CHANGES TO METHODOLOGY FOR CALCULATING DISTRIBUTION LOSS ADJUSTMENT FACTORS

DECISION PAPER

12 June 2018

Contents

1. Introduction & Background

1.1 Purpose of this paper

On 13 February 2018, NIE Networks published a consultation[1] setting out proposals for changes to the methodology for calculating distribution loss adjustment factors (DLAFs). The consultation provided a six week window for stakeholders to submit responses to NIE Networks on the DLAF proposals.

On 8 March 2018, during the consultation period, NIE Networks held a workshop for interested stakeholders. We provided an overview of the proposed changes to the DLAF methodology and stakeholders had an opportunity to ask questions about the proposals.

There were five formal responses to the consultation paper (mainly representing generator interests). The respondents were:

1. Energia;
2. The Consumer Council;
3. Brookfield Renewable;
4. DW Consultancy Ltd; and
5. Northern Ireland Renewables Industry Group.

This paper sets out NIE Networks' decision on proposed changes to the methodology for calculating DLAFs after considering the responses to our consultation. Further information on the proposed DLAF methodology was also requested, and is provided in Appendix 1.

Copies of the five responses are provided in Appendix 2 of this paper.

1.2 Changes from consultation to decision paper

Since the consultation paper was published we have changed the timeframes for the implementation of the DLAF methodology proposals. The changes to the DLAF methodology will be introduced over two years as follows:

- Day and Night DLAFs for all demand and generator customers will be introduced from 1 October 2018 for the 2018/19 DLAFs; and
- Site Specific DLAFs for 33kV generator exports will be implemented the following year (i.e. from 1 October 2019 for the 2019/20 DLAFs). A default DLAF of 1.000 for 33kV exports where there is no or incomplete metered information will also be implemented at this time.

Further information on the timeframes is provided in section 3.1 of this paper.

1.3 Background

NIE Networks' Electricity Distribution licence requires us to produce DLAFs each year to apportion the distribution losses to customer metered demand and generation. DLAFs are used by the Single Electricity Market Operator (SEMO) and the System Operator Northern

[1] NIE Networks' consultation paper on proposed changes to methodology for calculating DLAFs, 13 February 2018: http://www.nienetworks.co.uk/documents/regulatory-documents/dlaf-consultation

Ireland (SONI) in their charges to suppliers (c£700m annually[2]), and in SEMO's payments to distribution connected generators.

SEMO's charges to suppliers are based on supplier consumption volumes multiplied by the DLAFs. Similarly their payments to distributed generators are based on generator exports multiplied by the DLAFs. If payments to distributed generators reduce then, in a balanced market, charges to suppliers would also reduce. Similarly, if payments to generators increase then charges to suppliers would also increase.

Following the recent growth in distributed generator connections and export volumes, NIE Networks commissioned consultants to assess the impact of distributed generation on network losses. After significant analysis, the consultants concluded that the majority of generators connected to the 33kV network increased electrical losses on the 33kV network. In contrast, generators connected to the 11kV and LV networks reduce upstream distribution losses but have minimal impact on losses associated with their connected voltage.

The consultant's findings in relation to the 33kV connected generators are at odds with how distribution losses are attributed under NIE Networks' current DLAF methodology. At present, a common DLAF applies to both demand and generation connected at each voltage. As the published DLAFs are greater than unity this assumes customer demand increases distribution losses while generation reduces distribution losses. The consultants carried out power flow studies which showed that this is no longer true for generation connected to the 33kV network as the vast majority of these generators actually increase distribution losses.

The consultants also reviewed the DLAF methodologies employed by the distribution network operators (DNOs) in Great Britain (GB) and the Republic of Ireland (ROI) to consider a more suitable DLAF methodology for Northern Ireland (NI), which would reflect how demand and generator customers contribute to the distribution losses.

In GB and ROI there is greater granularity in the published DLAFs used to attribute losses to demand and generator customers connected at distribution voltages. Site Specific DLAFs allow for the appropriate allocation of losses to generators in relation to their individual impact on network losses. The Site Specific losses are then taken into account when the remaining losses are apportioned to other generator and demand customers for the calculation of Generic DLAFs. In addition, GB DNOs generally apply Seasonal Time of Day DLAFs while ESB Networks publish Day and Night DLAFs. The time differentiated DLAFs provide signals to encourage customer behaviour; to reduce network losses when the system is heavily loaded.

1.4 Consultation proposals

NIE Networks currently publish[3] three DLAFs each year – the annual average DLAFs for connections to the 33kV, 11kV and LV networks. There is no seasonal or time of day differentiation in the DLAFs. With the exception of different DLAFs for each distribution connected voltage, there are no locational DLAFs in Northern Ireland.

[2] Based on a high level assumption that SEMO and SONI's charges are circa 8p/kWh in total

[3] The DLAFs are published in the "Statement of Charges for use of the NIE Networks' Electricity Distribution System by Authorised Persons", latest version effective from 1 October 2017 to 30 September 2018: http://www.nienetworks.co.uk/documents/Regulatory-documents/DUoS-Statement-Oct17-Sept18-Approved.aspx

After considering the findings from the loss studies and reviewing the DLAF methodologies employed in GB and ROI, NIE Networks published a consultation which proposed changes to the DLAF methodology for Northern Ireland. The proposals included the introduction of:

(i) Site Specific DLAFs for 33kV generator exports; and

(ii) Day and Night DLAFs for all demand and generator customers.

Site Specific DLAFs for 33kV connected generators

We proposed that NIE Networks should adopt Site Specific DLAFs for 33kV generator exports. Generic DLAFs would continue to apply to all imports metered at the 33kV generator connections.

Under the Site Specific methodology, the DLAF value calculated for each 33kV generator would depend on the impact the individual generator has on the network losses over a calendar year. For cases where there is no metered information or incomplete historic information available to calculate the generator impact on losses, we proposed the use of a default DLAF of 1.000 for the generator export. A DLAF of unity would assume the generator had no impact on losses (either to increase or reduce). This default figure would apply for the full tariff year and be reviewed the following year when additional data becomes available.

We proposed that Site Specific DLAFs would apply to generators connected to the 33kV network only. Site Specific DLAFs would not apply to the generators connected to the 11kV or LV networks at this time as the net impact of these generators is to reduce network losses. Generic DLAFs would be calculated for 11kV and LV generators and for all demand customers, taking account of the losses already attributed to the 33kV connected generators.

Time of Day DLAFs

In the consultation paper we proposed the introduction of time differentiated DLAFs for Day and Night. The Day and Night periods were defined as follows:

- For customers connected at LV with non half-hourly meters the Day period covers the time from 08:00 to 23:00 in winter and 09:00 to 00:00 during summer. The Night period covers the remaining hours.
- For customers with half-hourly meters (including LV customers) the Day period is from 08:00 to 23:00 summer and winter. The Night period covers the remaining hours from 23:00 to 08:00.

The Day and Night periods would apply to Site Specific and Generic DLAFs at all distribution voltages. Time differentiated DLAFs can provide appropriate signals to customers about their impact on network losses; if customers react to these signals they could reduce their total energy requirements and network losses would potentially reduce.

Summary of proposed DLAF methodology

The DLAF types proposed for generator exports and demands are summarised in the following table. For clarity, “demand” refers to metered consumption at demand customer and generator customer sites.

Connected Voltage	DAY		NIGHT	
	Generator Export	Demand	Generator Export	Demand
33kV	Site Specific Day DLAF	33kV Generic Day DLAF	Site Specific Night DLAF	33kV Generic Night DLAF
11kV	11kV Generic Day DLAF		11kV Generic Night DLAF	
LV	LV Generic Day DLAF		LV Generic Night DLAF	

Table1: NIE Networks' Proposal – DLAF types to apply to Generator Exports and Demands

The benefits of the proposed methodology are:

- The DLAFs would better reflect the influence of generation and demand customers on losses in the distribution network and would result in a fairer recovery of losses from the respective customers;
- Site Specific DLAFs would allow losses to be appropriately allocated to individual 33kV generators based on their impact on the network losses;
- The proportion of losses attributed to demand customers would decrease due to the recognition, through the Site Specific DLAFs, that most 33kV connected generators increase distribution losses;
- Lower DLAFs for demand would reduce the volume of energy purchased by suppliers at the transmission-distribution boundary;
- The introduction of Day and Night DLAFs would provide signals to encourage customer behaviour to reduce network losses when the system is heavily loaded;
- Demand customers could influence the amount of energy they pay for without reducing their total electricity consumption, by moving a higher proportion of their consumption to night time (lower DLAFs at night mean the energy attributed to a customer at night is lower than during the day for the same kWh consumption); and
- The proposed DLAF methodology would provide closer alignment with GB & ROI DLAFs.

Additional detail on proposed DLAF methodology can be found in section five of the consultation paper.

2. Consultation responses

In this section we have summarised the comments received from stakeholders in relation to the proposals set out in the consultation paper and we have provided our response to the comments. The stakeholder comments have been grouped into key themes, as set out below.

2.1 Support for NIE Networks' proposals

Stakeholder comments

One respondent noted full support for the new DLAF methodology proposed by NIE Networks as it would help to ensure that losses are recovered equitably from generators and demand customers.

Another respondent acknowledged the rationale behind implementing Site Specific DLAFs and the justification for greater granularity in the DLAFs to attribute losses to demand and generation connections. While the other respondents agreed with the concept of increased granularity through time-differentiated calculations to assess the losses on the distribution network.

Some respondents stated support for the rationale that losses should not be borne entirely by suppliers/demand customers, however some indicated concerns that implementing Site Specific DLAFs could further contribute to other policy changes which were affecting the financial arrangements of renewable generators.

NIE Networks Response

NIE Networks welcomes the support for the principles proposed in the new DLAF methodology. We appreciate that all respondents acknowledged the concept of increasing the granularity of the DLAFs – either through Site Specific DLAFs or time differentiated DLAFs, and that no concerns have been raised in relation to the introduction of Day and Night DLAFs.

We also note that most respondents supported the reallocation of losses such that total distribution losses were not attributed to demand customers.

2.2 Retrospective change

Stakeholder comments

Several respondents stated that the consultation proposals to introduce Site Specific DLAFs for 33kV generators would result in a retrospective change being applied to these generators.

These respondents stated that retrospectively applying the entire charge to 33kV generators who have funding models that did not take the new DLAF calculation methodology into account would be a retrospective change. Project investors who have committed capital to a project could be negatively impacted by the change in methodology, to the extent that some may have difficultly meeting investor expectations and discharging debt obligations.

Respondents added that introducing a retrospective change on generators will erode confidence for project developers/investors and risks the further development of renewable generation in Northern Ireland as well as creating a viability risk for those generators already in operation.

NIE Networks Response

It is important to note that the proposals set out in the consultation paper do not suggest that any retrospective change will apply. The proposed new methodology would apply to all, (existing and new) generators and demand customers going forward but no DLAF changes or costs would be retrospectively applied for previous years.

NIE Networks has a requirement under its Electricity Distribution licence[4] to produce DLAFs each year to apportion the distribution losses to customer metered demand and generation. Following the recent growth in distributed generator connections and exports, most of the

[4] NIE Networks' Electricity Distribution Licence: https://www.uregni.gov.uk/sites/uregni/files/media-files/NIE%20Distribution%20Licence%20effective%2022%20January%202018.pdf

33kV connected generators now increase losses on the network – as proven by the losses studies performed by our consultants. The DLAF methodology needs to be updated to take account of this impact and to allocate losses fairly between generators and demand customers.

The DLAFs are published within NIE Networks' Distribution Use of System (DUoS) Statement of Charges to apply for a period generally no longer than a tariff year. The DUoS Statement of Charges does not provide any guarantee that the structure or methodology for setting DLAFs will not change. The concept of Site Specific and time differentiated DLAFs is already employed in GB and ROI. Any parties operating in these jurisdictions would already be subject to these DLAFs.

Several respondents referred to the proposed methodology applying "the entire charge to 33kV generators". We want to clarify that under the proposed methodology, all losses that occur at the 33kV network level are not recovered solely from 33kV generators and demand customers. Based on the 2015 calendar year losses, 29% of the losses at the 33kV network level are due to generator connections at that voltage and would be allocated to 33kV generators through the proposed Site Specific DLAFs. The generic losses are then calculated such that 5% of the 33kV network losses would be allocated to 33kV demand customers and the remaining 66% to customers connected to the 11kV and LV networks on the basis that some of the energy delivered to these customers travels through the 33kV network and accumulates losses.

2.3 Alternative proposals suggested by respondents

In the consultation responses, three respondents suggested alternative proposals for DLAFs. These are summarised below.

2.3.1 Retain current methodology for all generators

Stakeholder comments

One respondent stated that while they agreed with the proposals set out in the consultation, they do not feel that this is an appropriate time to introduce them as the financial viability of generator connections in NI is questionable due to other issues such as increased rates, phasing out of NIROC's and the absence of government. This respondent suggested that the current methodology should be retained for all generators and that it should be reviewed again in five years. Two other respondents also agreed with NIE Networks' proposals but suggested that the current methodology should be retained at this stage and reviewed in five years.

NIE Networks Response

We note that the respondents agreed with the consultation proposals but they suggested that we should postpone any implementation and review the methodology in five years. The reason for this suggestion appears to be that other policy decisions (which fall outside of NIE Networks' remit) have had a negative financial impact on generators.

As mentioned previously, NIE Networks consultation proposals will help to allocate losses more fairly among customer groups and therefore the DLAFs will be more equitable. Therefore it is appropriate to proceed with the implementation of the proposed methodology as soon as is reasonably practicable. The timing of the implementation of Site Specific DLAFs has changed since the consultation was published in order to allow sufficient time for

complex design changes to market systems. Further information of the implementation timeframes is provided in section 3.1 of this paper.

2.3.2 Socialisation of DLAF charges

Stakeholder comments

Two respondents suggested that DLAF charges should be socialised among all distribution system users. Their view is that this would ensure a reduction in DLAF charges for demand customers while also ensuring the increase in DLAF charges for generators is not overly punitive. They suggested that losses could be allocated on a pro rata GWh basis, with both generators and demand customers sharing the burden of the losses.

NIE Networks Response

The proposed DLAF methodology set out in the consultation paper calculates the losses at each network level. The losses are then apportioned between the customer groups based on their contribution to the losses. For example, the losses at the 33kV network are allocated across generators and demand customers connected to the 33kV network, and all customers downstream as energy flows downstream contributing to the losses. Whereas the losses on the LV network are allocated across the generators and demand customers connected to the LV network only, as the 11kV and 33kV customers do not use the LV network.

The suggestion by respondents to socialise DLAFs on a pro rata GWh basis could actually have an impact on 33kV generators opposite to that which the respondents suggested it would have. If the total distribution losses were apportioned between all generators and demand customers on a pro rata GWh basis, then the allocation of losses to 33kV generators and demand customers could both increase substantially. Conversely the allocation of losses to the LV demand customers would decrease significantly.

We consider that it is more appropriate for DLAFs to be allocated based on network usage and energy flows.

2.3.3 New methodology only to be forward looking

Stakeholder comments

One respondent suggested a two-tiered DLAF solution where existing generators (already connected to the distribution system) would continue to have DLAFs based on the current methodology; while those generators connected post the final decision would be charged based on the new methodology.

The respondent suggested that this would ensure that generators connected under an expectation of DLAFs based on current methodology calculations are protected; while forward looking generators are charged appropriately for the DLAF volumes they contribute.

NIE Networks Response

We note that the two-tiered approach suggested by the respondent would result in substantial cross-subsidy in relation to the allocation of losses through the DLAFs. The new generators and potentially all existing demand customers would have to cover the losses and potentially the associated energy costs incurred by the existing 33kV generators. This would provide an unfair advantage to the existing 33kV generators and could distort competition.

It would be inappropriate to implement this suggestion as it is taking a step away from the appropriate allocation of losses. It would also be unfair to the new generators and demand customers as they have no control over the losses which the existing 33kV generators might incur.

The respondent's suggestion could also be considered as discriminatory as it may deter competition in the generation market due to new generators receiving DLAF terms which are less favourable than the terms for existing generators.

2.4 Requests for further information

Stakeholder comments

Some of the respondents asked for additional information on the proposed methodology including the following specific questions. Responses to these queries are provided in Appendix 1.

1) How was it determined that 11kV & LV generation reduce losses on higher voltage networks and have minimal impact on their network of connection?
2) Why are generic DLAFs being applied to 11kV & LV generation and is this appropriate?
3) What is the rationale for continuing to apply generic DLAFs to demand connections rather than Site Specific DLAFs?
4) Additional information was requested to explain the methodology that will be applied by NIE Networks when calculating DLAFs for generators.
5) Further clarification was requested on the "substitution method" for calculating DLAFs.
6) What scenarios modelled will determine the DLAF apportioned to a generator (i.e. summer valley, winter peak etc).
7) One respondent stated that it would be beneficial if a number of examples are provided to illustrate what the specific 33kV DLAFs would be for a generator based on criteria such as length of connection to load etc. on a non-generator specific basis.

3. Decisions on new DLAF methodology

The consultation responses did not highlight any concerns with regards to the principles of the new proposed DLAF methodology itself; instead the responses acknowledged the rationale for the proposed changes but focused on concerns about the financial viability of 33kV generators due to various government policy changes which have had a negative financial impact on these generators. As these policies are outside NIE Networks' remit the proposed methodology changes and all comments from the respondents have been considered in the context of their impact on all Northern Ireland demand and generator customers and NIE Networks' licence obligation to provide annual DLAFs "accurate in all material respects".

As mentioned previously, NIE Networks employed consultants to complete loss studies which identified that 33kV generators increase losses on the distribution network. However, the current DLAF methodology assumes that the 33kV generators reduce distribution losses,

rather than increasing losses so it is clear that the DLAF methodology would need to change in order to apportion the losses more appropriately between generators and demand customers. Some of the respondents noted agreement with this concept of apportioning losses in a more equitable way so that suppliers would not bear the full cost of the losses going forward.

Following careful consideration of the consultation responses we have decided to proceed with implementing the changes to the DLAF methodology as proposed in the consultation paper.

We are therefore proceeding with the implementation of:

(i) Site Specific DLAFs for 33kV generator exports;

(ii) A default DLAF of 1.000 for 33kV exports where there is no or incomplete metered information (assumes a neutral position on losses); and

(iii) Day and Night DLAFs for all demand and generator customers.

The new DLAF methodology will better reflect the influence of generation and demand customers on losses in the distribution network and ultimately result in a more equitable allocation of the losses between demand and generation customers. In addition, suppliers will no longer bear the full cost of the distribution losses.

The Site Specific DLAFs will allow losses to be appropriately allocated to individual 33kV generators based on their impact on the network losses. The Site Specific losses will then be taken into account when the remaining losses are apportioned to other generator and demand customers for the calculation of Generic DLAFs.

The introduction of Day and Night DLAFs under the new methodology could encourage customer behaviour to reduce network losses when the system is heavily loaded. The Day and Night DLAFs will allow demand customers to influence the amount of energy they pay for without reducing their total consumption, by moving a higher proportion of their consumption to night time.

The new DLAF methodology will bring NI more into line with GB and ROI as all GB DNOs and ESB Networks publish Site Specific DLAFs as a minimum for generators connected at 33kV and above and they also have time differentiated DLAFs .

Under NIE Networks' distribution licence, the Utility Regulator (UR) is not required to approve the DLAF methodology; however the UR does approve the actual DLAF values that are produced from the methodology and published in NIE Networks' Statement of Charges. We therefore engaged with the UR before issuing the consultation paper in February and we have had further engagement with the UR before publishing this decision paper.

3.1 Timeframes for implementation

As explained above, we are proceeding with the implementation of the changes to the DLAF methodology as set out in the consultation paper. However the timeframes for implementation have changed since the consultation paper was published.

The implementation of the changes to the methodology will be phased in, as follows, to facilitate complex design changes to market systems for the Site Specific DLAFs:

- Day and Night DLAFs for all demand and generator customers will be introduced from 1 October 2018 for the 2018/19 DLAFs; and
- Site Specific DLAFs for 33kV generator exports and the use of a default DLAF of 1.000 for 33kV exports where there is no or incomplete metered information will be implemented the following year (i.e. from 1 October 2019 for the 2019/20 DLAFs).

These implementation dates will allow for necessary system changes to be completed and tested prior to the DLAF methodology changes taking effect.

Appendix 1: Additional Information on DLAF Methodology

As mentioned in section 2 of the decision paper, some of the consultation responses asked for additional information on the proposed methodology. This appendix provides our responses to the specific questions asked about the methodology.

1. How was it determined that 11kV & LV generation reduce losses on higher voltage networks and have minimal impact on their network of connection?

Impact of 11kV and LV connected generators on losses in networks at higher voltages

In general, system electrical losses are a product of the load on the network, the distance the electricity has to travel across the network and the number of transformation levels the electricity has to pass through. Energy provided by generation connected at 11kV or LV will reduce the energy required from generators connected higher up the system and so reduce the amount of electricity transported across the higher voltage networks. It therefore follows that, generation provided at 11kV reduces losses on the 33kV network while generation provided at LV reduces losses on the 11kV and 33kV networks.

Impact of 11kV connected generators on 11kV network losses

Additional power flow simulations were performed by our consultants to assess the impact of generators connected to the 11kV network under normal loading conditions on the grid. Power flows were conducted with all 11kV generators switched out at the time points of maximum demand per day and night periods in each calendar month in 2015. The 11kV generators were then switched back in, their production set to their maximum capacity and the power flow was repeated. In each case the system losses were recorded. 48 studies were performed in total.

This resulted in evaluating the impact on the system losses of all 11kV generators jointly. The losses attributed to these generators were calculated as the difference between the system losses with the generator disconnected and then connected. These studies found that 11kV generation reduce 11kV network losses during the day but increase the 11kV losses at night. However, the overall impact over the whole day is a reduction in the 11kV network losses.

Generators connected to the 11kV network tend to be connected close to demands and so reduce power flows in 11kV circuits. Also, 11kV generators do not tend to have dedicated assets in which additional losses occur. This results in reduced losses on the 11kV network during the day. At night, the 11kV generation increases the 11kV network losses and could be explained by reverse power flows at times during the night when the system loading is low. It is estimated that over a year and considering the whole day, 11kV generation operating at maximum export reduces 11kV network losses by approximately 2.35%. When calculated using an approximated export profile and a load factor of 20%, it is estimated that 11kV generators reduce annual losses on the 11kV network by 0.3%.

Impact of LV connected generators on LV network losses

The generation connected to NIE Networks' LV network can be categorised into 2 groups, i.e. (i) generation connected via dedicated transformers to the 11kV network but metered at

LV (typically generators with maximum export capacity greater than 50kVA), and (ii) generators which export directly onto the LV network.

LV generators connected via dedicated 11kV/LV transformers are metered at LV due to NIE Networks' least cost technically acceptable policy. The losses incurred due to the power flows through the transformer and any dedicated circuitry is attributed to LV for the purpose of DLAF calculations. The annual losses due to these generators was evaluated based on typical iron and copper losses for such connections, and is estimated as c.1.2% of LV system losses.

Conversely, LV generators connected within the LV system with local demand reduce the power flow through the LV circuits and 11kV/LV transformers. The impact on LV losses attributed to these generators was assessed based on studies made for typical GB networks. As more than 98% of directly connected LV generation in Northern Ireland is PV, we used GB studies of PV penetration to estimate the impact of LV generation on LV system losses. According to these studies, for low PV penetration levels, an increase of 1% in the PV penetration level results in 1.25% LV loss reduction. Based on these metrics, NIE Networks experiences a 1.34% LV generation penetration (at the time of this analysis) which leads to a 1.68% estimated annual LV loss reduction.

The net impact of the 2 types of generation connected at LV is to reduce the LV network losses by less than 1%.

2. Why are generic DLAFs being applied to 11kV & LV generation and is this appropriate?

As explained above, the 11kV and LV generators reduce losses on higher voltage networks and in general contribute a small reduction to the losses on the network to which they are connected. Therefore, at this time, we consider it appropriate to continue to apply a generic DLAF to the 11kV and LV generator exports as the generic DLAF assumes these generators reduce network losses.

A change to the DLAF methodology for generators connected at 11kV and/or LV may however be considered in the future, if there is a significant change in the impact these generators have on the distribution network losses.

3. What is the rationale for continuing to apply generic DLAFs to demand connections rather than Site Specific DLAFs?

The generic DLAFs for demand customers at all network levels assume that the demand customers contribute to the losses on the network. As this assumption is valid we therefore do not consider it necessary to change from generic DLAFs for these customers at this time. We also note that ESB Networks do not apply Site Specific DLAFs to demand customers in ROI.

4. Additional information was requested to explain the methodology that will be applied by NIE Networks when calculating DLAFs for generators.

Methodology for Calculating Generic DLAFs

Step 1 – Calculation of losses for 33kV and 11kV networks

- NIE Networks use metered data for the last calendar year to calculate losses and DLAFs e.g. for the 2018/19 DLAFs we will use the 2017 year data. Half hour data is collated for distributed generators and demand customers connected to the 33kV and 11kV networks.
- Multiple power flow simulations are performed to calculate the electrical losses for each half hour in a selected week of each calendar month. As the 7 days are selected to represent the month, public holidays will be avoided. Essentially it is assumed that the simulated losses as a percentage of the energy delivered during a representative week can be extrapolated to the whole month, hence the weekly losses are extrapolated to determine the total losses for the Day and Night periods in each month.
- The annual Day losses (kWh) are the sum of the monthly Day losses and the annual Night losses (kWh) are the sum of the monthly Night losses.
- The losses calculated for the 33/11kV transformations are included in the total 11kV losses for the purpose of calculating the DLAFs.

Step 2 – Calculation of LV network losses

- LV losses are calculated as the residual losses after the 33kV and 11kV losses have been subtracted from the total distribution losses.
- Total distribution losses are calculated as the difference between (i) units entering the distribution network from transmission and distributed generators, and (ii) units exiting the network based upon customer kWh consumption.
    (i) The units entering the distribution network are determined using half hour metering data for bulk supply points and distributed generators. Estimated export units for micro-generators are also included, using market agreed rules to assess the export volume.
    (ii) The units exiting the distribution network are determined using half hour metering data for 33kV and 11kV connected customers (including imports at distributed generator sites). Public Service Obligation (PSO) data (to an accuracy of at least month+4) is used for LV customer imports.
- For the purpose of the DLAF calculation, the LV losses include the 11kV/LV transformation losses.

Step 3 – Calculation of generic DLAFs

- DLAFs are calculated for each Day and Night period based on network losses expressed as a proportion of input energy to the relevant network. The calculation takes into consideration the fact that losses in lower voltage systems cause losses in higher voltage systems.

- Generic DLAFs for 33kV connections take into account the effects of Site Specific DLAFs i.e. losses incurred by the 33kV connected generators.
- Based on the calculated and disaggregated losses per each network level and by taking into account losses caused by Site Specific generation, the Day and Night DLAFs are then calculated for each network level using the following formulae:

$$DLAF_{33kV}(ToD) = \left(1 + \frac{Losses_{33kV} + Losses_{33kVGen}}{Energyin_{33kV} + Energy_{33kV} - Losses_{33kV}}\right)$$

$$DLAF_{11kV}(ToD) = DLAF_{33kV}(ToD) \times \left(1 + \frac{Losses_{Total\ 11kV}}{Energyin_{11kV} - Losses_{Total\ 11kV}}\right)$$

$$DLAF_{LV}(ToD) = DLAF_{11kV}(ToD) \times \left(1 + \frac{Losses_{Total\ LV}}{Energyin_{LV} - Losses_{Total\ LV}}\right)$$

All values corresponding to the respective ToD (i.e. Day and Night periods):-

$DLAF_{33kV}$	- DLAF for the 33kV network in respective ToD
$DLAF_{11kV}$	- DLAF for the 11kV network in respective ToD
$DLAF_{LV}$	- DLAF for the LV network in respective ToD
$Energy_{33kV}$	- Units generated by the Site Specific generation at 33kV
$Losses_{33kV}$	- Losses in the 33kV network
$Losses_{Total11kV}$	- Losses in the 11kV network, including the 33/11kV substation losses
$Losses_{Total\ LV}$	- Losses in the LV network, including the 11kV/LV substation losses and non technical losses
$Losses_{33kVGen}$	- Calculated losses corresponding to Site Specific generation in the 33kV network. (Negative if generation increases losses and positive if losses are decreased).
$Energyin_{33kV}$	- Power flowing into the 33kV network from the higher voltage system
$Energyin_{11kV}$	- Power flowing into the 11kV network from the higher voltage system
$Energyin_{LV}$	- Power flowing into the LV network from the higher voltage system

<u>Methodology for Calculating Site Specific DLAFs</u>

Step 1 – Calculation of losses for the 33kV Generators

- The substitution method is used to assess the impact of the 33kV connected generators on the system losses. To perform this study, the maximum loading time point for the Day and Night in each calendar month is initially recorded. Then, for each of those recorded time points, each 33kV generator is switched out, the load/generation of the network is scaled to 60% (to represent normal operation) and a power flow performed. Then, the generator is switched in, its production set to the maximum capacity and the power flow calculation performed again. In both cases the total system losses are recorded and the losses attributed to the individual generator calculated as the difference between the recorded system losses at that time point. 48 power flow simulations are performed for each generator to assess their impact on losses.
- A Loss Load Factor relating to the generator's export profile over the Day and Night periods in each month is then calculated. The Loss Load Factor is required to produce an average loss value to make allowance for the connection not

continuously operating at its maximum export capacity within any given time period and, therefore, not contributing to losses on a constant basis.

- Loss Load Factors are calculated based on the available customer's half-hourly metering data for each Day and Night period using the expression:

$$\text{Loss Load Factor} = \frac{\sum export^2}{No.of\ periods * MEC^2}$$

- The simulated loss values are multiplied by the number of hours in the respective Day and Night period and by the respective Loss Load Factor to produce the losses figure, in kilowatt-hours.

Step 2 – Calculation of Site Specific DLAFs

- The Site Specific DLAF is specified by the losses attributable to the respective generator connection in each Day and Night period averaged over the number of units generated. The generation Site Specific DLAF is given by the ratio:

$$1 + \frac{the\ losses\ attributable\ to\ the\ generator\ connection}{units\ generated\ by\ generator\ connection}$$

- DLAFs for generators whose output causes an overall reduction in system losses will be greater than unity (i.e. these generators are assigned a benefit). Generators whose output causes an overall increase in system losses will have DLAF of less than unity.

5. Further clarification was requested on the "substitution method" for calculating DLAFs.

Site Specific Loss Factors are normally calculated using the substitution method. The substitution method involves load flow analysis where energy loss calculations are carried out with the site's load/generation connected and then disconnected from the modelled network. Losses are calculated for the respective seasonal or time of day periods of the year. Only technical losses are taken into account. The resulting change in losses is attributed to the specific connection and used to calculate the Site Specific Loss Adjustment Factors.

Our response to question 4 above shows how NIE Networks used the substitution method to calculate the Site Specific DLAFs for 33kV connected generators.

6. What scenarios modelled will determine the DLAF apportioned to a generator (i.e. summer valley, winter peak etc).

For generic studies a representative week is modelled for each month on a half hour by half hour basis (48x7 half hours per month). From these studies the maximum load case for each month Day and Night is identified (24 cases for the year). From empirical data, average load is approximately 60% of the peak, therefore for each of the 24 cases the load and generation are scaled to 60%.

To assess the contribution that each 33kV generator makes to the network losses, the network is modelled without the generator being studied and with the generator at maximum output, at the time of system maximum demand during the Day and Night periods for each month.

7. One respondent stated that it would be beneficial if a number of examples are provided to illustrate what the specific 33kV DLAFs would be for a generator based on criteria such as length of connection to load etc. on a non-generator specific basis.

In general there are three main variables which influence the network losses and Site Specific DLAFs; the generator capacity, the amount of local load and the dedicated network impedance. To provide examples of Site Specific DLAFs may be misleading because DLAFs will not only depend on the physical characteristics of the generator's connection and its output, but also the site specific metered data associated with local demand connections. The DLAFs we propose to use are based on actual metered data for all demand and generator connections to the distribution network. Two generators connected to the 33kV network with similar characteristics may have different DLAFs due to, for example, the size or timing of local load.

Appendix 2: Consultation responses

Response by Energia to NIE Consultation

Proposed Changes To Methodology For Calculating Distribution Loss Adjustment Factor (DLAF's)

21st March 2018

1. Introduction

Energia welcomes the opportunity to respond to the NIE consultation – Proposed Changes To Methodology For Calculating Distribution Loss Adjustment Factors (DLAF's)*.* Energia has contributed significantly to Northern Ireland's renewable generation capacity over the past number of years. This has been achieved through our investment, development, contracting and trading activities with stable policy support from government.

This proposed introduction of retrospective costs on generators is a further erosion in the confidence of project developers/funders and not only risks the further development of renewable generators in Northern Ireland but the viability of those already constructed and in operation.

Energia agrees with the concept of increased granularity through a time-differentiated calculation to assess the losses on the distribution system and agrees that this cost as per other jurisdictions should not be bourne entirely by the supplier. However to retrospectively apply the entire charge (at 33kV) on generators who have funding models that did not take into account the new proposed calculation methodology is unfair and will leave many 33kV generators unable to discharge their debt obligations.

Further clarification is required from NIE on the proposed "Substitution Method" for calculating DLAF's. What scenarios modelled will determine the DLAF apportioned to a generator i.e. summer valley, winter peak etc. In addition, it would be beneficial if a number of examples are provided illustrating what the specific 33KV DLAF's for a generator will incur based on criteria such as length of connection to load etc. on a non-generator specific basis.

To ensure fairness Energia propose the following alternatives in preferred order:

I. Retain the current methodology for all generators

The financial viability of generator connections in Northern Ireland due to on-going issues such as increased rates, phasing out of NIROC's and absence of government is highly questionable at present, to add a further significant burden on generators may mean a cessation of new build generation at 33kV level. As outlined above Energia agrees with the concept of the proposed new methodology, however we do not feel that this is the appropriate time to introduce it on a retrospective basis. Energia prose retaining the current calculation methodology with a view to reviewing again in 5 years.

II. New calculation methodology to only be forward looking (grandfathering)

A more equitable solution would be to implement a two-tiered DLAF solution whereby generators already connected to the distribution system continue to be charged using the current calculation methodology, while those who connected post the final decision will be charged according to the new methodology. This ensures that generators who connected under an expectation of DLAF calculations being carried as per the current methodology are protected while on a forward looking basis generators are charged appropriately for the DLAF volumes they contribute.

III. Socialisation of DLAF charges

Calculating DLAF values such that the costs are socialised amongst all distribution system users will ensure a reduction in DLAF charges for demand customers while also ensuring the increase in DLAF charges for generators is not overly punitive. This could be allocated on a pro rata GWhr basis, with both generators and demand customers sharing the losses burden.

2. Summary

While Energia agrees with the concept of apportioning losses that are currently all to attributed to suppliers in a more equitable manner, to do so now will risk generator investment in Northern Ireland and significantly increase the risk of default on the current 33kV generation fleet. A number of solution are proposed above which we feel will meet the objectives of the consultation while also protecting existing and future generation investment.

27 March 2018

Karen Wilson
Network Pricing Team
NIE Networks
120 Malone Road
Belfast

Dear Karen

Ref: PROPOSED CHANGES TO METHODOLOGY FOR CALCULATING DISTRIBUTION LOSS ADJUSTMENT FACTORS – CONSULTATION PAPER

The Consumer Council is a non-departmental public body (NDPB) established through the General Consumer Council (NI) Order 1984. Our principal statutory duty is to promote and safeguard the interests of consumers in Northern Ireland (NI). The Consumer Council welcomes the opportunity to respond to this NIE Networks (NIEN) consultation.

The Consumer Council recognises that NIEN has used the evidence of its own recent study to assess how generators at 33kV, 11kV and LV networks impact on network losses, to inform its proposed new methodology on the calculation of distribution loss adjustment factors. In our view NIEN's proposals will help ensure that distribution losses are recovered equitably from generators and customers. Therefore we support NIEN's new methodology.

If you require further information or you wish to discuss any aspect of this response please contact Paulino Garcia on 02890 251645 or Paulino.Garcia@consumercouncil.org.uk.

Yours sincerely

PAULINO GARCIA
Senior Policy Officer (Energy)

Brookfield Renewable

Response to Proposed Changes to Methodology for Calculating Distribution Loss Adjustment Factors Consultation Paper

Submission Date: 27 March 2018

Brookfield

Brookfield

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Date: 27 March 2018

RE: Proposed Changes to Methodology for Calculating Distribution Loss Adjustment Factors

Dear Ms. Wilson,

Brookfield Renewable welcome the opportunity to provide feedback on the Proposed Changes to Methodology for Calculating Distribution Loss Adjustment Factors Consultation Paper. This is an important issue for Brookfield Renewable, as well as the wider renewable energy industry, and we support the submission made by NIRIG in response to this consultation.

Brookfield is a global alternative asset manager with over 100 years' experience owning and operating real assets across Infrastructure, Real Estate, Renewable Power and Private Equity. Brookfield Renewable, part of the broader Brookfield group, is a leading continental independent power producer with over 16,000 MW of hydroelectric, wind, solar and storage capacity as well as fully integrated investment, operating, power marketing and development capabilities. Our Irish portfolio comprises 390 MW operating wind capacity across 22 wind farms in nine counties and a 200 MW development pipeline. In addition to operating a wind portfolio in the Single Electricity Market, Brookfield Renewable also actively trade power across the interconnectors between SEM and BETTA.

Brookfield Renewable acknowledge the rationale behind implementing site-specific Distribution Loss Adjustment Factors (DLAFs) and the justification for greater granularity in the published DLAFs used to attribute losses to demand and generation connections at distribution voltages. Notwithstanding this, we believe that the proposal to introduce site specific DLAFs to 33kV generators is inequitable and constitutes a retrospective change. This proposal also contributes to a number of recent changes relating to renewable investments in Northern Ireland which cumulatively represent an erosion of investor confidence in the policy and regulatory stability of the jurisdiction.

Brookfield Renewable also believe that insufficient detail was provided in the consultation paper regarding the new DLAF methodology. We therefore request additional information regarding the following points:

- We do not consider it appropriate for site specific DLAFs to be proposed for 33kV generators when generic DLAFs are proposed for 11kV and LV generators. Can more detail be provided on how it was determined that 11kV and LV generators reduce losses on higher voltage networks and have minimal impact on their network of connection?
- We request clarity on why it is proposed to continue to apply generic DLAFs to demand connections rather than site specific DLAFs? Brookfield Renewable are of the opinion that the same approach should be adopted for both generation and demand connections.

- It currently remains unclear what methodology will be applied by NIE when calculating DLAFs for 33kV generators. Please can some detailed examples be provided showing how the site specific DLAFs are to be generated? In the absence of this information it is difficult to estimate potential DLAFs for existing and future generators.

Should you require any further information in relation to the points raised above please don't hesitate to get in touch.

Kind regards,

Niamh O'Sullivan
Regulatory and Power Markets Analyst, Ireland

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[By Email]

27th March 2018

Sent by email to: karen.wilson2@nienetworks.co.uk

Re: Consultation on Proposed Changes to Methodology for Calculating Distribution Loss Adjustment Factors
Dated 13th February 2018

Dear Ms. Wilson,

We, DW Consultancy Ltd (DWC), are wind farm project developers operating in both Northern Ireland (NI) and the Republic of Ireland (RoI). We have been active in the Northern Irish wind industry for over ten years, and have developed a large portfolio of operational and consented (c.200MW+), and proposed (c.25MW) onshore wind farm projects. We continue to be an active developer of windfarm projects in NI, with c. 60MW expected to go to construction in the coming year.

DWC welcome the opportunity to respond to the above referenced *Consultation* on '*Proposed Changes to Methodology for Calculating Distribution Loss Adjustment Factors*'.

DWC support the detailed response provided by the Northern Ireland Renewable Industry Group (NIRIG) to this Consultation, in particular the suggestion to retain the current methodology for all generators with a view to reviewing again in 5 years.

Please do not hesitate in contacting us if you have any queries or wish to discuss this matter further.

Yours Sincerely,

Barry O'Kane, B.Eng, C.Eng, MIEI,
Chartered Engineer
On Behalf of: DW Consultancy Ltd.

cc Ms. Doreen Walker DW Consultancy Ltd.

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NIRIG response to NIE consultation on Proposed Changes To Methodology For Calculating Distribution Loss Adjustment Factors (DLAFs)

27 March 2018

The Northern Ireland Renewables Industry Group (NIRIG) represents the views of the renewable electricity industry in Northern Ireland, providing a conduit for knowledge exchange, policy development, support and consensus on best practice between all stakeholders. Committed to making a positive difference, we promote responsible development, support good community engagement and deliver low-cost electricity generation from sources such as onshore wind, tidal, solar and storage using our greatest natural resources**.**

NIRIG welcomes the opportunity to respond to NIE's consultation. We have queries regarding the methodology and level of detail included in the consultation. We have also suggested alternatives to the proposals contained within the consultation.

Queries

1. A) Can more detail be provided on how it was determined that 11kV & LV Generation reduce losses on higher voltage networks and have minimal impact on their network of connection?
   B) Is this why generic DLAFs are being applied to these connections?
   C) Is this appropriate?
2. What is the rationale to continue to apply generic DLAFs to demand connections rather than site specific DLAFs?
3. It remains unclear what methodology will be applied by NIE when calculating DLAFs for generators. In the absence of this information, it is not possible to estimate potential DLAFs for existing and future generators.

Proposals

This proposed introduction of retrospective costs on generators is a further erosion in the confidence of project developers, investors and funders in the policy and regulatory stability

of Northern Ireland and risks the further development of renewable generators in Northern Ireland.

NIRIG acknowledges the rationale for increased granularity through a time-differentiated calculation to assess the losses on the distribution system and agrees that this cost as per other jurisdictions should not be borne entirely by the supplier. However, retrospectively applying the entire charge (at 33kV) on generators who have funding models that did not take into account the new proposed calculation methodology constitutes a retrospective change. Project investors and funders who have committed capital to projects in advance of this change will be negatively impacted, some potentially to the extent where they will have difficulty in meeting investor expectations and discharging debt obligations.

In the broader context it is unclear how the decarbonisation agenda will succeed if policy changes at a regulatory and government level can retrospectively add costs to renewables projects while removing financial support. We would like to engage in a comprehensive discussion with all stakeholders about the need for increased decarbonisation, inward investment in renewables and the policy levers that can be used to facilitate this.

In 2011 the Planning (Fees) (Amendment) Regulations (Northern Ireland) enabled a maximum planning fee of £250,000 for wind farm projects, a considerable increase from the previous maximum fee of £11,834. Recent planning statistics demonstrate that the average processing time for renewables projects rose from 64.8 weeks in 2016 to 88.9 weeks in 2018. Increasing fees while not delivering on targets impacts project costs twice over.

In 2014 the rates revaluation led to significant increases for renewables projects: in Omagh District Council values for single turbines rose by an average of 661% and large-scale wind farms in saw an average proposed increase of 465%. The ratings method of calculation meant that 'high capital, low fuel cost' electricity generation was disproportionately impacted: wind is particularly affected as finance is a key cost, which cannot be taken into account in the valuation calculation. We understand that a further rates revaluation will take place shortly.

In 2016 the support scheme for renewables projects in Northern Ireland closed and no alternative scheme was set up to replace it, leaving Northern Ireland as the only part of these islands without government support for renewables.

This proposal therefore contributes to a pattern of signals that renewable investments in Northern Ireland are at risk from a range of policy changes. The cumulative effect of these changes will impact business models and act to damage overall investor confidence. Given that, NIRIG suggests the following alternatives to NIE Networks' proposals:

I. Retain the current methodology for all generators

The financial viability of generator connections in Northern Ireland due to on-going issues such as increased rates, phasing out of NIROC's and absence of government is highly questionable at present. While we agree with the proposal we do not feel that this is the appropriate time to introduce it on a retrospective basis. We instead propose retaining the current calculation methodology with a view to reviewing again in 5 years.

II. Socialisation of DLAF charges

Calculating DLAF values such that the costs are socialised amongst all distribution system users will ensure a reduction in DLAF charges for demand customers while also ensuring the increase in DLAF charges for generators is not overly punitive. This could be allocated on a pro rata GWhr basis, with both generators and demand customers sharing the losses burden.

We would welcome responses to our queries above and a better understanding of the proposed methodologies. We would also encourage dialogue between all stakeholders regarding the potential impact of retrospective changes, the cumulative impact of such changes on business models and the role of policy-makers in enabling investor confidence to ensure continued investment in this sector.

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Meabh Cormacain
NIRIG