



**Formal dispute regarding the
Cost of connecting a 225kW wind turbine
at 159 Glen Road, Maghera**

Determination

26 October 2011

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Formal dispute regarding the cost of connecting a 225kW wind turbine at 159 Glen Road, Maghera

Determination

1 Section One – Introduction

- 1.1 The Northern Ireland Authority for Utility Regulation (the **Authority**) received, by way of a letter dated 28 January 2011, a formal complaint from the Rev. Seamus O’Connell PP V.F. (the **Complainant**) regarding a connection charging dispute between NIE plc (**NIE**) and him (the **Complaint**).
- 1.2 The Complaint between the Complainant and NIE (together, the **Parties**) relates to the costs charged by NIE to connect a 225kW wind turbine at 159 Glen Road, Maghera to the existing 11kV network.
- 1.3 The Complaint falls to be determined by the Authority under Article 31A of the Electricity (Northern Ireland) Order 1992, and in accordance with Directive 2003/54/EC. The Authority has considered the Complaint in accordance with its Dispute Resolution Procedure dated April 2007 (as supplemented for reasons of good governance and best practice and also as updated in June 2011).
- 1.4 Tanya Wishart (Director of Electricity) has been appointed to determine the dispute. I, Tanya Wishart do so as a delegate of the Authority and on its behalf.
- 1.5 This document sets out the determination in relation to this Complaint.
- 1.6 In writing this Determination, the Authority have had the benefit of being able to consider the following materials relevant to the background to the Complaint -
 - 1.6.1 A report from the Investigating Team (the **Investigation Report**)
 - 1.6.2 Technical reports from consultants Sinclair Knight Merz (SKM) who were employed by the Authority to undertake a technical assessment of the solution costed by NIE.
 - 1.6.3 One volume of documents (the **Bundle**) which contains all the papers submitted by the Parties

1.7 Annex 1 of this Determination contains the documents referred to above at 1.6 (i)-(iii).

2 Section Two – The Parties

- 2.1 The Complainant is leading the delivery of a 250kW wind turbine on the premises of 159 Glen Road, Maghera, BT46 5JN.
- 2.2 NIE is a subsidiary of ESB. It is the owner of the electricity transmission system in Northern Ireland, and the owner and operator of the electricity distribution system in Northern Ireland.
- 2.3 NIE is licensed in relation to the former activity, and the same licence regulates the latter activity (although it is not a licensable activity in its own right).
- 2.4 NIE is the only party in Northern Ireland entitled to offer terms to connect, or to modify an existing connection, to the electricity distribution system.

3 Section Three - Factual Summary

3.1 This Complaint centres on the cost charged by NIE to connect a 225kW wind turbine near Maghera to the existing 11kV network. The Complainant claims that other turbines of a similar size have been connected at a lower cost.

3.2 The central points in the Complaint are:

1. The timeframe for completion of grid connection; and
2. The cost of grid connection.

The Complainant raised the following queries and asked the Authority to initiate a formal dispute:

“why does the final quotation from NIE bear no resemblance to their own cost sheet?

one year later, how can NIE quote almost £10,000 less for a similar grid connection?

I ask the regulator to initiate a formal review of the cost of this project, particularly as NIE engineers were on site for about three days only. Our own workmen prepared the site, opened the cable trenches, sanded /closed the cable trenches and fitted the foundations for the transformer.”

3.3 The key events and milestones in this case are detailed below:

Date	Event
02/09/2008	Planning application submitted
17/06/2009	Turbine received planning permission
03/07/2009	Application form submitted to NIE
06/07/2009	Job number provided to the Complainant
05/08/2009	Full application form and fee submitted (date on form)
10/08/2009	The Complainant paid connection application fee
21/08/2009	NIE accept connection offer was received
14/12/2009	NIE issue connection offer
22/12/2009	Connection offer accepted
19/04/2010	All legalities, equipment delivery and payment completed

Date	Event
21/05/2010	Work on site completed
01/12/2010	<p>Complainant starts Complaint process with NIE</p> <p>Having conducted a preliminary review it was established that the Complaint was not one which could be resolved to the satisfaction of the Parties without the need to engage in a formal Determination process.</p>
28/01/2011	<p>Complainant formally raises issue with the Authority and the Authority wrote to the Parties informing them of the process and timelines</p>

4 Section Four – Relevant Licence Conditions & Connection Charging Rules

The Licence requirements

4.1 The relevant licence (the **Licence**) can be found at the following link:

http://www.uregni.gov.uk/uploads/publications/2009-08-26_NIE_plc_Licensing_Scheme_Transmission_Licence_-_Consolidated.pdf

4.2 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.

4.3 NIE is the only party in Northern Ireland entitled to offer terms to connect, or to modify an existing connection, to the electricity distribution system. NIE is required by Condition 30 of the Licence to offer such terms and these are offered following receipt by NIE of an application containing all such information as NIE may reasonably require for the purpose of formulating the terms of the offer.

4.4 NIE is required by Condition 30 to offer terms for connection or modification to an existing connection as soon as practicable and, except where the Authority consents to a longer period, in any event not more than three (3) months after receipt by NIE of a connection application containing all the information that NIE may require for the purpose of preparing the connection offer.

4.5 NIE is required by Condition 32 of the Licence to prepare a statement approved by the Authority setting out the basis upon which charges will be made for connection to the Distribution System. The statement of charges is set out in the link below:-

<http://www.nie.co.uk/suppliers/pdfs/NIE%20Distribution%20Connection%20Charging%20Statement%20-%20March%202010.pdf>

4.6 NIE is required by Condition 32 of the Licence to set connection charges at a level which will enable NIE to recover:

- a) 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

b) a reasonable rate of return on the capital represented by such costs.

4.7 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.

Connection Charging Rules

4.8 The Statement of Charges for connection to the Northern Ireland Distribution System also defines the methodology for the charging arrangements applicable to all customers

4.9 NIE will normally offer a customer the Least Cost Technically Acceptable ("LCTA") connection.

4.10 Where a customer requests a connection design which is more expensive than the LCTA connection then, if that option is acceptable to NIE, the customer will be required to pay in full the estimated cost of providing the additional Connection Assets necessary to meet the customer's requirements, in addition to the connection charge levied under Section 4 or 5, as appropriate.

4.11 There may be occasions where NIE decides for its own reasons that the preferred design is not the LCTA connection. In that event, the customer, or group of customers, will only be required to pay for the estimated cost of the LCTA connection.

5 Section Five - Technical Details of NIE's LCTA & Associated Costs

5.1 NIE provided the following breakdown of what they consider to be the LCTA:-

"The equipment identified for this connection are

- *Package substation*
 - o *500kVA transformer*
 - o *VT*
 - o *LV cabinet*
 - o *Kiosk shell*
 - o *Earthing material*
- *11kV 185mm2 XLPE underground cable*
- *240mm2 parallel waveform LV underground cable*
- *Pole with fuses*
- *Metering*

5.2 *There are also a number of other activities that are carried out in the preparation of the connection offer and the provision of the connection. These include technical analysis, wayleaves and legalities, procurement, stores, etc. The costs for some of these activities are included in the overheads that NIE charge in the connection costs. The indicative costs that NIE publish in the Connection Charging Statement also include the overhead element.*

5.3 *In this connection offer NIE have stated that the costs attributed to the items listed above are:-*

<i>Overhead Line, Cable and Jointing</i>	<i>£ 9,691.18</i>
<i>Package Substation</i>	<i>£ 24,009.20</i>
<i>Metering</i>	<i>£ 550.00</i>
<i>Subtotal</i>	<i>£ 34,250.38</i>
<i>Operation and Maintenance</i>	<i>£ 7,841.88</i>
<i>Total (excl. VAT)</i>	<i>£ 42,092.26</i>

5.4 *.....The Connection Application Fee for this size of generator is £5000, as detailed in the Charging Statement, which is to reflect the costs incurred by NIE in producing the connection offer..... the planning engineer attended site visits and meetings as well as performing the technical analysis for the generation connection. For this connection the contribution of the connection application fee was considered in contribution to the cost of the connection. Therefore the connection assets and constructing the connection is approximately £29,250." The Authority notes the £29,250 figure is the subtotal of £24,250 less the connection application fee of £5,000.*

6 Section Six – Details of Independent Technical Assessment

6.1 SKM were employed to undertake a technical assessment of the solution costed by NIE as the LCTA. Their technical assessment is detailed below, with the full report attached to this Determination at Annex 1.

“Technical design

6.2 *The design of the connection appears reasonable in terms of the connection point to the distribution system via an existing 11kV overhead line which runs close to the Glen Road property.*

6.3 *However, there are elements of the design which appear to be conservative. These are:*

i) The connection is required to facilitate a 225kW wind turbine generator operating at a power factor of 0.85 as per the application form (connection agreement states 0.98) which equates to a rating of 265kVA. Given that NIE have standard transformers ratings that include a 315kVA rating this would appear the most suitable choice. However, NIE chose to install a 500kVA transformer on the grounds that if they had used a 315kVA rated transformer this would increase the source impedance of the network at the connection point, which may then impact upon the quality of supply in terms of turbine starting current and voltage flicker.

A review of manufacturers data indicates that transformers in the range 50-630kVA typically have similar impedance (around 4%), so it is not evident that the choice to install a 500kVA transformer is proven as it would not significantly alter the source impedance.

If NIE are to justify the choice of a larger transformer we would expect them to be able provide the relevant studies demonstrating the impact on the supply quality based on the actual impedances of the alternative transformers. As the connection application fee of £5000 was stated as being included in the connection offer we would consider that these studies would have been completed and should be able to be provided. Without these we do not consider that the need has been demonstrated.

ii) For the LV connection between the NIE transformer and the customer's switchgear NIE have installed parallel 3-phase 240mm² cables. Assuming continuous maximum export of the generator the required rating for this connection would be approximately 382A based on a nominal voltage of 400V. A single 3-phase 240mm²

cable laid direct in the ground has a current rating of approximately 390A which would appear sufficient for this application bearing in mind that the wind turbine is likely to have a utilisation factor in the region of 30%-50% and it will also be supplying part or all of the load to the Complainant's premises. Alternatively a single 300mm² cable with a rating of 435A could be used.

6.4 *We therefore consider that the second cable has not been justified.*

Plant and installation charges

6.5 *An estimated cost for provision of plant and installation for this connection has been estimated with unit prices derived from SKM sources. The estimated cost is approximately £33,800. This compares reasonably with the estimated NIE cost of £34,250. However, taking account of the issues raised above relating to the technical design then these costs could be reduced as follows:*

i) If a 315kVA transformer had been utilised instead of a 500kVA transformer then an estimated cost reduction in the region of £2,500 could be applied.

ii) If a single 240mm² or 300mm² cable had been utilised then we would then an estimated cost reduction in the region of £1,500 could be applied.

O&M Charges

6.6 *It should also be noted that if the plant and installation charges are reduced, due to the possible reductions outlined above, then the O&M costs detailed in the connection charges would also be reduced.”*

7 Section Seven – Additional Evidence Provided by NIE

7.1 In response to a further data request from the Authority (set out at item 1 of the Bundle contained at Annex 1), NIE provided the following information:

a) detailed analysis including any calculations or desktop studies on how NIE choose the 500kVA transformer including details of the local supply

7.2 *“The existing 11kV three-phase network was located within close proximity of the wind turbine’s connection point.*

7.3 *Provision of the connection to the 225kW wind turbine at Glen Road necessitated the erection of a new in-line pole, equipped with fuses and surge arrestors. This pole was erected below the existing 11kV overhead line. A short length of 11kV cable was connected between the new pole and the proposed package substation which consisted of a voltage transformer, 500kVA distribution transformer and LV fuse cabinet. From the package substation parallel low voltage cables were laid in to the customer’s switchboard, which was located within the customer’s metering room. Earthing of the package substation involved the installation of a bare copper earth grid around the package substation and earth wire along the open cable trenches. Import/export metering was installed at the connection point.*

7.4 *The customer was responsible for completing the substation under building and all cable trenching.*

7.5 *In considering the capacity of the transformer installed for the connection, the connection arrangement was based on previous experience gained from providing connections to other 225kW wind turbines.*

7.6 *There is only a very small number of the 225kW wind turbines connected to the 11kV distribution network in Northern Ireland and the supply arrangement used at Glen Road was based on the connection arrangements that were previously used to connect similar wind turbines.*

7.7 *The customers connected at these other locations have not raised any power quality issues nor have they indicated that the connection of the wind turbine has interfered with their production processes or building supplies. However, some fine tuning of the wind turbine’s controller, the NIE network and the NIE connection arrangement was required, as a result of the setting applied to the wind turbine’s internal controller disconnecting the wind turbine from the grid.*

7.8 NIE has not been asked to carry out any fine tuning of the network or connection arrangement at Glen Road.

b) The assumptions and rational behind equipment choice

7.9 The equipment is chosen to be fit for purpose for the size of the connection required.

7.10 The main items of equipment used in this connection were:

Equipment	Rational
500kVA transformer -	Reasons detailed in response to a)
VT	Needed as part of a package substation
LV cabinet	Needed as part of a package substation
Kiosk shel	Needed as part of a package substation
Earthing Material	Needed as part of a package substation
11kV 185mm ² XLPE underground cable	Minimum standard of 11kV cable
240mm ² parallel waveform LV underground cable	Required to minimise voltage rise
Pole with fuses	Minimum standard
Metering	Minimum spec. for generation

c) A list of the size of transformers NIE typically use

7.11 Below is a list of the size of ground mounted transformers that NIE use to connect to the 11kV network:-

- 11kV/400V 315kVA
- 11kV/400V 500kVA
- 11kV/400V 800kVA
- 11kV/400V 1000kVA

d) The impact likely to be expected on the quality of supply to the customer through the use of a different transformer

7.12 *The selection of a smaller ground mounted transformer would increase the source impedance of the network at the connection point and may provide an unsatisfactory quality of supply to the customer, due to the large starting current, which is drawn by the wind turbine when connecting to the grid or when the wind turbine is switching over from the small generator to the large generator.*

7.13 *The variability of the output of the wind turbine can create voltage surges on the customer's supply which can cause voltage flicker. Voltage flicker is a phenomenon which is noticeable on customer's lights.*

7.14 *The provision of a larger ground mounted transformer would reduce the source impedance of the network at the connection point and therefore, further reduce the likelihood of quality of supply issues occurring.*

e) Outturn cost of the completed project

7.15 *The outturn cost so far is £32,883.43.*

7.16 *The customer has still to return the test results for Schedule 1A of G59 as set out in the letter of terms for connection. On completion of the tests, the customer will post the results to NIE and we will review them. On acceptance of the test results we will execute the Connection Agreement and ensure that the administration associated with recording this connection is completed.*

7.17 *As described at 5.3 the quoted cost of the connection activities and materials set out within the connection offer is £34,250.80, excluding O&M and VAT.*

7.18 *This is a variance of £1,367.37 (4%) before completion of the final activity relating to analysing the test results and executing the connection agreement. Following completion any remaining over-recovery will be netted off against the RAB (in line with normal practice) and therefore there is no net gain for NIE."*

8 Section Eight – Additional evidence provided by NIE following draft determination

8.1 NIE's response to the draft determination consisted of a letter reviewing the draft determination and a technical attachment which supports their review and upholds the design solution adopted by NIE. NIE's full response is attached to this Determination at Annex 1.

8.2 NIE provided detailed technical information covering the following aspects:

- The specific characteristics of the Customer's Equipment
- The specific characteristics of the Network Connection
- The requirement to ensure Adequate Power Quality (including Voltage Flicker)

9 Section Nine – Additional evidence provided by the Complainant following the draft determination

- 9.1 The Complainant responded to the draft determination by stating that while he was pleased and thankful for the work carried out on his behalf, the draft determination did not address the core issue in that two individuals who have also had installed 225Kw Wind Turbines, similar to the one at Glen Road, paid significantly less. The Complainant stated that there is a discrepancy of almost £7,000-£10,000.00 between the cost he paid and the costs of other two.
- 9.2 The Complainant also stated that all parties agreed that he is the nearest to the grid for a connection.
- 9.3 The Complainant asked for adjudication by the Authority after NIE failed to address the discrepancy satisfactorily.
- 9.4 Following an information request from the Authority, the Complainant provided costings relating to the other sites. Confirmation was obtained from the third parties that they allow their information to be used as evidence in this Complaint. The Complainant raised three issues in his response
- *One year later, two individuals were offered quotations by NIE (excluding SCADA) for less than the Complainant paid.*
 - *Of all three relevant individuals, the Complainant has the shortest distance to connection.*
 - *The cost of three (3) days work by NIE at Glen Road bears no resemblance to the quotation one of the Complainant's engineers saw by accident, on the time sheet prepared by NIE.*
- 9.5 The Complainant also referred to the paragraph 'Characteristic of the Customer's Equipment' in NIE's response and the comment 'Based on our experience a typical value of 2.5 times the machine rating has been allowed for in our design. Evidence was provided from his engineer that advises that this calculation should have been based on a factor of 1 rather than on a factor of 2.5.
- 9.6 The Complainant's letter also refers to the meeting with NIE on 24 April 2011 in which NIE demonstrated that the costs were equal as applied to all three customers. A copy of this was provided to the Authority.

10 Section 10 - Authority Assessment of Additional evidence provided by the Parties following the draft determination

NIE Additional Information

- 10.1 SKM were again employed to undertake a further technical assessment of the information provided by NIE in response to the draft determination. The full report is attached to this Determination at Annex 1. SKM have stated that the NIE assumptions appear reasonable based on the information available
- 10.2 The Authority notes that NIE should ensure that they have all the necessary information available to minimise the assumptions used and therefore provide more accurate costings.
- 10.3 In addition to discussing the implications of the information provided on the Complaint, the Authority needs to highlight the fact that NIE was asked to provide all relevant information for the dispute and the omission of the information discussed in section 8 has lengthened the period of this dispute. NIE should have been aware of the significance of the information provided in their response to the draft determination.

Complainant Additional Information

- 10.4 While the Complainant's letter dated 17 July 2011 quotes a rating of 1 rather than the 2.5 rating used by NIE it should be noted that neither NIE or SKM believe that this information was available at the design stage.
- 10.5 The Authority's assessment of the cost information provided concludes that there are differences in the scale of the quotes provided by NIE up to £4,000, but not in the region of £10,000.
- 10.6 The question raised by the Complainant as to whether or not the Glen Road connection is the shortest cannot be verified fully by the evidence given. However, NIE indicated that the specifics of the Glen Road site (erection of a pole and fuse switch disconnector and more expensive underground cable) are legitimate reasons for higher costs.
- 10.7 Given that costs have been verified by SKM and the fact that the plant costs are approximately two thirds of the total cost, a labour cost of £20,000 therefore remains unproven and it is unclear where this figure could have been derived from.
- 10.8 A particular concern is the fact that NIE omitted O&M costs from one of the quotes used for comparison. The Authority will address the issue of accuracy of quotations, but this issue does not form part of this determination.

10.9 The Complainant states in his letter that he should have been charged for two runs of cable 55 meters long not 80 meters long. No evidence has been provided to substantiate this.

11 Section Eleven – Determination

- 11.1 Based on the additional technical information provided by NIE and the assessment carried out by SKM, the Authority accepts that the design and costs proposed by NIE are reasonable.
- 11.2 However, there should be a larger onus on NIE to ensure that they have all the information available to minimise the assumptions used and therefore provide more accurate costings. The Authority will address this issue with NIE.
- 11.3 On assessing the additional cost data provided by the Complainant, the differences in the costs between the 3 sites can be explained. In addition, the costs were independently assessed by SKM and deemed to be reasonable.

Additional Point of Note

- 11.4 In addition to discussing the implications of the information provided on the Complaint, the Authority needs to highlight the fact that NIE was asked to provide all relevant information for the Complaint and the omission of the information discussed below has lengthened the period of this Complaint. NIE should have been aware of the significance of the information provided in their response to the draft determination and will be questioned as to why this was not provided during the Complaint process
- 11.5 The Authority is particularly concerned that NIE have omitted O&M costs from some quotations assessed as part of this Complaint. This calls into question the quality and attention to detail of the connections process within NIE. The Authority will be addressing this issue separately with NIE.
- 11.6 As part of the NIE response to the draft determination, NIE made the following statement:

“If the draft determination is upheld, NIE will need to revise its design criteria in accordance with its findings. If this results in unsatisfactory performance for customers this may result in claims for compensation against NIE. In such circumstances NIE would expect to be able to recover any compensation paid by NIE under its price control and we would request confirmation from the Authority that this will be the case.”

The Authority can confirm that any compensation claims would not be recoverable.

- 11.7 The Authority also notes that the timeframe for the connection offer is outside the requirements of NIE's licence. Further information will be requested from NIE on delivered timeframes for other similar connection offer requests.

11.8 The Authority considered whether to ask one or both Parties to pay the cost of the SKM report but given the relatively small numbers involved in this Complaint, the Authority have decided, in this case, not to make such a request.

Tanya Wishart

Authorised on behalf of the Authority

Annex 1

Investigation Report

Technical report from SKM

Bundle (Volume of Documents)