by something of the order of 8-17%, however, the potential consequences of a higher impact fault was also considered and was regarded as outweighing the benefits of moving to a lower standard. The exact quantities considered in determining the impact was referenced to the cost of a total system shutdown, with the US Eastern Seaboard being used as an example where the cost to the regional economy was comparable to half the annual energy bill for the region. In conclusion the licensees all suggested that the most onerous fault conditions against which security should be assessed should remain unchanged at this time, pending the outcome of the review programme.

KEMA's view

1.36. There would appear to be merit in considering short duration reductions in the standard e.g. extending the potential for time limited derogations to a lower security level, where there is a cost benefit of allowing the new generation to connect earlier. Reliability analysis would be required to quantify the merits and risks of such an approach.

1.37. Furthermore, the number, location and character of double circuit fault events (N-D) might advantageously be re-examined to enable a more permanent but targeted relaxation to N-1 operation. It may be possible to extend this to consider a standard that maintains a bad weather arrangement of generation (including distributed generation) and network arrangements that would enable the system to operate at N-2 for bad weather circumstances (recognising that this would bring additional costs to operations at times). All of the above require a more probabilistic or risk based approach to setting the standards that would maintain the level of security to demand points to, with redundancy in transmission being one element that enables that security.

1.38. In addition, a strategic assessment with the aim of reducing the incidence of double circuit events would clearly be helpful and might for example address tower lightning vulnerability and performance, and protection stability.

Limitations that drive investment for current generation projects

1.39. The licensee responses showed that thermal limitations i.e. avoidance of unacceptably overloaded equipment, drove nearly 70% of all system reinforcements and these potential overloads most often occurred under the N-2 secured event. Having to secure against N-2 or N-D (worst double overhead line fault outage) events drove nearly 90% of all transmission reinforcements.

KEMA's view

1.40. This suggests that there is a benefit of moving to an N-1 security standard, at least on a selective basis, as it would significantly reduce the need for investment in the transmission system to accommodate additional generation. Consideration must be given to the potential impact of such a reduction on demand security and the risks associated with high impact, low probability events should be quantified. Such work should be incorporated into the reviews of the security standard and are included in the proposed work plan for the development of the current GBSQSS.

Exchange of information

1.41. To enable the most efficient and secure utilisation of the whole GB transmission system consistent standards must be adopted for the running and development of the system. This requires information to be exchanged between those who have the responsibility of meeting those standards, especially in areas where the actions in one network has implications on its neighbours.

1.42. The efficient development of the transmission system requires data collection, analysis and modelling for the array of elements that comprise the interconnected system. Included within this is data submitted by Users of the transmission systems that enables the system security to be assessed and reinforcement requirements to be identified. Under the British Electricity Transmission and Trading Arrangements the SO-TO Code ("STC") was established that determined the information exchange requirements from the System Operator ("GBSO") and the Transmission Owners (TO). The STC prescribes by inclusion the data items that can be provided by the GBSO. Within the arrangements a concept of the Boundary of Influence was established, whereby it was accepted (as a simplification) that outside of that boundary, there would only be minimal impact from one TO area to another. This allowed a limited dataset to be exchanged between the GBSO and the Scottish TOs for investment planning purposes. The licensees suggested that this original simplifying assumption appears to be inadequate, with modelling of the transmission system showing deviations that are outside of acceptable tolerances and noted that this could lead to inefficient investment decisions. The licensees have proposed changes to the STC that would seek to alleviate these issues by ensuring a single GB-wide dataset is used for all of TOs for reinforcement investment planning purposes.

KEMA's view

1.43. The moves to increase the sharing of information between the licensees would appear to be a helpful development, particularly noting that longer term trends indicate continued high network loading which is likely to result in greater sensitivity to system variables (as voltage and stability limits are approached)

and underscores the importance of accurate modelling. It is important that impact of any increased sharing of information is considered to ensure that there are no unintended consequences whereby any party is materially disadvantaged.

Developments

1.44. The licensees were requested to provide information on their current initiatives and research and development programmes that could facilitate the release of additional capacity or allow the connection of new generation.

1.45. The licensees are carrying out work in three main areas that would allow greater capacity to be released from the existing transmission system. These relate to improving the thermal ratings of overhead lines, which are discussed in paragraph 1.2 above. In addition, the licensees have been working on new monitoring and protection solutions that would allow faster disconnection of faults and predictive systems that seek to prevent a wider area system collapse, which would lead to significant loss of supply events. If proven these developments would allow the transmission system to be operated closer to the limit of its capability potentially without significant increased risk to security of supply because contingency actions would be undertaken automatically by fast acting or predictive protection systems. There is a risk that the transmission system becomes increasingly brittle as operational margins approach their working minimum levels, whereby disruptive events remain rare, but are increasingly catastrophic in their consequences, e.g. a high impact system incident is likely to spread more quickly with less chance of a successful intervention by operators (or automatic systems) to intercept cascade failure. It will be important for a strategic risk assessment process to be undertaken if the incentives on network operators increasingly address maximum utilisation of capacity in the short-term. This should include the deployment of leading practices in network modelling and development of suitable predictive tools, together with the appropriate skills and training and simulation and if necessary revised operational management practices.

1.46. The licensees are also embarking on a benchmarking exercise to assess the security standards used in countries with similar societal, political and economic backgrounds to the UK and that reflect other similar characteristics, e.g. island networks with limited interconnections. The questionnaire based benchmarking study aims to complete by 31 March 2009 and provide insight in to the satisfaction of the utilities of the balance of risk, cost and security of supply.

Summary remarks

1.47. In summary, it is clear that the projects and actions outlined by the licensees would deliver enhancements that could allow greater connection of new generation. It is also clear, however, that many of the responses do not include new thinking and may not consider the strategic considerations of a different future, one perhaps with large numbers of small generators embedded in lower voltage systems or greater demand response from smart metering or direct load control.

1.48. For these actions and approaches to succeed there is a need to address not only the core issues but ensure the commercial and regulatory arrangements and

the necessary resources are in place to drive timely resolutions to best meet TSORG objectives.

Appendix 5 - Summary of responses to the Analytical Discussion Document

1.49. We received six responses to the Analytical Discussion Document, from a mixture of incumbent generators, interest groups and consumer bodies. Elements of the majority of responses were aimed at issues broader than those directly related to the remit of the Analytical Discussion Document; however, these are also summarised below.

General comments

- One respondent stated that it recognises the efforts of industry, government and Ofgem, but is concerned about the bottom-up approach we have adopted results in complex access options being developed. It stated that complexity may create confusion and deter market entry.
- Another respondent highlighted defects in the planning process as being a major cause of the GB Queue and the funding mechanism for timely investment. This party believes that measures to combat these defects, in addition to relevant changes to the GBSQSS and relatively fast changes to access, such as TEC sharing, can significantly reduce the queue.
- One respondent considers that timely access and planning consents are the major hurdles to achieving the government's targets.
- Another respondent expressed support for progressing sensible and proportionate changes to accommodate renewable generation, providing improvements now and on an enduring basis. This respondent welcomed the initial support by Ofgem and BERR to allow industry mechanisms to deliver the solution.
- One respondent believes that there are three key factors to the TAR: tackling climate change by facilitating new low CO₂ at an efficient cost without impeding security of supply, planning and construction issues around infrastructure and better sharing of capacity. This party also believes that it is impossible to secure sensible connection dates, partly because National Grid has to be convinced that each station will connect, and that it will retire by a certain date.
- Another party considers that investor confidence would be best served if TEC continues to be for the life of the plant, provided that TNUoS continues to be paid, otherwise there will be a risk of stranding which may divert capital elsewhere. Another respondent echoed this view.

Access models

- One respondent expressed full support for objective assessment of costs and benefits, together with clarity on which features of given strawmen deliver against the TAR objectives.
- One party questions whether the difficulty in managing constraints is overstated, given Ofgem can investigate any abuse by market participants. This respondent also believes information on constraints needs to be transparent.
- One respondent stated that although it was beneficial to achieve rapid deployment of low carbon generation, it does not think identifying all potentially workable access models is the most efficient way forward. Specifically, this respondent does not think that spending a long period of time on developing long term auctions is desirable as industry does not want it.

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- Another respondent considers that splitting access into a number of building blocks demonstrates the danger of starting from a few straw men. A large number of straw men can be created, and it is at the building block level that the debate of pros/cons should occur. This party felt there would be benefit if Ofgem/BERR concluded on the relative merits of these components.
 - One respondent felt that if connect and manage was adopted it would provide an incentive for the TO to be flexible and/or innovative, i.e. proposing to underground transmission lines rather than overhead lines which can be considerably delayed in the planning process. This party also felt that the costs of connect and manage were overstated as the normal market feedback mechanism should mitigate costs as no more generation should want to run at any instant than the amount required to meet demand. If costs were significant. This party postulates that one approach might be to hold back planning consents on particular projects.
 - One respondent believes it is important to ensure that options put forward by Poyry and IPA are appropriately assessed on complexity and cost, as well as on efficiency and competition. Efficiency also benefits the environment by appropriately allocating resources. This party also considers that the IPA work does not seem to consider constraint cost implications and the creation of cross subsidies in some models, nor consideration of operational or implementation costs and timescales associated with moving to each model.
 - One respondent questioned whether assumption of 1:1 exchange rate between zones was appropriate. This party was also unclear as to how Model C worked and whether FTEC is simply a financial instrument. Inter-zone trading as a logical extension to intra-zonal may be possible in the long term, but its complexity and the effect on the stability of zones should be carefully assessed.
 - One respondent was not convinced that market based product allocation provides efficient signals in a world where revenue is dictated by the price control.
 - One respondent states that Model A is described as allowing more renewable generation to connect but questions whether this is the case as it can not be fully used as the system can not accommodate it, and will be constrained off at high prices. Would also require additional reserve and other ancillary services including part-loading, which should be included in calculation of environment costs/benefits
 - One respondent was concerned that the IPA analysis suggests renewable generation can be treated in a different way to conventional i.e. connect and manage for renewables only, which would be discriminatory.
 - Another respondent questioned how new transmission rights should be treated and do not agree auctions are appropriate, as subsidised generation would be at a competitive advantage. This party also considers that connect and manage (Model A) would result in extremely high constraint costs whilst it is likely the CO₂ benefit would not materialise as the generation has to be constrained off. This respondent went on to agree that discrimination between different categories of technology is not appropriate.
 - Another respondent recognises there is considerable scope for TEC sharing particularly in relation to OCGT plant that often runs when the wind does not. This respondent also sees benefit in a non-firm product in relation to spill.

Investment and incentives

- One party stated that it was important to recognise network investment drivers given that the government's targets will not be achieved. This respondent went on to state that strategic investment and investment based on user-commitment should be considered.
- Another respondent stated that network development must accommodate increased connection of distributed generation. This respondent also stated that user commitment is a necessity, and will ensure financially viable projects succeed in obtaining planning consents.
- One respondent thinks that strategic planning is an insightful approach to resolving the GB Queue. It considers that the SO tries not to incur constraint costs by delaying connection until infrastructure is complete and therefore has no incentive to innovate in order to deliver timely connection.
- One respondent stated that investment is absolutely crucial, including strategic investment, as in the long run it will be cheaper than constraints.

Incentives

- One respondent set out the importance of considering the appropriate framework for incentives, stating that it could be considered as part of the 2009/10 SO incentive scheme.

System Operation

- One respondent considers that optimisation of the transmission system is vital, and little weight is given to it in the Analytical Discussion Document.
- One respondent recognised the benefits of enhanced line ratings, hot wiring, fair weather relaxations and greater use of commercial intertrips.

Industry Code Amendments

- One respondent stated that existing CUSC amendments such as CAP131 and CAP148 could contribute to meeting the TAR objectives. This respondent also expressed a need to understand how CAP161-6 would fit into the overall framework and whether they will be assessed under an objective framework developed by Ofgem/BERR.