Appendix 1 – Demand HCC development methodology

Introduction

1.1. As part of our Decision on changes to the electricity distribution connection charging boundary, published alongside this document, we set out that Distribution Network Operators (DNOs) should implement a new high-cost cap ('HCC') for demand connections.[1] This is a threshold above which the connecting customer must pay in full for any wider network reinforcement costs driven by their connection. We have specified the level at which this cap should be set as £1720/kVA. This appendix sets out the work we undertook to reach this decision.

1.2. In our January 2022 consultation on updates to our minded-to positions, we proposed that introducing a demand HCC at an appropriate threshold could strike a balance between achieving the benefits outlined in our original proposals, whilst ensuring that DUoS bill payers are better protected from the costs of excessively expensive connections.[2] Without some mitigation alongside the shallow connection boundary, there would be limited incentive for connecting customers to avoid connecting in areas of particularly high reinforcement cost and/or to request capacity in excess of their needs, which would have to be funded by Distribution Use of System ('DUoS') charge billpayers.

1.3. The analysis we set out in this appendix is based on information that we requested from the DNOs, to determine a suitable demand HCC level. In determining this level, we adhered to the principle set out in our January 2022 consultation, that the demand HCC should be set at a threshold (such as the 95th percentile of connection offers on a £/kVA basis[3]) which would act as a reasonable protection against the high-cost projects only.

1.4. Applying this principle in practice, based on broad stakeholder support, we decided to set the HCC at a level where no more than 5% of historic connection offers across RIIO-ED1 would have breached it. This is consistent with our position that the HCC should act as a backstop protection against only the highest-cost connections. In the interest of geographical fairness, we furthermore determined that this 5% threshold,

[1] Paragraph 1.15 of DCUSA, at the time of publication, refers to the 'high-cost project threshold' for generation connections of £200/kW. In our decision documents we refer to this as a 'high-cost cap' or HCC, and for ease of understanding have consistently used this term.

[2] Paragraph 2.89 of our Updates to our Minded-to Positions, available here: https://www.ofgem.gov.uk/publications/access-and-forward-looking-charges-significant-code-review-updates-our-minded-positions

[3] The demand high-cost cap refers to kVA rather than kW in line with how capacity is expressed in connection offers for demand customers.

based on historical connection offers, should not be breached by the level we set, in any individual DNO region.

1.5. We also determined that the HCC should be calculated by considering the cost of reinforcement at the voltage level of connection and at the voltage level above. This ensures that where projects at lower voltage levels could otherwise trigger very high costs to DUoS billpayers, therefore would still be an appropriate signal to the connecting customer.

Methodology

1.6. To support our final decision on an HCC for demand connections, we undertook analysis of connection offers made by all GB DNOs for connections that required reinforcement work from 2017/18 to 2020/21, based on available RIIO-ED1 period data at the time of request.

1.7. We explained in our January 2022 update to our minded-to positions that the data we had available at the time of consultation was reflective of the overall reinforcement cost per connection but did not show the voltage levels at which reinforcement was triggered. We were therefore unable to consult on a specific threshold that aligned with our principles-based minded-to position that the HCC should consider reinforcement at the voltage level of connection plus the voltage level above.[4] In lieu of this data, we proposed a set of principles we would apply to determine an appropriate cap (and our rationale behind them) alongside indicative data on the potential magnitude of any cap, based on reinforcement costs at all voltage levels.

1.8. Since our update to our minded to positions, we requested more granular data from the DNOs, which enabled us to conduct further analysis. In response to this request, DNOs provided full datasets including the levels at which reinforcement was funded for each connection offer. The additional information also included categorisation by voltage level at point of connection and the voltages of associated reinforcement. Using this data, we were able to consider whether any user groups were likely to be disproportionately affected by the HCC, based on the types of connections typically located at different voltage levels and the likelihood of them triggering the cap.

[4] Paragraph 2.92 of our updated minded-to consultation, available here: https://www.ofgem.gov.uk/publications/access-and-forward-looking-charges-significant-code-review-updates-our-minded-positions

1.9. With this data, we analysed a range of options for the demand HCC in line with the principles upon which we consulted. We receive the following data for each connection offer:

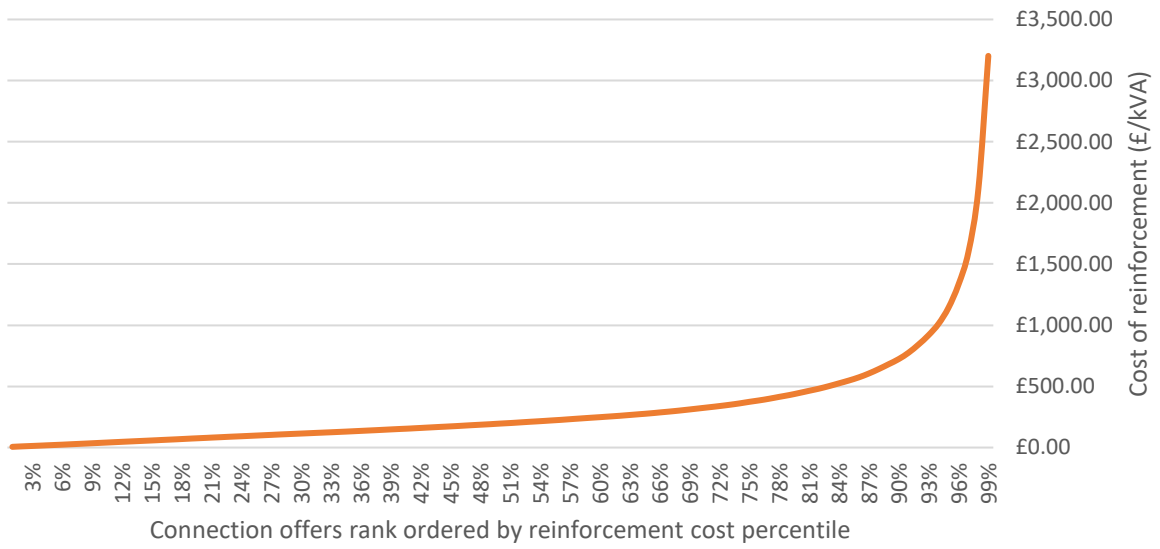
- The licence area
- A unique project ID
- The capacity of the connection (kVA)
- Connection type based on the voltage of connection and the voltage levels of reinforcement required
- The total customer funded reinforcement (£)
- The total DUoS funded reinforcement (£)

1.10. Using this information, we calculated the total cost of reinforcement and the £/kVA value for each connection offer. After this data had been gathered, we undertook an exercise to cleanse it for data errors to ensure it was useable for our analysis. There were a very small number (0.01%) of data points that we excluded because they were missing a piece of information that was needed to calculate a £/kVA value for the connection offer.

Analysis

1.11. The first piece of analysis we undertook was to assess the percentiles of the £/kVA values based on rank ordering connection offers by reinforcement costs. This indicated that there was an exponential increase in connection offer costs at higher percentile levels, as shown in Figure 1.

Figure 1: Connection offers issued by DNOs over the course of RIIO-ED1 to date, rank ordered by reinforcement cost percentile on the x-axis and cost of reinforcement in £/kVA on the y-axis



1.12. Figure 1 illustrates that the cost of reinforcement in connection offers is reasonably consistent for the majority of projects, with these costs rising significantly for the most expensive 10% of projects. This suggests that reinforcement costs are not linear, and the reinforcement costs for the most expensive connections exceed the majority of connection offers by a significant margin.

1.13. An earlier version of this graph was included in our updates to our minded-to positions based upon the dataset available prior to the additional data request outlined in this methodology section[5]. To establish an appropriate level for a demand HCC based on the updated dataset, we reviewed the number of connections that would be affected by a cap set at various levels.

1.14. Table 1 illustrates a range of options considered for setting the demand HCC. We included the current level of the generation HCC (in £/kW) to review how many demand connection offers would be affected by a cap at this level. However, this option would cause almost half of all connection offers issued over the RIIO-ED1 price control period to be affected, which would have been inconsistent with the principle upon which we consulted.

[5] Figure 1 of our updated minded-to consultation, available here: https://www.ofgem.gov.uk/publications/access-and-forward-looking-charges-significant-code-review-updates-our-minded-positions

Table 1: Average number of demand connection offers across GB for the RIIO ED1 period that would be affected by an HCC set at various £/kVA levels

Cap level (£/kVA)	Proportion of demand customers requiring reinforcement that would trigger the HCC
£200 (comparable to the generation HCC[6])	49.1%
£1000	6.3%
£1144 (95% percentile)	5%
£1300	4.3%
£1400 (Updated minded-to suggested level, which was based on the previous dataset)	3.7%
£1500	3.4%
£1700	2.9%
£1720 (four times the average cost of reinforcement)	2.8%
£1900	2.4%

1.15. We then investigated if customers in any DNO regions would be unfairly penalised or benefit disproportionately from our proposal. To determine this, we compared the total number of connection offers made against the number that would have triggered the HCC in each region. At the HCC level set out in our update to our minded to position of £1400/kVA, we observed variations ranging from 0.5% in South Wales to 5.9% in East Midlands. This would variation in impact from region to region is due to the nature of connection offers issued in these different areas of the network.

1.16. Using the additional data provided by DNOs, we also reviewed which types of projects most regularly exceeded various HCC levels. The majority of projects affected by the HCC were low voltage point of connection offers with associated high voltage level reinforcement. These connection offers made up the majority of our dataset, however, they are not disproportionately overrepresented in our final figures. The type of

[6] The demand high-cost cap refers to kVA rather than kW in line with how capacity is expressed in connection offers for demand customers.

connections offers mostly affected (as a percentage of offers issued where reinforcement costs exceed the cap, compared to the total number of offers) were connections at a lower voltage level that had associated Extra High Voltage (EHV) reinforcement. This is because the reinforcement of equipment at EHV includes some of the highest cost equipment at a distribution level. We are satisfied that this an acceptable outcome of setting an HCC as we believe that where it is in the interest of wider consumers, investment in the EHV network can be carried out by the DNO as opposed to being triggered by an individual connection.

1.17. Considering these factors, we determined that an appropriate threshold would therefore be £1720/kVA. This captures only 2.8% of demand connection offers issued over the period of assessment whilst ensuring that no more than 5% of demand connection offers in any individual DNO region exceed the cap. We believe this strikes a balance between achieving the benefits outlined in our previous proposals, whilst ensuring that DUoS bill payers are better protected from the costs of excessively expensive connections. It also aligns with the principle upon which we previously consulted.

Summary of findings

1.18. Due to the exponential increase of connection costs at the higher percentiles, setting a demand HCC at £1720/kVA can provide significant additional protection for DUoS billpayers against having to pay for reinforcement associated with a small number of very expensive connection offers.

1.19. In support of our decision to move to a 'fully shallow' demand connection charging boundary, whereby demand customers will not ordinarily have to contribute to the cost of reinforcement assets, we conclude that additional protections for DUoS billpayers are necessary. Having undertaken analysis of the cost transference from connecting individuals to DUoS billpayers, we are satisfied that a demand HCC can act as a suitable safeguard to protect DUoS payers from having to pay for high reinforcement costs that may not be in their interests. Without the implementation of an HCC, there would be limited financial disincentive for connecting parties to avoid projects with very high reinforcement costs which could lead to less efficient network investment.

1.20. In considering the level of an HCC we have remained committed to the principle set out in our January 2022 consultation that the demand HCC should be set at a threshold (such as the 95th percentile of connection offers on a £/kVA basis) which would act as a reasonable protection against the highest-cost projects only. We decided that it

would be appropriate to ensure that this was satisfied in each individual DNO region in the interests of geographical fairness, whilst retaining a single threshold to ensure consistency and clarity in connections policy. This is an additional requirement from our update to our minded to positions and means that the figure of £1400/kVA is no longer appropriate (as aforementioned this cap would affect 5.9% of projects in one geographical area).

1.21. Instead, the HCC should be calculated by considering the cost of reinforcement at the voltage level of connection and at the voltage level above. The data shows that connections over the ED1 period did not typically require reinforcement at the voltage level two above the voltage at the point of connection. It is also consistent with the current rules for the application of the generation HCC.

1.22. We continue to retain the demand HCC, alongside the generation HCC and other DUoS mitigations, within the scope of our ongoing DUoS Significant Code Review given that any decision to change DUoS charges may have an impact on the efficacy or requirement of the cap remaining at the level we have set. Some respondents to our consultation on updates to our minded to proposals proposed that the HCC should be index-linked. We have decided not to index link the HCC given the opportunity to keep the arrangements under review. Should any further changes to the HCC be required in accordance with our DUoS SCR conclusions, we anticipate including those changes as part of our final decision and direction under that SCR process.

1.23. We have decided that an HCC set at £1720/kVA for demand connections is appropriate. At this level there is no DNO region in which over 5% of offers over the ED1 period examined are affected (EMID being the highest at 4.9%). The figure is also four times the average cost of reinforcement in offers over the ED1 period. Considering offers issued over the four year period we examined, an HCC set at £1720/kVA captures ~£250m of connection offer reinforcement costs above the threshold. Whilst we acknowledge that this may not be representative of savings, since the data refers to offers issued rather than offers accepted, this provides additional indication that billpayers will be protected, should similarly high reinforcement cost connections continue to come forward under the new arrangements.