

## Monitoring the 'Connect and Manage' electricity grid access regime

### Sixth report from Ofgem, 14 December 2015

In 2010 we were asked to monitor and report on the impact of the enduring Connect and Manage grid access regime. This is our sixth report, which covers the year from 1 October 2014 to 30 September 2015.

### Report Highlights

- Since the Connect and Manage regime was implemented, a total of 255 large generation projects<sup>1</sup> have signed Connect and Manage offers, representing a capacity of over 42,500 MW.
- Connection dates for these projects have been brought forward by an average of just over five years compared to the previous 'Invest and Connect' approach<sup>2</sup>.
- 28 large projects, with a total capacity of 1,898 MW<sup>3</sup>, have connected under Connect and Manage.
- National Grid estimates that around 5.9 million tonnes of carbon dioxide have been saved through renewable generation connecting early as a result of Connect and Manage<sup>4</sup>.
- There has been an increase in constraint costs that can be attributed to the Connect and Manage regime during the year. The annual constraint costs attributable to generators connected under Connect and Manage have increased from £69.4m in the year to 30 September 14 to £121.7m in the year to 30 September 2015.
- National Grid expects these constraint costs to drop to nearly zero in 2017/18. The forecast of constraint costs after this date, and particularly in the early 2020s, depends on uncertain assumptions about the level of future generation coming forward and the date for completion of large reinforcement projects.
- We continue to approve funding to the onshore transmission owners<sup>5</sup> for large scale transmission network reinforcement works. In addition to the projects approved previously, in December 2014 we approved the Caithness Moray link which will allow 1,200 MW of additional renewable generation to connect in the north-east of Scotland by 2018.

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<sup>1</sup> All the data in our report covers transmission connected and large embedded generation projects only.

<sup>2</sup> Under 'Invest and Connect', generators seeking to connect to the network had to wait for the completion of all wider transmission system works identified as required for their connection, in accordance with the minimum criteria set out in the National Electricity Transmission System Security and Quality of Supply Standard (NETS SQSS).

<sup>3</sup> This is the most recent view of total capacity provided by National Grid, according to their Transmission Entry Capacity register

<sup>4</sup> This is from National Grid's calculations on the conventional fuel displaced by the output from the Connect and Manage generating stations. This is not necessarily the aggregate impact in net terms.

<sup>5</sup> The onshore transmission owners are: National Grid Electricity Transmission plc in England and Wales, Scottish Power Transmission Ltd in Southern Scotland and Scottish Hydro Electric Transmission plc in Northern Scotland and the Scottish Islands

## Background

The Connect and Manage transmission access regime was introduced by government in August 2010 and implemented on 11 February 2011. Its aim was to improve access to the electricity transmission network for generators by offering generation customers connection dates ahead of the completion of wider transmission system reinforcements. This allows them to connect earlier to the transmission system, but may result in additional constraint costs.

We monitor the Connect and Manage regime, and the Department of Energy and Climate Change (DECC) has asked us to publish an annual report on:

1. The impact on connections by generation type and region
2. Developers' confidence in the new arrangements
3. Costs and benefits to consumers of the new arrangements
4. Progress and costs of delivering the necessary wider grid investments.

Over the next few pages, we summarise the evidence in each of these areas for the reporting period. We also include information from the onshore transmission licensees on the differences between the connection dates requested by customers and the connection dates they are offered.

## 1. Grid connection

### Impact on connections by generation type and region

- 1.1. This section reports on the number of connection agreements entered into, and the amount of generation connected to the transmission system under Connect and Manage. The data is based on information from National Grid Electricity Transmission plc (NGET), and published in its quarterly report<sup>6</sup> on the Connect and Manage regime.
- 1.2. As at 31 September 2015, a total of 255 signed Connect and Manage agreements had been entered into by transmission connected and large embedded generators. These agreements total 42,500 MW of capacity. This is a net<sup>7</sup> increase of 54 projects, and 5,536 MW, compared to September 2014.
- 1.3. The number of generators with a signed Connect and Manage agreement that have now connected to the system has also increased in the year to 30 September 2015. There are now a total of 28 large connected generators with a combined capacity of 1,898 MW that are connected to the system under the Connect and Manage regime. This is an increase of five projects and 490 MW of capacity, from 30 September 2014.
- 1.4. Connection dates for all generators continue to be advanced under Connect and Manage<sup>8</sup>. The average advancement is still five years; this has remained stable since our previous report.

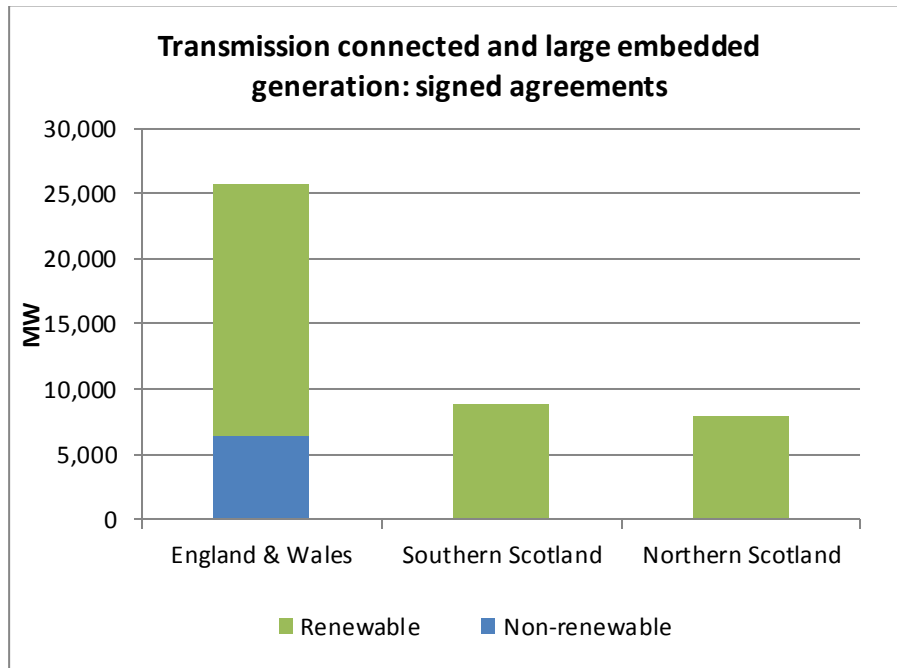
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<sup>6</sup> <http://www2.nationalgrid.com/UK/Services/Electricity-connections/Industry-products/connect-and-manage/>

<sup>7</sup> The net increase is the combination of some projects terminating / reducing capacity and some new connection agreements

<sup>8</sup> In comparison with the connection date which would be provided under an 'Invest and Connect' offer.

- 1.5. The graph below shows that around 85% of the capacity that has benefitted from advanced connection dates under the Connect and Manage regime is renewable generation. Just over 6,300 MW of non-renewable generation, in England and Wales, is also benefitting from earlier connection dates.
- 1.6. Appendix 1 contains more detailed data on connections. It compares the total offers, signed agreements and connected generation under the Connect and Manage regime for the period from implementation up to 30 September 2015, with the position in the year before.



**Capacity of signed connect and manage agreements since February 2011**

**Timely connections**

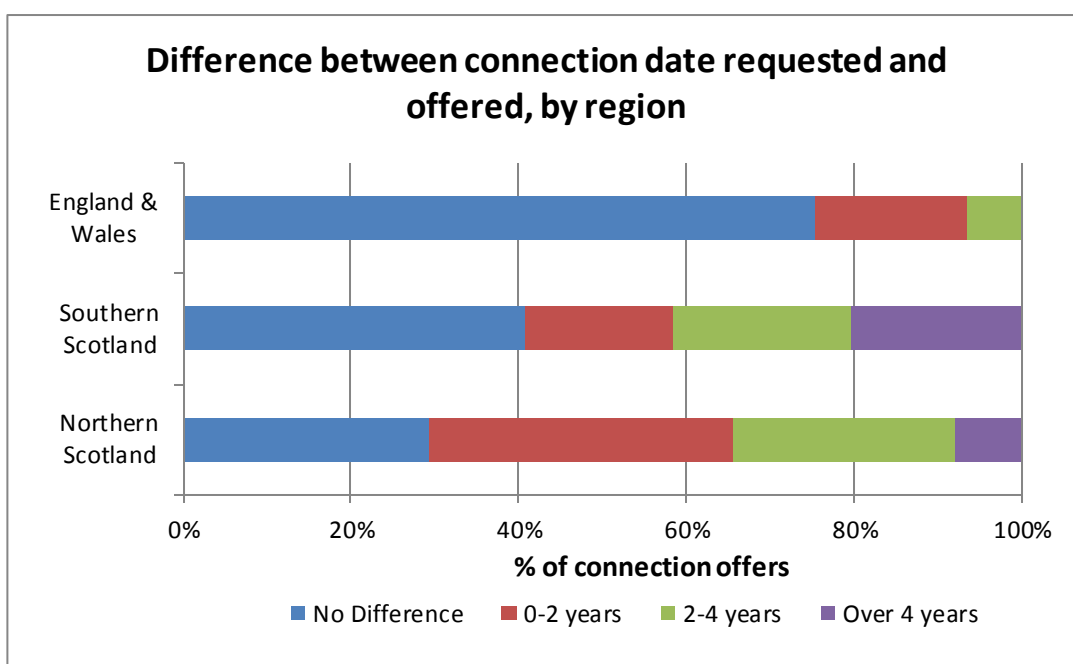
- 1.7. Every six months, we receive “Timely Connections” reports from onshore transmission licensees. These reports show us what factors are affecting the connection dates offered to generators. There is a non-confidential version of the combined reports on NGET’s website<sup>9</sup>.
- 1.8. The reports show that NGET, as System Operator (SO), issued a total of 271 connection offers (including offers to Distribution Network Operators on behalf of embedded generators and offers to modify existing applications) between 1 October 2014 and 31 September 2015.
- 1.9. 236 of these offers were Connect and Manage offers and these include new offers and modification applications. 72 of the offers were unique new Connect and Manage offers for connection to the transmission system.
- 1.10. Of all the connection offers made:
  - 61 were in England and Wales
  - 108 were in Southern Scotland

<sup>9</sup> <http://www2.nationalgrid.com/UK/Services/Electricity-connections/Industry-products/timely-connections-report/>

- 102 were in Northern Scotland

44% of these offers met the customers' requested dates.

1.11. The graph below illustrates, for each of the transmission owners' regions, the offers that met customers' requested completion dates, and the difference when the request was not met, in the year to 30 September 2015. During the year, in England and Wales, 25% of offer dates were made for a date later than requested by the customer. In Northern Scotland and Southern Scotland, around 71% and 59% respectively of offers, were made for a date later than requested by the customer, reflecting the network constraints in that part of Great Britain. This is, however, a small improvement on the previous year where 74% and 65% of offers were for a date later than requested by the customer.



1.12. These differences reflect the fact that some connections depend on other works being completed. These could include substation works, getting planning consents, collaborating with distribution network operators, and the timing of outages.

### Developers' confidence in the new arrangements

1.13. Under the RIIO-T1<sup>10</sup> arrangements we hold the companies accountable for delivering a range of outputs including timely connections, maintaining a reliable network, and engaging with stakeholders. We have two years of data 2013/14 and 2014/15, with accompanying annual reports which are published on our website<sup>11</sup>. At this stage, the data shows the companies performing in line with their targets.

1.14. We are aware that due to the demand for connections in areas of scarce grid capacity such as Northern and South West Scotland, developers' may not be able to secure a connection date as early as they would like. NGET has been working with developers to find opportunities where possible to advance connection dates within

<sup>10</sup> RIIO-T1 is the first transmission price control to reflect the new RIIO (Revenues = Incentives + Innovation + Outputs) model.

<sup>11</sup> <https://www.ofgem.gov.uk/network-regulation-%E2%80%93-riio-model/network-performance-under-riio/riio-t1-performance-data>

the existing Connect and Manage framework such as offering non-firm connections. NGET has also developed the Customer Connection Interface Tool to help customers' access network information in a user-friendly way and understand the challenges it faces in developing the transmission system in England and Wales. We will continue to work with NGET, the Scottish transmission owners and DECC to monitor the impact of delays in the ability to connect future generators to the transmission network.

## 2 Costs and benefits to consumers

- 2.1 This section reports on the costs and benefits to consumers of the regime to date. The data is based on information from NGET, some of which is published in its quarterly report on the Connect and Manage regime.

### Constraint costs to date

- 2.2 Last year, we reported that NGET had identified constraint costs<sup>12</sup> relating to Connect and Manage of £69.4m<sup>13</sup> in the year to 30 September 2014. This was 30% of total constraint costs in that period. In the year to 30 September 2015, 5 more projects have connected to the transmission system under Connect and Manage, bringing the total to 28 connected sites.
- 2.3 The constraint costs related to Connect and Manage in the year to September 2015 were £121.7m, representing 33% of the total constraint costs of £365.3m. The increase in constraint costs related to Connect and Manage is consistent with the increase in total constraint costs during the year.

### Controlling constraint costs

- 2.4 There are a number of incentives on NGET, as SO, to control the costs of managing constraints on the system. Our balancing services incentives scheme sets a target for these costs. NGET shares a proportion of any under or over-spends against this target, and has the incentive to keep constraint costs as low as possible. This scheme runs from 1 April 2015 until 31 March 2017 and we are currently reviewing what changes might be needed from April 2017 onwards. NGET's licence conditions require it to act economically and efficiently. We monitor NGET's actions and have the powers to take action if we consider it is in breach of its licence. We also have an innovation fund of up to £10m to support NGET in the rollout of technology which could be used to manage potential constraints.
- 2.5 With support from Ofgem, DECC introduced the Transmission Constraint Licence Condition (TCLC) in October 2012. The TCLC will stay in effect until 15 July 2017, with the possibility of a two-year extension. Its purpose is to prevent generators from benefitting at consumers' expense during periods of electricity transmission constraints. This could be by making dispatch decisions that create or exacerbate constraints, or by benefitting excessively from bids they make to reduce their output. The TCLC has so far had a positive impact. For example, the average amount paid per MWh to onshore wind farms to reduce generation is now significantly lower compared to before the TCLC came into force. We will continue to monitor electricity generators' compliance with the TCLC.

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<sup>12</sup> A constraint arises where the system is unable to transmit the power supplied to the location of demand due to congestion at one or more parts of the transmission network. In the event that the system is unable to flow electricity in the way required, NGET will take actions in the market to increase and decrease the amount of electricity at different locations on the network. These actions incur a cost.

<sup>13</sup> From 1 September 2013 to 30 September 2014.

- 2.6 It's important that communication between the SO and the transmission owners (TOs) is effective. It ensures that connections are made in a timely manner and constraint costs are minimised. The SO-TO code (STC) defines the high-level relationship between the parties. During RII0-T1, we worked with the TOs and the SO, to challenge further their commitments on communication, sharing information and making decisions that could make this interaction more effective in minimising industry costs. This might, for example, be through altering TO work plans at relatively small cost but in a way that allows a significant reduction in constraint costs.
- 2.7 The more detailed principles for coordination and communication between the SO and the TOs are in the Network Access Policies (NAP) for NGET and the two Scottish TOs which we approved in June 2015. We have been working with the TOs and SO to consider whether changes could be made to existing arrangements to support the NAP and TOs statutory obligations<sup>14</sup>. For example, financial incentives on the SO or additional funding mechanisms to help ensure the SO and TOs make decisions that maximise benefits across the whole transmission system.

### **Carbon savings to date**

- 2.8 In its quarterly reports, NGET has published information on the carbon savings made through the Connect and Manage regime. These savings arise when renewable generation connected under Connect and Manage offsets generation from other sources.
- 2.9 In last year's report, total carbon savings attributable to the Connect and Manage regime were 2.7 million tonnes of carbon dioxide (CO<sub>2</sub>). As at 31 September 2015, carbon savings have doubled to a total of 5.9 million tonnes since the start of the regime. It should be noted that the carbon benefit calculations are based on National Grid's estimate of the conventional fuel (e.g. coal, gas) that is displaced by the output from the Connect and Manage generating plants.
- 2.10 NGET has said that it does not have access to real time metering information for certain types of embedded generation and, for this reason, it remains unable to allocate any related constraint costs or related carbon savings to these generators.

## **3 Future costs and benefits**

- 3.1 This section reports on the forecast future costs and benefits of the regime. NGET update their forecasts for this annually in their Connect and Manage forecast report. The last forecast is dated April 2015 and can be found on their website<sup>15</sup>.
- 3.2 NGET's forecast of the costs and benefits of Connect and Manage is based on the Future Energy Scenarios (FES) which it publishes annually and provides four scenarios for NGET to use in planning for the long term development of the network<sup>16</sup>. The forecasts used in its latest Connect and Manage forecast report are based on the FES published in July 2014. Subsequently NGET has published a FES in July 2015. It should be noted that the forecasts in both the 2014 and 2015 FES do not reflect any potential impact of the latest Government announcements regarding the potential scope and level of future renewables subsidies. In addition, NGET has highlighted that their forecasts should not be viewed as definitive forecasts.

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<sup>14</sup> Section 9 of the Electricity Act 1989 details a requirement on transmission licensees to develop and maintain an efficient, co-ordinated and economical system of electricity transmission.

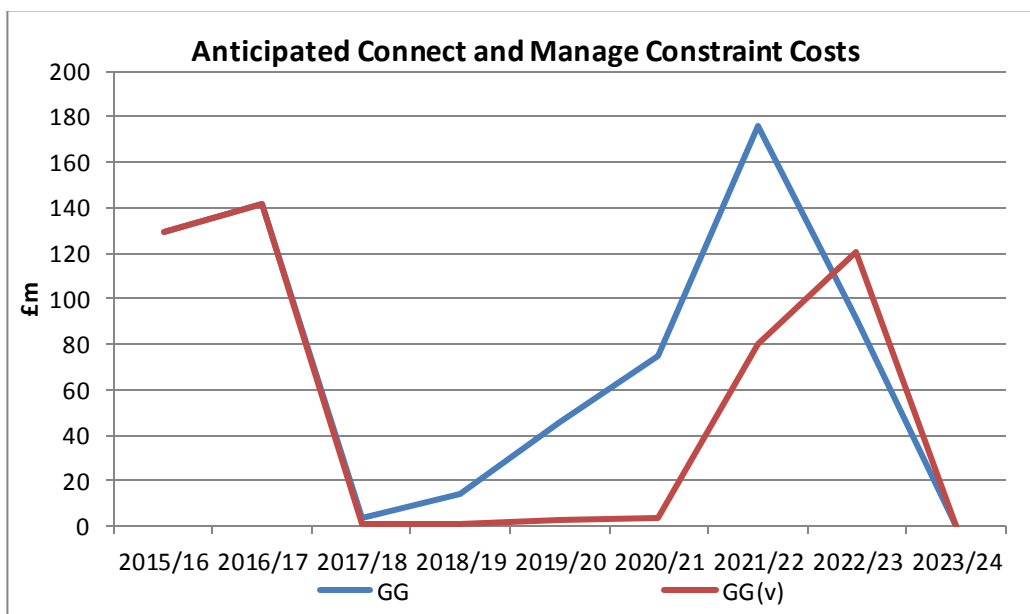
<sup>15</sup> The most recent Connect and Manage reports can be found at <http://www2.nationalgrid.com/UK/Services/Electricity-connections/Industry-products/connect-and-manage/>

<sup>16</sup> The Future Energy Scenarios can be found at <http://fes.nationalgrid.com/>

- 3.3 In the Connect and Manage forecast, NGET has used the Gone Green (GG) scenario from the 2014 FES scenario and a variant of the Gone Green scenario, 'Gone Green variant', for its modelling. The Gone Green variant uses another FES scenario, Slow Progression, for wind deployment with other generation and demand as per the GG scenario.
- 3.4 In the 2015 Connect and Manage forecast report, NGET also uses a different modelling tool to previous years. It has changed from a PLEXOS model to an ELSI model, which is NGET's in-house tool for long term constraint forecasts, the Network Development Policy and their Strategic Wider Works need cases. Information on the model itself and how it works can be found in the most recent Connect and Manage forecast report.

### Future constraint costs

- 3.5 The graph below shows the forecast annual Connect and Manage constraints under both scenarios (GG and GG Variant).



- 3.6 NGET expects constraint costs associated with Connect and Manage to peak in year ending March 2017 at £142m but then to reduce to nearly zero in 2017/18. This is mainly due to the impact of major reinforcements such as the Beaulieu Denny line, which completed in November 2015, and the Western HVDC link connecting Scotland and Northern England which is expected to be completed in 2017. Under the GG scenario, constraints are anticipated to start rising again from 2018/19 as new generators connect to the transmission system leading to further system constraints in advance of further reinforcements.
- 3.7 Longer range forecasts require a forecast of generation projects coming forward from 2018 onwards and assumptions about the likely completion dates for major new reinforcements not yet under development, such as the potential for a second HVDC link to connect on the East Coast between Scotland and England. The forecast shown in the graph above is based on a GG scenario in 2014 FES which includes high levels of new projects, both renewable and conventional, coming forward post 2018 and connecting ahead of new major network reinforcements. This results in increasing Connect and Manage constraints from 2018. The modelling shows this falling on the completion of the Eastern HVDC link which the model assumes will be 2023/24.

- 3.8 In our view, the likely outturn costs will depend on a number of uncertain factors. We would expect the 2016 FES, published in July 2016, to provide a set of scenarios which better reflect the potential level of generation over this time period given the recent changes to the policy on renewables subsidies. The requirement for and timing for future network reinforcement will in turn be driven by future levels of generation. It is not therefore certain that the level of constraints that can be attributed to Connect and Manage will be as shown in this report. This applies equally to the periods where forecasts costs are high and where forecasts costs are low. The same factors will also influence the total level of constraint costs over this period.

### **Future carbon savings**

- 3.9 In its quarterly reports, NGET projects carbon savings attributable to the Connect and Manage regime under the GG scenario. These reports can be found on the National Grid website<sup>17</sup>.

## **4 Progress and costs of delivering the necessary wider grid investments**

- 4.1 We have been managing programmes which fund the TOs for transmission network reinforcement so that an optimal level of network constraints relative to the cost of new transmission network investment is reached in the long term, and new generation connects to maintain security of supply and bring low carbon benefits.
- 4.2 Two major investments projects funded prior to the current price control period are due to complete over the next two years.
- Beaulay-Denny: The upgraded transmission line between Beaulay in the North of Scotland and Denny in central Scotland was energised in November 2015. The existing 132kV line has been upgraded to 400kV. This will help to reduce constraints and losses on the network, and facilitate the connection of additional renewable generation. The final reinstatement works on the Beaulay-Denny project are expected to be completed by the end of 2016.
  - Western HVDC link: this is a new sub-sea link between Scotland and England with a capacity of 2,200 MW and will help reduce constraints between Scotland and England. This is expected to be completed in summer 2017, a year later than initially planned due to cable manufacturing issues. Other areas of the construction programme are progressing in line with the project schedule.
- 4.3 RIIO-T1 put in place the Strategic Wider Works (SWW) process for the approval of major transmission investments. In their RIIO-T1 business plans, the three onshore TOs identified transmission projects totalling approximately £8 billion (2009/10 prices) that may be needed over the next decade. This will, however, be dependent on there being sufficient likelihood of new generation coming forward to justify the need for these projects.
- 4.4 In 2013 we approved funding for two transmission projects under the SWW arrangements. Both are due to complete later this year.

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<sup>17</sup> The most recent outturn reports for Connect and Manage can be found here: <http://www2.nationalgrid.com/UK/Services/Electricity-connections/Industry-products/connect-and-manage/>



- Kintyre-Hunterston: an upgrade to the existing network on the Kintyre peninsula and a new subsea cable to Hunterston substation which will deliver 270 MW of additional transmission capacity, reducing existing constraints and enabling connection of new renewable generation. The construction programme is on track to allow energisation by the end of 2015 as scheduled.
  - Beaully-Mossford: an upgrade to the existing network to provide 252 MW of additional transmission capacity north-west of Inverness. The works completed in December 2015.
- 4.5 In December 2014 we also approved £1.1 billion funding for SHE Transmission to build the Caithness Moray project in the north east of Scotland. The project involves laying a subsea cable beneath the Moray Firth and upgrades to existing transmission onshore. Enabling works for major construction phases on the project are progressing to schedule, and the manufacture of the specialised subsea cable is also underway. When completed in 2018, the Caithness Moray project will allow 1,200 MW of new onshore renewable generation to connect.
- 4.6 We are currently assessing a SWW proposal from NGET which involves a 400kV upgrade between Hinkley Point and Seabank to connect the planned new nuclear power station, Hinkley Point C.
- 4.7 We have recently agreed with the TOs to introduce a new stage in our SWW assessment process. This initial assessment will take place around the same time as when the TO is starting its planning consents process for a project. This will give us earlier sight of major transmission projects. As a result we expect to be in a better position to:
- Manage interdependencies between our assessment and the key milestones of a project.
  - Identify at early stage whether projects are suitable for tendering.
  - Identify key areas where the companies need to demonstrate the need/efficiency of their plans as part of the final needs case assessment.
- 4.8 Going forward we'll have more reliable and consistent information on the pipeline for major transmission projects from the annual Network Options Assessment (NOA) which the SO will first publish in March 2016. It will set out its view of the most efficient options to meet the needs it has identified to increase the capacity of the transmission system.

## **Appendices**

1. Connections data
2. Associated documents

## Appendix 1 – Connections data

Table 1: Connection information for large projects (offers, agreements and connected generation)

Region			As at September 2014	As at September 2015	Difference
<b>England &amp; Wales</b>	Total number of offers, agreements and connections		40	49	+9
	MW		21,547	25,786	+4,239
	Average reduction in connection date		3	3	0
		Number of projects connected	2	3	+1
		MW connected	411	631	+220
<b>Scotland</b>	Total Number		161	206	+45
	MW		15,503	16,800	+1,297
	Average reduction in connection date		5.4	5.5	+0.1 years
		Number of projects connected	21	25	+4
		MW connected	997	1,267	+270
<b>Totals</b>	<b>Total number of offers, agreements and connections</b>		<b>201</b>	<b>255</b>	<b>+54</b>
	<b>MW</b>		<b>37,050</b>	<b>42,586</b>	<b>+5,536</b>
	<b>Average reduction in connection date</b>		<b>5</b>	<b>5</b>	<b>0 years</b>

## Appendix 2 - associated documents

- Department of Energy & Climate Change – Government Response to the technical consultation on the model for improving grid access – 27 July 2010  
[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/42979/251-govt-response-grid-access.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/42979/251-govt-response-grid-access.pdf)
- Previous reports to the Secretary of State, Monitoring the 'Connect and Manage' electricity grid access regime  
<https://www.ofgem.gov.uk/electricity/transmission-networks/transmission-access-review>
- National Grid's Quarterly Connect and Manage reports  
<http://www2.nationalgrid.com/UK/Services/Electricity-connections/Industry-products/connect-and-manage/>
- National Grid's Timely Connections reports  
<http://www2.nationalgrid.com/UK/Services/Electricity-connections/Industry-products/timely-connections-report/>