



**Charges for Connecting Groups of Generators to the  
Northern Ireland Distribution System**

**A Consultation Paper**

**16 March 2010**



## **EXECUTIVE SUMMARY**

Northern Ireland Electricity plc (“NIE”) is continuing to receive numerous requests from developers to connect their wind farms to the Northern Ireland distribution system and this is presenting major challenges in planning developments on the network. NIE is concerned that not all wind farms can be connected using sole-use overhead power lines and sees no alternative but to connect many of them into shared substations.

Should that option be adopted new connection charging policies need to be developed.

Four charging options are set out in this paper:

- Option 1      Developers only pay for the sole-use assets in the connection charge and the cost of the shared assets is recovered through use of system charges.
- Option 2      The first to connect pays the total cost and then receives a partial refund in respect of the cost of the shared asset from those connecting at a later date.
- Option 3      Each developer pays in proportion to their share of the connection capacity.
- Option 4      Each developer pays in proportion to their share of the generation capacity expected to be connected.

Views on the four options outlined, along with suggestions for other options, are invited by 28 April 2010.

---



**TABLE OF CONTENTS**

Page

**1 Introduction ..... 1**

**2 Wind Farm Connection Activity ..... 1**

**3 Statutory and Licence Obligations ..... 2**

**4 Connection Charging Methodology ..... 3**

    4.1 Harmonisation of connection charging policy for the Single Electricity Market..... 3

    4.2 Northern Ireland distribution connection charging methodology ..... 4

    4.3 Connection charging arrangements in the Republic of Ireland ..... 6

**5 Shortcomings of the Existing Connection Charging Methodology ..... 6**

**6 Overhead Line Consents ..... 7**

**7 Connection Charging Methodology Options..... 7**

**8 Discussion ..... 9**

**9 How to Respond to this Consultation ..... 10**

**Figure 1 – Illustration of the LCTA charging Methodology ..... 11**

**Appendix 1 – Existing wind farms ..... 12**

**Appendix 2 – Wind farms in the planning process..... 13**

**Appendix 3 – Illustration of connection charges for each charging option..... 15**

**Appendix 4 – Illustration of cash flows for Option 2 ..... 17**

**Appendix 5 – Illustration of cash flows for Option 3 ..... 18**

**Appendix 6 – Illustration of cash flows for Option 4..... 19**



## 1 Introduction

Approximately 7% of Northern Ireland's electricity is generated from renewable energy sources and it has been proposed by the Department of Enterprise, Trade and Investment ("DETI") that in two years time this will increase to 12% and in ten years time, 40%.<sup>1</sup>

The majority of the generation projects which will contribute towards meeting the 40% target will be wind generation and, in particular, onshore wind. As such, Northern Ireland Electricity plc ("NIE") is continuing to receive numerous requests from developers<sup>2</sup> to connect their wind farms to the Northern Ireland distribution system<sup>3</sup> and this is presenting major challenges for NIE in two particular areas:

Firstly, the planning and development of a power system to an optimal level of capacity and to a timescale that meets the needs of developers is always demanding. Where the project timescales, both for network and generation developments, are uncertain and where the future generation capacity requirements are not finalised, it is particularly complex.

Secondly, it has become clear to NIE through discussions with the planning authorities that the connection of all the proposed wind farms to the distribution system using individual overhead power lines is unlikely to be possible as to do so would create an unacceptable detrimental effect on the environment. It is likely that NIE would get permission to connect the initial developments using sole-use overhead lines but severe difficulties will be encountered when seeking planning permission for subsequent lines to run in parallel with those lines already constructed. This would have the effect of reducing the overall amount of generation which can be connected to the system. However, NIE believes that the impact on the landscape would be mitigated if some wind farms were to be connected through shared higher capacity overhead power lines and if that was to be implemented then more generation capacity could be connected.

This consultation paper sets out proposals for connecting groups, or 'clusters', of generation projects to the distribution system and, in particular, outlines potential charging options. Views are invited on these proposals.

## 2 Wind Farm Connection Activity

There are 23 wind farms currently connected to the Northern Ireland electricity system with a total maximum output of 326 MW. Details of these wind farms are provided in Appendix 1.

There are a further 17 wind farms in Northern Ireland which have now received planning permission from the Department of the Environment. Most of the developers of these wind

---

<sup>1</sup> [http://www.detini.gov.uk/draft\\_strategic\\_energy\\_framework\\_2009-2.pdf](http://www.detini.gov.uk/draft_strategic_energy_framework_2009-2.pdf)

<sup>2</sup> The term 'developer' in this paper should be taken to mean the party responsible for the construction of a generation project and/or the party who applies for an offer of connection to the distribution system.

<sup>3</sup> NIE manages connections to the distribution system – the electricity system in Northern Ireland operating at 33kV and below. The transmission system operator, SONI Ltd, manages connections to the transmission system, the electricity system in Northern Ireland operating at 110kV and above.

farms have applied to NIE for an offer to connect their wind farms to the Northern Ireland distribution system. The total maximum output of these wind farms is 293 MW.

There are a further 47 wind farms currently in the planning process and under consideration by the Department of the Environment. The total maximum output of these wind farms is 908 MW. Details of these wind farms are provided in Appendix 2.

While some wind farms will be offered individual connections, NIE believes there is a need to group the remainder into about 10 clusters in order to connect them to the distribution system.

### **3 Statutory and Licence Obligations**

NIE is the owner of the Northern Ireland electricity distribution system and is authorised by means of a Licence<sup>4</sup> issued by DETI under Article 10(1)(b) of the Electricity (Northern Ireland) Order 1992 as amended (the “Order”) and it is regulated by the Northern Ireland Authority for Utility Regulation (“NIAUR”).

NIE also has a statutory obligation to comply with the Order.

Under the Licence, NIE is responsible for the planning, development, maintenance and operation of the distribution system, a system consisting of some 27,000 miles of network connecting approximately 800,000 customers and with a maximum demand of about 1,900 MW.

Offers for connection to the distribution system are made by NIE following receipt of an application containing all the information that NIE requires in order to prepare the offer.

NIE is required by Condition 32 of the Licence to prepare a statement approved by NIAUR (The Statement of Charges for Connection to the Northern Ireland Distribution System) setting out the basis upon which charges will be made for connection to the distribution system. A copy of that statement can be obtained at:

[www.niegetconnected.co.uk/downloads/statement\\_of\\_charges.pdf](http://www.niegetconnected.co.uk/downloads/statement_of_charges.pdf).

Other relevant licence obligations are:

- (a) NIE is required by Condition 15 of the Licence to ensure that in providing offers of connection to the distribution system it does not unduly discriminate between any persons, or any class or classes of person or persons.
- (b) NIE is required by Condition 30 of the Licence to offer terms for connection to and use of the distribution system, subject to the terms of the Licence and the Order. This requirement applies in respect of works required on the transmission system as well as works required on the distribution system.

---

<sup>4</sup> [http://www.niaur.gov.uk/uploads/publications/2009-08-26\\_NIE\\_plc\\_-\\_Licencing\\_Scheme\\_Transmission\\_Licence\\_-\\_Consolidated.pdf](http://www.niaur.gov.uk/uploads/publications/2009-08-26_NIE_plc_-_Licencing_Scheme_Transmission_Licence_-_Consolidated.pdf)

- (c) NIE is required by Condition 32 of the Licence to set connection charges at a level which will enable NIE to recover:
- (i) the appropriate proportion of the costs directly or indirectly incurred in carrying out any works, the extension or reinforcement of the distribution system and the provision and installation, maintenance and repair and, following disconnection, removal of any electric lines, electrical plant, meters, special metering, telemetry, data processing equipment or other items; and
  - (ii) a reasonable rate of return on the capital represented by such costs.
- (d) NIE is also required by Condition 32 of the Licence to ensure that, in setting its charges for connection, it shall not restrict, distort or prevent competition in the generation, transmission, distribution or supply of electricity.

Under Article 12 of the Order NIE, as an electricity distributor, has a duty to:

- (a) develop and maintain an efficient, coordinated and economical system of electricity distribution; and
- (b) facilitate competition in the supply and generation of electricity.

## **4 Connection Charging Methodology**

### **4.1 Harmonisation of connection charging policy for the Single Electricity Market**

In December 2007 the Single Electricity Market (“SEM”) Committee issued a consultation paper <sup>5</sup> on transmission connection charging policies under the SEM. Attached to that consultation paper were the draft charging statements of SONI, the Northern Ireland Transmission System Operator, and EirGrid, the Transmission System Operator in Ireland. <sup>6</sup> These papers represented the output of extensive work carried out by SONI, EirGrid and NIE, in co-operation with the Commission of Energy Regulation (“CER”) and NIAUR.

A decision paper was issued by the SEM Committee on 14 March 2008. <sup>7</sup> The decision paper approved the transmission connection charging statements of SONI and EirGrid which meant that transmission connection charging policies were broadly harmonised across the island. The current connection charging policy for SONI can be found at [www.soni.ltd.uk](http://www.soni.ltd.uk) and the connection charging policy for EirGrid can be found at [www.eirgrid.com](http://www.eirgrid.com).

---

<sup>5</sup> Draft Connection Charging Statements: A Consultation Paper - SEM-07-12

<http://www.allislandproject.org/en/generation.aspx?mode=author&article=16f054e8-4338-4c77-a6bb-0c6eb1fa18cf>

<sup>6</sup> The two Transmission System Operators are the only parties entitled to make offers of connection to the all-island transmission system.

<sup>7</sup> Transmission Connection Charging Statements: A Decision Paper SEM-08-028 14 March 2008

<http://www.allislandproject.org/en/generation.aspx?mode=author&article=16f054e8-4338-4c77-a6bb-0c6eb1fa18cf>

---

However, the decision paper did not address distribution connection policies in the SEM and the existing distribution connection charging policies of NIE continued to apply. The current situation is that the vast majority of generation connections in Northern Ireland, mainly wind farms, will be made to the distribution system.

## **4.2 Northern Ireland distribution connection charging methodology**

### **4.2.1 Generation connection charges**

As stated in Section 3, NIE's connection charging methodology is set out in "The Statement of Charges for Connection to the Northern Ireland Distribution System" and that statement should be read in full to gain a complete understanding of the charging methodology <sup>8</sup>.

The key charging policies relevant to the connection of generators state that the developer shall pay for:

- (a) the estimated cost of installing new and/or modified connection assets; and
- (b) a proportion of the estimated cost of installing any new connection assets which are to be shared with others who are connecting simultaneously, if any.

In this context, the term 'connection assets' means:

- (i) those assets required to connect the customer's assets to the distribution system, including, as appropriate, civil works, electrical lines, electrical plant, meters, telemetry and data processing equipment;
- (ii) those assets required to reinforce the distribution system which are at the connection voltage level and one voltage level above; and
- (iii) in the case of a customer connecting at 33kV, those assets required to reinforce the transmission system at 110kV which are installed to enable the transfer of the customer's maximum export capacity or maximum import capacity, disregarding electricity flows caused by any other customer.

### **4.2.2 Payment terms**

The connection charge is normally payable in full in advance of commencing site construction works. However, in the case of connection works for generators and load customers being connected, or already connected, at 33kV NIE may agree to the connection charge being payable during construction of the connection, subject to security for payment of the connection charge being provided. Where a connection is to be commissioned or constructed in phases, payments will be reflective of those phases with payment details set out in the connection offer.

### **4.2.3 Least cost technically acceptable connection offer**

---

<sup>8</sup> [www.niegetconnected.co.uk/downloads/statement\\_of\\_charges.pdf](http://www.niegetconnected.co.uk/downloads/statement_of_charges.pdf).

A key concept in connection charging is the “least cost technically acceptable” connection or “LCTA”. NIE will normally offer a developer the LCTA connection but there may be occasions where NIE decides for system reasons that the preferred connection design is not the LCTA connection. In that event, the developer will only be required to pay for the estimated cost of the LCTA connection.

In this context “LCTA” is defined as the connection which:

- (i) complies with the Transmission and Distribution System Security and Planning Standards<sup>9</sup>; and
- (ii) complies with any other applicable standard, regulation and code; and
- (iii) takes into account committed developments on the Distribution System; and
- (iv) is the least overall cost.

This policy was introduced to ensure that a customer does not pay an increased connection charge where NIE has chosen, for system reasons, to construct a more expensive connection.

#### 4.2.4 Shared connection assets and the refund mechanism

It is an existing NIE policy that where a new customer is connected to the distribution system by making use of connection assets which were funded by an existing domestic customer(s) who connected within the preceding five years the new customer will be charged a proportion of the value of the shared connection assets, calculated in accordance with the Electricity (Connection Charges) Regulations (Northern Ireland) 1992. The existing domestic customer will then be entitled to receive a partial rebate of the original connection charge.

Note that these provisions only apply to domestic customers already connected.

While legislation requires a refund mechanism for domestic customers it does not exclude it for other classes of customers. Some of the options described in section 7 of this paper make use of a refund mechanism.

#### 4.2.5 General

NIE would welcome views on the Statement of Charges in general. One particular aspect which respondents may wish to comment on is payment terms. NIE does not at present allow customers to pay connection charges annually but is willing to consider such an option. Respondents may wish to submit views on whether or not annual connection charges would be a positive development and, if so, over what period they should be paid. However, should this option be implemented then measures may need to be introduced to protect Northern Ireland customers from bearing the risk of a customer going into payment default. Views are also requested on credit cover arrangements which would be appropriate.

---

<sup>9</sup> These are the standards which NIE is required by the Licence to comply with in planning and developing the Northern Ireland electricity system. They can be found at [www.nie.co.uk/marketopening](http://www.nie.co.uk/marketopening).

### **4.3 Connection charging arrangements in the Republic of Ireland**

Offers to connect renewable generators to either the transmission or the distribution system in the Republic of Ireland follows a group processing approach. Connection applications are processed in “Gates” by EirGrid, the Transmission System Operator, and by ESB Networks, the Distribution System Operator in accordance with procedures approved by CER. The system operators are now processing Gate 3, the third renewable group.

The group processing approach enables the system operators to process concurrently a number of connection offers for generators of known capacity, rather than having to treat each application on an individual basis. That process is not possible in Northern Ireland as developers cannot be issued with connection offers until they secure planning permission for their generating plant. This requirement was introduced to prevent inefficient hoarding of capacity by developers who might not receive planning permission. This could threaten achievement of Government renewable energy policy.

Regarding the charging methodology, where a number of generators connect simultaneously in the group and share the use of connection assets each generator will be charged a proportion of the estimated cost of the shared connection assets calculated on a per MW share of the utilisation.

## **5 Shortcomings of the Existing Connection Charging Methodology**

In common with all UK electricity network licences, NIE’s licence was written at a time when generation connections were few and far between and were mostly connections of large power stations to the transmission system. The licence therefore envisages a sequential approach to making connection offers to generators with each offer considered in isolation. The distribution connection charging statement is consistent with that expectation. Consequently, the statement does not include rules for:

- (a) charging generating stations which are closely located and which could be more efficiently connected by making use of shared assets;
- (b) charging for connection assets which will be used at some point in the future; or
- (c) refunding customers who funded connection assets, in part or in full, and which are subsequently utilised by other customers.

There is also a difficulty with the LCTA principle. For example, where there are several wind farms in close proximity and which, for planning reasons, cannot all be connected using individual, sole-use power lines, the only viable option would be to connect them into a shared substation and through a shared higher capacity line to the existing system. In this scenario the initial developer would be offered a connection to the shared substation but would only pay for the LCTA connection (likely to be a 33kV overhead line connecting the wind farm to the nearest suitable point on the existing system).

The LCTA connection for the second developer is likely to be a sole-use connection to the newly constructed shared substation. Similarly for the third, fourth and so on. This would

almost certainly mean that the cost of the cluster would never be recovered through connection charges. The LCTA connections in this scenario are illustrated in Figure 1.

A further issue is that repeatedly designing and costing LCTA connections, with no intention of constructing such connections, imposes inefficient and avoidable costs on the industry.

It is therefore NIE's view that the LCTA charging methodology is impractical and inefficient when connecting a number of closely located projects to the system.

## **6 Overhead Line Consents**

NIE requires the consent of DETI under Article 40 of the Order to install an overhead power line with a nominal voltage of 20kV and above. DETI will only grant consent where it is satisfied that the line meets certain criteria.

As stated earlier, there are a significant number of developers who have applied to NIE for offers of connection to the distribution system and there are a larger number of developers who are going through the planning process at present and NIE will, in all likelihood, be requested to make offers for connection at some point in the future.

Whilst some of these projects could be connected by means of separate individual overhead lines NIE believes that it would not get planning permission to connect them all in this way. The only reasonable solution is to connect them through shared circuits to minimise the number of overhead lines crossing the landscape.

NIE has sought guidance from the DOE Planning Service as to what is acceptable from a planning perspective. The first wind farm to obtain planning permission in an area is likely to seek a sole-use connection. Should NIE offer that type of connection then the advice received is that the probability of NIE getting planning permission for lines to connect subsequent developers is significantly diminished and this could undermine DETI's 40% target.

Even assuming that planning permission could be obtained for later connections, NIE's experience is that landowners are likely to object to additional equipment on or over their property when a reasonable alternative could have been achieved.

## **7 Connection Charging Methodology Options**

This section sets out four connection charging options on which views are invited. Respondents may also wish to submit alternative options for NIE's consideration.

Illustrations of the connection charges for each option are provided in Appendix 3.

### ***Option 1***

This option entails re-designating the charging boundary between connection assets and system assets, system assets being the term normally used to define those assets which are funded through use of system charges.

In this option the connection boundary is shallower than it currently is. Only the 'sole-use' assets would be defined as connection assets. The shared 'connection' assets would be funded by use of system charges.

Should this option be the preferred option, NIE would like to receive views on how the use of system charges should be levied. Distribution use of system charges are currently only paid by Suppliers. If that continued to be the case, it would reduce the connection charge payable by the developer but would increase the costs borne by Suppliers in Northern Ireland and these costs are likely to be passed through to customers in their electricity bills.

Alternatively, the costs of the shared connection assets could be funded by a new generator distribution use of system charge and/or the generator transmission use of system charge should some of the shared assets have a nominal voltage of 110kV and above and therefore be part of the transmission system. Whilst this would reduce the connection charges payable by developers it would increase their ongoing costs through use of system charges. Suppliers, and therefore Northern Ireland customers, would not be directly affected by this option.

NIE has not considered a new generator distribution use of system charge in any detail. Should respondents be in favour of this option NIE would welcome views on the design and application of such a charge.

Another variation might be to fund the shared assets by a new generator distribution use of system charge and through Supplier use of system charges. This would also reduce the connection charges payable by developers but would increase the Suppliers' charges, although to a lesser extent than if it was funded by Suppliers alone.

### ***Option 2***

In this option the first to connect would pay the full cost of the sole-use assets and the full cost of the assets which may be shared as some point in the future. At the time that subsequent connections are made the first to connect would receive a partial refund in respect of their payments for the shared assets, based on the relative usage of the shared assets. There would be no partial refund for the sole-use assets.

This would place a high cost on the first to connect. There would be no impact on Suppliers and therefore no impact on Northern Ireland customers.

It is for consideration over what time period partial refunds might apply. Under the transmission connection charging methodology SONI will issue partial refunds if the initial developer connected within the preceding ten years. The Electricity (Connection Charges) Regulations (Northern Ireland) 1992 specify five years. Views are invited on what might be an appropriate period.

An illustration of the cash flows under this option is provided in Appendix 4.

### ***Option 3***

In this option each developer would pay in full for the sole-use assets and would pay for a share of the joint assets, based on the fraction of the total connection capacity. In other words,

if the connection capacity was, say, 70MW, and the first generator to connect had a capacity of 23MW then it would pay 23/70ths of the cost of the shared assets.

In this option it is possible that some of the costs of the shared assets would never be recovered from the developers as it would require the generation capacity connected to equal the connection capacity. Appendix 3 – Option 3 shows such an example. The balance would need to be recovered through use of system charges and could ultimately be borne, at least in part, by Northern Ireland customers. One method to reduce the risk of failure to recover costs, and at the same time improve energy efficiency, is to ensure that the initially installed transformer capacity at the cluster substation is appropriate for the medium term. The transformer size could be used to define the connection capacity.

NIE has considered how charges would be re-set if a developer sought a connection of sufficient capacity to cause the total connected generation capacity to be greater than the capacity of the connection. This would require increasing the connection capacity by the addition of a further transformer at the wind cluster point. In most scenarios this would lead to refunds to those already connected even although the cost of the shared assets had not been fully recovered. A benefit would be that the additional transformer would lead to increased security.

Use of system charges would be applied in the early years to recover NIE's financing costs but this would be returned to customers in the years following the final connection if the connection was fully utilised.

An illustration of the cash flows under this option is provided in Appendix 5.

#### ***Option 4***

In this option each developer would pay in full for the sole-use assets and would pay for a share of the joint assets, based on the total capacity expected to connect. In other words, if the total capacity expected to be connected was 59MW and the first wind farm to connect had a capacity of 23MW then it would pay 23/59ths of the cost of the shared assets.

Under this option, if all the generation capacity that was expected to connect did connect there would be no net impact on use of system charges. Use of system charges would be applied in the early years to recover NIE's financing costs but this would be returned to customers in the years following the final connection.

An illustration of the cash flows under this option is provided in Appendix 6.

## **8 Discussion**

NIE must take into account the obligations and duties set out in the licence and the Order when assessing the relative merits of each charging option.

Option 1 proposes that only the costs of the sole-use assets are recovered through connection charges and that the shared assets are funded through use of system charges. This has the effect of requiring other customers to fund part of the connection between the grouped generators and the existing system. While this would reduce barriers to connecting generators

to the system some may take the view that it is inappropriate for other customers to bear some of the costs. NIE believes that there are charging methodologies in existence similar to this but such a connection charging methodology would normally be coupled with a generator use of system charge to ensure that those who require and benefit from the investment in shared assets pay, at least in part, over time, for those shared assets.

Option 2 requires the first to connect to bear all the initial costs and be refunded part of the cost of the shared assets when others connect to the shared substation. This is a high barrier to entry for the first connectee but could be attractive to those coming later. This option should have no impact on Suppliers or Northern Ireland customers.

Options 3 and 4 are similar in that any shortfall in contributions from developers would be recovered through use of system charges. The difference is that in option 3 each developer pays in proportion to their usage of the capacity of the connection and in option 4 each developer pays in proportion to their share of the expected capacity to be connected.

On balance NIE currently feels that options 3 & 4 best meet the requirements to develop and maintain an efficient, coordinated and economical system of electricity distribution and to facilitate competition in the supply and generation of electricity. However, under option 3 there is a risk that the total costs are not recovered from developers if the installed capacity is not fully utilised. Similarly, in option 4 there is a risk that the amount of generation capacity which receives planning approval and proceeds to completion is less than NIE's expectations.

## **9 How to Respond to this Consultation**

NIE would be pleased to receive your views on the charging options set out in this consultation paper by 28 April 2010 in order that NIE can prepare a revised connection charging statement for NIAUR's consideration.

Your responses should be in writing and addressed to:

Leslie Bryans  
Northern Ireland Electricity plc  
Fortwilliam House  
Edgewater Office Park  
Edgewater Road  
Belfast  
BT3 9QJ

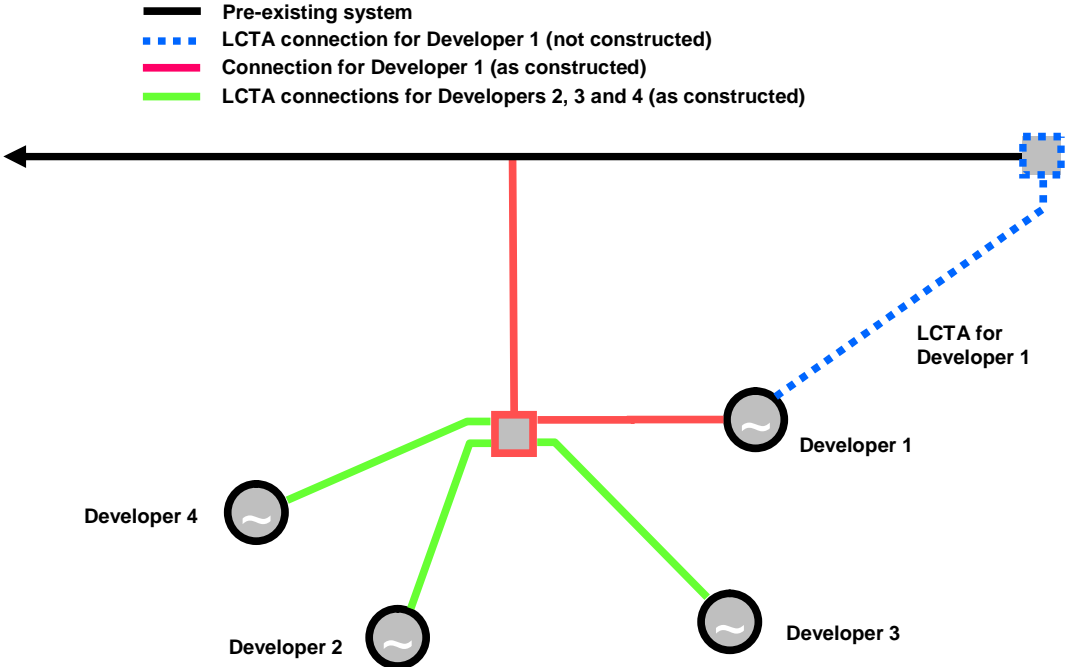
Or sent by email to: [dave.thornton@garrickconsulting.com](mailto:dave.thornton@garrickconsulting.com)

NIE will be happy to arrange bilateral meetings during the consultation period for further discussions or clarifications.

Additional copies of this paper can be downloaded at:

[www.niegetconnected.co.uk/publications.php](http://www.niegetconnected.co.uk/publications.php)

**Figure 1 – Illustration of the LCTA charging Methodology**



**Appendix 1 – Existing wind farms**

<i>Wind farm</i>	<i>Substation</i>	<i>MW</i>
Corkey	Ballymena	5
Rigged Hill	Coleraine	5
Elliott's Hill	Larne	5
Bessy Bell	Omagh	5
Slieve Rushen	Aghyoule	5
Owenreagh	Strabane	5
Lendrum's Bridge	Omagh	5.9
Lendrum's Bridge 2	Omagh	7.3
Altahullion	Limavady	26
Tappaghan	Omagh	19.5
Snugborough	Aghyoule	13.5
Slievenahanaghan	Ballymena	1
Callagheen	Enniskillen	16.9
Lough Hill	Strabane	7.8
Bin Mountain	Strabane	9
Wolf Bog	Larne	10
Slieve Rushen 2a	Aghyoule	27
Altahullion Extension	Limavady	11.7
Bessy Bell 2	Omagh	9
Slieve Rushen 2b	Aghyoule	27
Owenreagh Ext	Strabane	5.1
Slieve Divena	Omagh	30
Garves	Coleraine	15
Gruig	Coleraine	25
Tappaghan Ext	Omagh	9
Hunters Hill	Omagh	20
<b>Total</b>		<b>325.7</b>

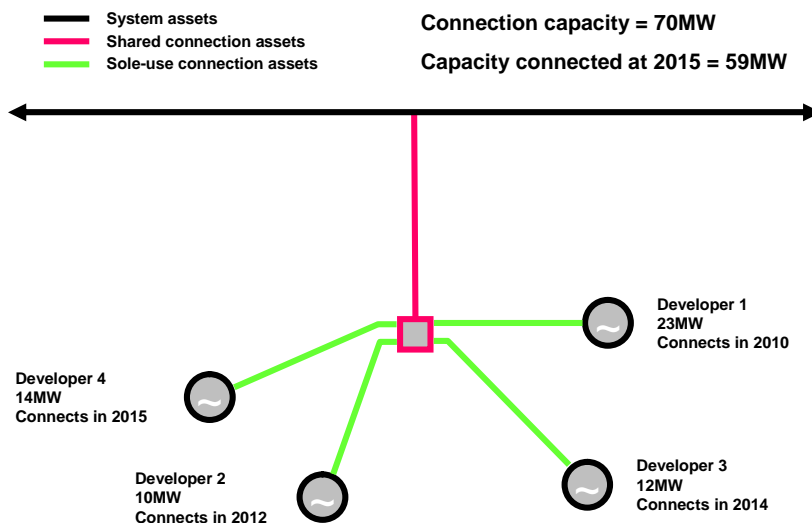
**Appendix 2 – Wind farms in the planning process**

<i>Wind farm</i>	<i>MW Applied for</i>
Drumadarragh	11.5
Glenbuck 2	15
Crockagarran Ext	3
Crockdun	27
Cregganconroe	14
Altgolan	17.5
Eglish	27
Seegronan	20.7
Inishative	18
Corby Knowe	9
Clunahill	21
Altahullion III	27.6
Crockbrack	6
Cappagh	9
Glenconway	30
Brockaghboy	60
Meenakeeran	24
Ora More	20.7
Dunbeg	42
Smulgedon	17.5
Cloonty	10
Tullinoid	15.75
CastleCraig	75
Ellginny Hill	44
Eshmore	15
Slatbeg	20.7
Rathsherry	20.7
Molly Mountain	21
Gronan	34.5
Callagheen Ext	13.8
Tullywisker	6
Beltonanean	2.6
Koram Hill	13.8

<i>Wind farm</i>	<i>MW Applied for</i>
Shantavny Scotch	14
Farkland	51
Slieveglass	6.9
Curraghmulkin (Dooish)	39.1
Lisnamuck	6
Teiges	12.5
Aghamore	15
Slieve Croob	4.6
Corkey Ext	2.5
Crockbaravally	6.9
Mullynaveagh	4.6
Pigeon Top	20.7
Connaught Road	1.7
Thornog ext	9.2
<b>Total</b>	<b>908.1</b>

Note: NIE recognises that planning permission is sometimes granted on the basis of a reduced generation capacity and/or on a reduced number of wind turbines. These figures should not necessarily be treated as the expected levels of capacity required.

### Appendix 3 – Illustration of connection charges for each charging option



#### Option 1

	<i>Connection charge for the sole-use connection assets</i>	<i>Connection charge for the shared connection assets</i>
Developer 1	100% of sole-use asset costs	0
Developer 2	100% of sole-use asset costs	0
Developer 3	100% of sole-use asset costs	0
Developer 4	100% of sole-use asset costs	0
Costs recovered through use of system charges = 100% of shared asset costs		

#### Option 2

	<i>Connection charge for the sole-use connection assets</i>	<i>Connection charge for the shared connection assets</i>
Developer 1	100% of sole-use asset costs	23/59 of shared asset costs <sup>1</sup>
Developer 2	100% of sole-use asset costs	10/59 of shared asset costs <sup>1</sup>
Developer 3	100% of sole-use asset costs	12/59 of shared asset costs <sup>1</sup>
Developer 4	100% of sole-use asset costs	14/59 of shared asset costs <sup>1</sup>
Costs recovered through use of system charges = 0		

**Option 3**

	<i>Connection charge for the sole-use connection assets</i>	<i>Connection charge for the shared connection assets</i>
Developer 1	100% of sole-use asset costs	23/70 of shared asset costs <sup>2</sup>
Developer 2	100% of sole-use asset costs	10/70 of shared asset costs <sup>2</sup>
Developer 3	100% of sole-use asset costs	12/70 of shared asset costs <sup>2</sup>
Developer 4	100% of sole-use asset costs	14/70 of shared asset costs <sup>2</sup>
Costs recovered through use of system charges = 11/70 of shared asset costs <sup>3</sup>		

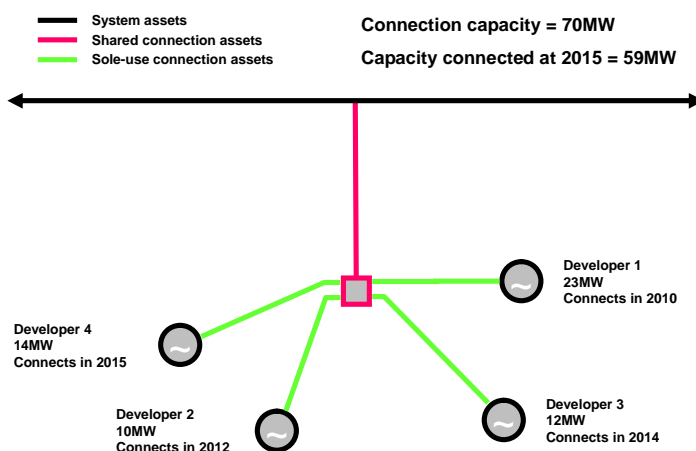
**Option 4**

	<i>Connection charge for the sole-use connection assets</i>	<i>Connection charge for the shared connection assets</i>
Developer 1	100% of sole-use asset costs	23/59 of shared asset costs <sup>4</sup>
Developer 2	100% of sole-use asset costs	10/59 of shared asset costs <sup>4</sup>
Developer 3	100% of sole-use asset costs	12/59 of shared asset costs <sup>4</sup>
Developer 4	100% of sole-use asset costs	14/59 of shared asset costs <sup>4</sup>
Costs recovered through use of system charges = 0 <sup>5</sup>		

## Notes to Appendix 3:

- 1 These charges show the net position at 2015 if all four developers connect their ‘full’ capacity to the cluster. If fewer projects, or less generation capacity, connect then these charges could increase for those that do connect, increasing up to 100% of the shared asset costs if only one project connects. The key point is that 100% of the costs of the shared connection assets are recovered from the developers who connect, in proportion to their connected capacities. Nothing is recovered through use of system charges.
- 2 This charge is fixed regardless of how much generation capacity connects to the cluster.
- 3 This charge will decrease if more than 59MW of generation capacity connects to the cluster and increase if less than 59MW of generation capacity connects to the cluster.
- 4 This charge will decrease if more than 59MW of generation capacity connects to the cluster.
- 5 There will be some costs recovered through use of system charges if less generation capacity connects to the cluster than was expected in order to recover the costs of the shared connection assets not recovered through capital contributions from the developers.

## Appendix 4 – Illustration of cash flows for Option 2



Capacity of the connection (MW)	70
Cost of the shared assets (£m)	20

Year	2010	2011	2012	2013	2014	2015
------	------	------	------	------	------	------

Capacity connected (MW)	23		10		12	14
Cumulative capacity connected (MW)	23	23	33	33	45	59
Remaining capacity available (MW)	47	47	37	37	25	11

Charge to Developer 1 (£m)	20.0 <sup>1</sup>					
Charge to Developer 2 (£m)			6.1 <sup>2</sup>			
Charge to Developer 3 (£m)					5.3 <sup>3</sup>	
Charge to Developer 4 (£m)						4.7 <sup>4</sup>

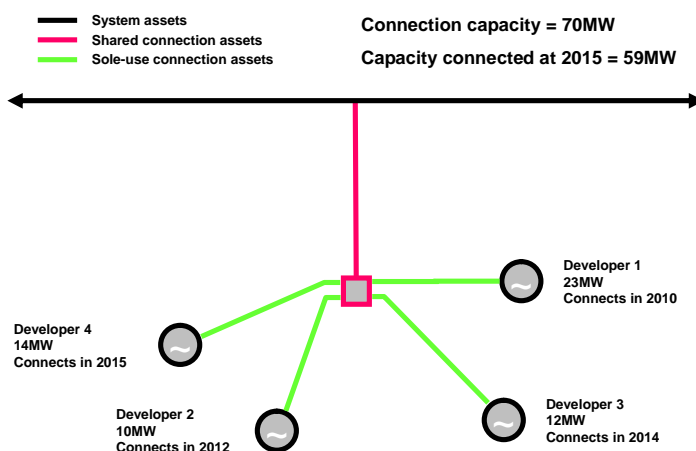
Refund to Developer 1 (£m)			6.1		3.7	2.4
Refund to Developer 2 (£m)					1.6	1.1
Refund to Developer 3 (£m)						1.3

Net position of Developer 1 (£m)	20.0	20.0	13.9	13.9	10.2	7.8
Net position of Developer 2 (£m)			6.1	6.1	4.4	3.4
Net position of Developer 3 (£m)					5.3	4.1
Net position of Developer 4 (£m)						4.7

1.  $(23 \times 20)/23 = 20.00$     2.  $(10 \times 20)/33 = 6.06$     3.  $(12 \times 20)/45 = 5.33$     4.  $(14 \times 20)/59 = 4.75$

Notes: All costs are expressed in real terms.  
Cash flows are in respect of the shared connection assets only.

## Appendix 5 – Illustration of cash flows for Option 3



Capacity of the connection (MW)	70	
Cost of the shared assets (£m)	20	
Depreciation period (years)	20	
Rate of return (pre-tax)	6%	(Notional figure for illustration purposes only)

Year	2010	2011	2012	2013	2014	2015
------	------	------	------	------	------	------

Capacity connected (MW)	23		10		12	14
Cumulative capacity connected (MW)	23	23	33	33	45	59
Remaining capacity available (MW)	47	47	37	37	25	11

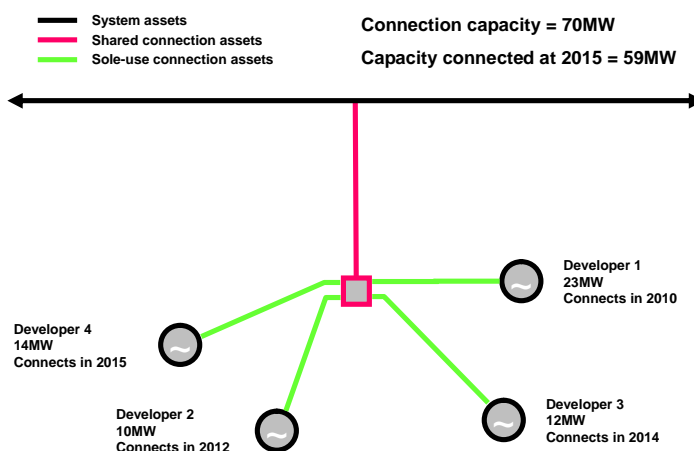
Charge to Developer 1 (£m)	6.6	<sup>1</sup>					
Charge to Developer 2 (£m)			2.9	<sup>2</sup>			
Charge to Developer 3 (£m)					3.4	<sup>2</sup>	
Charge to Developer 4 (£m)						4.0	<sup>4</sup>

Opening RAB	0.0	12.8	12.1	8.7	8.2	4.4
Capital Expenditure	20.0	0.0	0.0	0.0	0.0	0.0
Contributions	-6.6	0.0	-2.9	0.0	-3.4	-4.0
Depreciation	-0.7	-0.7	-0.5	-0.5	-0.4	-0.2
Closing RAB	12.8	12.1	8.7	8.2	4.4	0.2
Average RAB value	6.4	12.4	10.4	8.4	6.3	2.3
Return	0.4	0.7	0.6	0.5	0.4	0.1
Depreciation	0.7	0.7	0.5	0.5	0.4	0.2
Total collected annually through UoS	1.1	1.4	1.2	1.0	0.7	0.3

1.  $(23 \times 20)/70 = 6.57$     2.  $(10 \times 20)/70 = 2.86$     3.  $(12 \times 20)/70 = 3.43$     4.  $(14 \times 20)/70 = 4.00$

Notes: All costs are expressed in real terms.  
Cash flows are in respect of the shared connection assets only.

## Appendix 6 – Illustration of cash flows for Option 4



Capacity of the connection (MW)	70	
Cost of the shared assets (£m)	20	
Depreciation period (years)	20	
Rate of return (pre-tax)	6%	(Notional figure for illustration purposes only)

Year	2010	2011	2012	2013	2014	2015
------	------	------	------	------	------	------

Capacity connected (MW)	23		10		12	14
Cumulative capacity connected (MW)	23	23	33	33	45	59
Remaining capacity available (MW)	47	47	37	37	25	11

Charge to Developer 1 (£m)	7.8	<sup>1</sup>					
Charge to Developer 2 (£m)			3.4	<sup>2</sup>			
Charge to Developer 3 (£m)					4.1	<sup>3</sup>	
Charge to Developer 4 (£m)						4.7	<sup>4</sup>

Opening RAB	0.0	11.6	11.0	7.2	6.7	2.4
Capital Expenditure	20.0	0.0	0.0	0.0	0.0	0.0
Contributions	-7.8	0.0	-3.4	0.0	-4.1	-4.7
Depreciation	-0.6	-0.6	-0.4	-0.4	-0.2	0.0
Closing RAB	11.6	11.0	7.2	6.7	2.4	-2.3
Average RAB value	5.8	11.3	9.1	6.9	4.6	0.0
Return	0.3	0.7	0.5	0.4	0.3	0.0
Depreciation	0.6	0.6	0.4	0.4	0.2	0.0
Total collected annually through UoS	1.0	1.3	1.0	0.9	0.5	0.0

1.  $(23 \times 20)/59 = 7.80$     2.  $(10 \times 20)/59 = 3.39$     3.  $(12 \times 20)/59 = 4.07$     4.  $(14 \times 20)/59 = 4.75$

Notes: All costs are expressed in real terms.  
Cash flows are in respect of the shared connection assets only.