

DCP 425 – Cost Apportionment Factor methodology when the High-Cost Project Threshold is exceeded at the Voltage Level of the Point of Connection for a Generation Connection

All changes relate to DCUSA Schedule 22 ‘Common Connection Charging Methodology’.

Amend paragraph 1.16:

Reinforcement costs for the Minimum Scheme in excess of the High-Cost Project Threshold, shall be charged to you in full as a Connection Charge. For the avoidance of doubt, where Paragraph 1.36 applies, the High-Cost Project Threshold will not apply. The calculation of this charge will include all costs for Reinforcement carried out at the same Voltage Level and one Voltage Level above the Point of Connection to the existing Distribution System. For Generation Connections the High-Cost Project Threshold is £200/kW; for Demand Connections the High-Cost Project Threshold is £1,720/kVA. Reinforcement costs ~~up to and including below~~ the High-Cost Project Threshold will follow the methodology outlined under paragraphs 1.17 to 1.27. For Generation Connections, where the Reinforcement costs at the same Voltage Level as the Point of Connection are greater than the High-Cost Project Threshold then the methodology outlined under paragraphs 1.17 to 1.27 will be applied to Reinforcement costs up to and including the High-Cost Project Threshold only. The table below illustrates the application of the High-Cost Project Threshold.

Amend paragraph 1.18:

For a Generation Connection, where the Reinforcement is at the same Voltage Level of the voltage at the POC to the existing Distribution System, then the costs of Reinforcement shall be apportioned between you and us, unless other exceptions apply which take precedence. The methods used to apportion the costs of Reinforcement are set out in paragraphs 1.29 – 1.34 and shall be applied to the costs of Reinforcement up to and including the High-Cost Project Threshold in accordance with paragraph 1.28A.

Insert paragraph 1.28A:

For a Generation Connection and at the Voltage Level of the Point of Connection only, if the aggregate costs of Reinforcement less the High-Cost Project Threshold are greater than zero (the "excess"), the cost of Reinforcement to be apportioned for each CAF shall be reduced proportionally by the excess in accordance with the following formula:

$$RCA = RC - E \times \left(\frac{RC}{\sum_{i=1}^n RC_i} \right)$$

Where:

RCA means the cost of Reinforcement to be apportioned

RC means the cost of Reinforcement

E means the excess

n means the number of costs of Reinforcement to be apportioned

INSERT NEW EXAMPLES

Example 32: A new Generation Connection that has Reinforcement above the High-Cost Project Threshold at the Voltage Level of the POC (single asset to be cost apportioned).

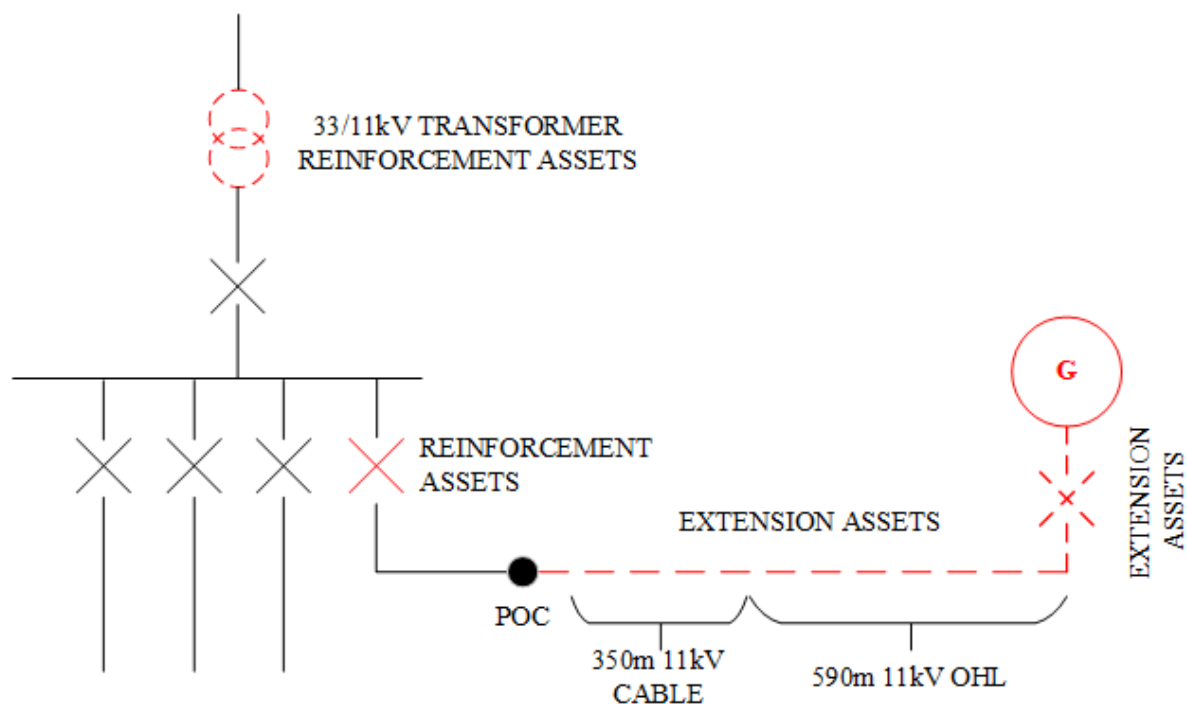
Purpose: To show how a Generation Connection that triggers the Generation High-Cost Project Threshold at the Voltage Level of the POC is charged when the Reinforcement required is for a single asset at the same Voltage Level of connection.

As in Example 30, a Customer wishes to connect a 225kVA wind farm (a Generation Connection).

To connect the wind farm, the Minimum Scheme involves the installation of 590m of 11kV overhead line, 350m of 11kV cable and associated jointing and install switchgear into the substation. In addition, Reinforcement is required to replace the 33/11kV transformer to facilitate reverse power flow and the 11kV circuit breaker in the primary substation. The New Network Capacity following Reinforcement is 19,700 kVA. The total cost of the Reinforcement is £525,400.

The High-Cost Project Threshold is exceeded for this connection. The HCPT is £200/kW (£45,000) and costs in excess of this threshold will be charged in full to the Customer (£480,400).

The cost of Reinforcement at the Voltage Level of the POC (£50,000) exceeds the High-Cost Project Threshold (by £5,000). The cost of Reinforcement to be apportioned at the Voltage Level of the POC is therefore reduced proportionally by the amount over the High-Cost Project Threshold at that Voltage Level.



Reinforcement:

Security CAF calculation: the numerator in the CAF calculation is the Required Capacity of the Customer, i.e. 225kVA. The denominator is the New Network Capacity following Reinforcement, this being the maximum generation that could be connected whilst keeping the voltage rise within acceptable limits. This is 19,700kVA.

The High-Cost Project Threshold for a Generation Connection is £200/kW.

The Reinforcement required to provide the connection is:

- 33/11kV transformer; and
- 11kV circuit breaker.

The 33/11kV transformer Reinforcement is one Voltage Level above the POC and not subject to the Security CAF. The work is covered by the High-Cost Project Threshold of £200/kW.

HCPT: $£200 \times 225 = £45,000$

$£525,400 - £45,000 = £480,400$ Customer Contribution

The 11kV circuit breaker Reinforcement of £50,000 is at the Voltage Level of the POC and is subject to the Security CAF. However, the cost of the work is over the High-Cost Project Threshold of £45,000 and therefore £5,000 is covered by the High-Cost Project Threshold and £45,000 is not covered.

The cost of Reinforcement for the 11kV circuit breaker is £50,000, which is 100% of the total cost of Reinforcement at the Voltage Level of the POC. The cost to be apportioned for the 11kV circuit breaker is therefore £45,000 ($50,000 - £5,000 \times 100\%$).

Security CAF: $(225/19,700) \times 100 = 1.14\%$

$£45,000 \times 1.14\% = £513$ Customer Contribution

The Connection Charge for this Scheme is calculated as follows:

Reinforcement Over High-Cost Project Threshold:	Cost	Apportionment/ HCPT	Customer Contribution
33/11kV Transformer Replacement	£475,400	$£525,400 - £45,000 = £480,400$	£480,400
11kV circuit breaker	£50,000		
Total Reinforcement Cost	£525,400		£480,400

Reinforcement Under High-Cost Project Threshold:	Cost	Apportionment/ HCPT	Customer Contribution
11kV circuit breaker	$£45,000$ $(£50,000 - £5,000 \times 100\%)$	$225/19,700 = 1.14\%$	£513
Total Reinforcement Cost (to be apportioned)	£45,000		£513

Extension Assets:	Cost	Apportionment	Customer Contribution
Electrical substation works	£34,500	n/a	£34,500
Install 590m of 11kV Overhead Line	£53,500	n/a	£53,500
Install 350m of 11kV XLPE cable	£14,000	n/a	£14,000
Total Extension Asset Cost	£102,000		£102,000

Total cost of the work = £525,400 + £102,000 = **£627,400**

Total Connection Charge to Customer = £480,400 + £513 + £102,000 = **£582,913**

Example 33 A new Generation Connection that has Reinforcement above the High-Cost Project Threshold at the Voltage Level of the POC (multiple assets to be cost apportioned).

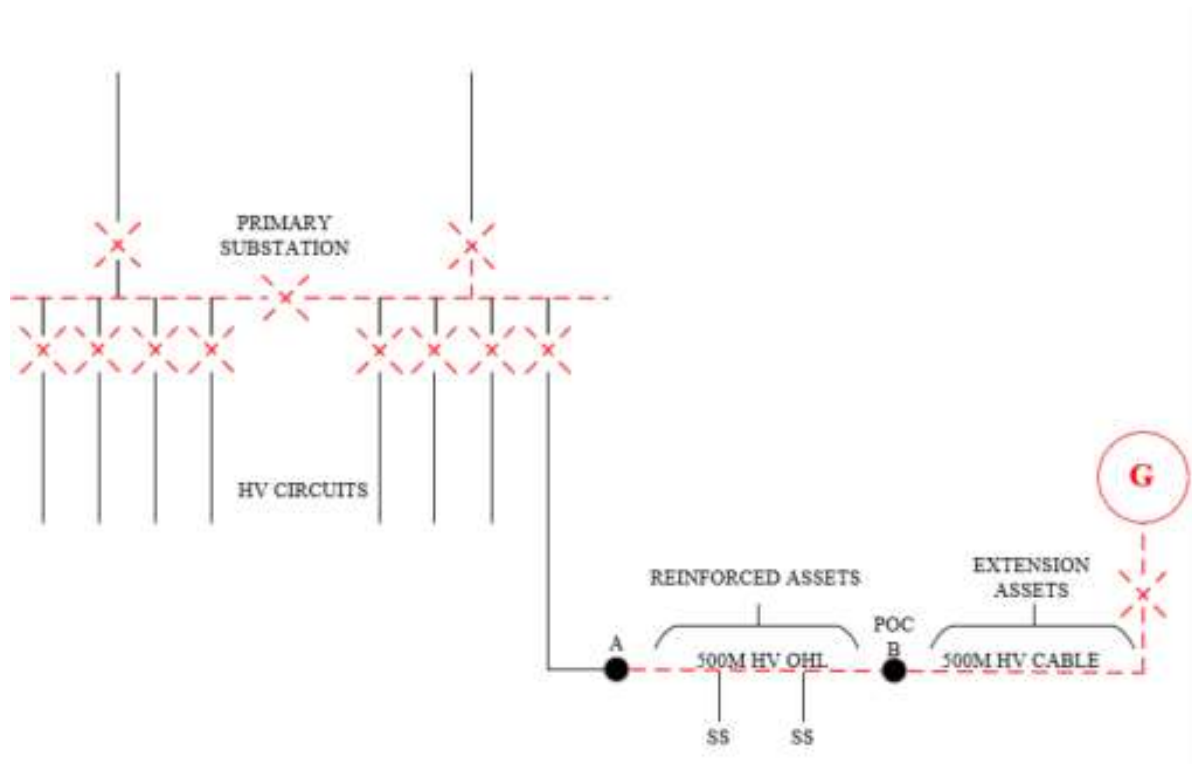
Purpose: To show how a Generation Connection that triggers the Generation High-Cost Project Threshold at the Voltage Level of the POC is charged when the Reinforcement required is for multiple assets at the same Voltage Level of connection.

Like Example 13, a Customer requests a connection to a generator with a Required Capacity for export purposes of 4MW (6MW in Example 13). The Fault Level contribution at the primary substation from the generation connection is 10MVA.

The POC is to the existing 11kV network at point B and it is proposed to install 500m of 11kV underground cable from the POC to the Customer's installation. This is treated as Extension Assets.

The connection requires the Reinforcement of 500m of 11kV overhead line between points A and B for a thermal capacity requirement and the Security CAF applies. The connection also requires the replacement of the existing 11kV switchboard at the primary substation in order to increase its fault level rating from 150MVA to 350MVA and the Fault Level CAF applies. However, the new fault level will be limited by the fault level rating of the local network of 250MVA. The total cost of the Reinforcement is £820,000.

The High-Cost Project Threshold is exceeded for this connection. The HCPT is £200/kW (£800,000) and costs in excess of this threshold will be charged in full to the Customer (£20,000). The cost of Reinforcement all relates to the Voltage Level of the POC. The cost of Reinforcement to be apportioned at the Voltage Level of the POC is therefore reduced proportionally by the amount over the High-Cost Project Threshold at that Voltage Level.



Reinforcement:

The Relevant Section of Network is the 11kV network from the primary substation to Point B.

Security CAF calculation: the numerator in the CAF calculation is based upon the Required Capacity of the Customer, i.e. 4MW. The denominator is based on the New Network Capacity following Reinforcement, which is 7.6MVA, i.e. after Reinforcement, in this particular case, the section of cable with the lowest rating.

The Relevant Section of Network is the 11kV switchboard at the primary substation.

Fault Level CAF calculation: The numerator in the CAF calculation is based upon the Fault Level contribution from the Customer's new generator connection, in this Example 10MVA. The denominator is based upon the New Fault Level Capacity, which is the lower of the Fault Level capacity of the new 11kV switchboard, 350MVA or of the local system, 250MVA in this Example.

The High-Cost Project Threshold for a Generation Connection is £200/kW.

The Reinforcement required to provide the connection is:

- Re-conductor of 500m of 11kV overhead line; and
- Replacement 11kV switchboard.

HCPT: $£200 \times 4,000 = £800,000$

$£820,000 - £800,000 = £20,000$ Customer Contribution

The Reinforcement of £820,000 is at the Voltage Level of the POC and is subject to both the Security CAF and Fault Level CAF. However, the aggregate cost of the work is over the High-Cost Project Threshold of £800,000 and therefore £20,000 is covered by the High-Cost Project Threshold and £800,000 is not covered. The total cost to be apportioned is therefore £800,000, not the cost of Reinforcement of £820,000.

The cost of Reinforcement for the re-conductor of 500m of 11kV overhead line is £20,000, which is 2.44% of the total cost of Reinforcement at the Voltage Level of the POC of £820,000. The cost to be apportioned is therefore £19,512 ($20,000 - £20,000 \times 2.44\%$).

The cost of Reinforcement for the replacement 11kV switchboard is £800,000, which is 97.56% of the total cost of Reinforcement at the Voltage Level of the POC of £820,000. The cost to be apportioned is therefore £780,488 ($£800,000 - £20,000 \times 97.56\%$).

Security CAF: $(4,000/7,600) \times 100 = 52.63\%$

$£19,152 \times 52.63\% = £10,269$ Customer Contribution

Fault Level CAF: $3 \times (10/250) \times 100 = 12.00\%$

$£780,488 \times 12.00\% = £93,659$ Customer Contribution

The Connection Charge for this Scheme is calculated as follows:

Reinforcement Over High-Cost Project Threshold:	Cost	Apportionment/ HCPT	Customer Contribution
Re-conductor of 500m of 11kV overhead line	£20,000	£820,000- £800,000= £20,000	£20,000
Replacement 11kV switchboard	£800,000		
Total Reinforcement Cost	£820,000		£20,000

Reinforcement	Cost	Apportionment	Customer Contribution
Re-conductor of 500m of 11kV overhead line	£19,512 (£20,000- £20,000*2.44%)	4/7.6 x 100% = 52.63% Security CAF	£10,269
Replacement 11kV switchboard	£780,488 (£800,000- £20,000*97.56%)	3x (10/250) x 100% = 12.0% Fault Level CAF	£93,659
Total Reinforcement Cost (to be apportioned)	£800,000		£103,928

Extension Assets	Cost	Apportionment	Customer Contribution
Installation of 500m 11kV cable	£150,000	n/a	£150,000
11kV circuit breaker at Customer's substation	£12,000	n/a	£12,000
11kV pole top termination	£2,500	n/a	£2,500
Total Extension Asset Cost	£164,500		£164,500

Total cost of the work: = £820,000 + £164,500 = **£984,500**

Total Connection Charge to Customer = £20,000 + £103,928 + £164,500 = **£288,428**

LEGAL TEXT FOR ALTERNATIVE OPTIONS ONLY (PARAGRAPH 1.28A)

Option 1: Cap Reinforcement where HCPT exceeded only (subject to zero floor)

For a Generation Connection and at the Voltage Level of the Point of Connection only, if the aggregated costs of Reinforcement less the High-Cost Project Threshold are greater than zero (the "excess"), the costs of Reinforcement to be apportioned shall be calculated as follows; where the costs of Reinforcement are associated with:

- (a) a single CAF, the cost of Reinforcement to be apportioned shall equal the High-Cost Project Threshold; or*
- (b) multiple CAFs, but where only one CAF has a cost of Reinforcement greater than the High-Cost Project Threshold in isolation, the cost of Reinforcement to be apportioned for that CAF shall be reduced by the excess; or*
- (c) multiple CAFs, and where both (i) multiple CAFs have costs of Reinforcement greater than the High-Cost Project Threshold in isolation and (ii) the aggregate costs of Reinforcement for those CAFs is greater than or equal to the excess, the costs of Reinforcement to be apportioned for those CAFs shall be reduced proportionally by the excess; or*
- (d) multiple CAFs, and where;*
 - (i) both (i) multiple CAFs have costs of Reinforcement greater than the High-Cost Project Threshold in isolation and (ii) the aggregate costs of Reinforcement for those CAFs is less than the excess; or*
 - (ii) none have a cost of Reinforcement greater than the High-Cost Project Threshold in isolation (but are in aggregate),*

the cost of Reinforcement to be apportioned for each CAF shall be reduced proportionally by the excess.

Option 2: Cap Reinforcement for a single HCPT exceedance otherwise cap all proportionally

For a Generation Connection and at the Voltage Level of the Point of Connection only, if the aggregated costs of Reinforcement less the High-Cost Project Threshold are greater than zero (the "excess"), the costs of Reinforcement to be apportioned shall be calculated as follows; where the costs of Reinforcement are associated with:

- (a) a single CAF, the cost of Reinforcement to be apportioned shall equal the High-Cost Project Threshold; or*
- (b) multiple CAFs, but where only one CAF has a cost of Reinforcement greater than the High-Cost Project Threshold in isolation, the cost of Reinforcement to be apportioned for that CAF shall be reduced by the excess; otherwise*
- (c) the cost of Reinforcement to be apportioned for each CAF shall be reduced proportionally by the excess.*

Option 4: Cap maximum Reinforcement (subject to zero floor)

For a Generation Connection and at the Voltage Level of the Point of Connection only, if the aggregate costs of Reinforcement less the High-Cost Project Threshold are greater than zero (the "excess"), the costs of Reinforcement to be apportioned shall be calculated as follows:

- (a) Subject to (c), the maximum cost of Reinforcement to be apportioned shall be reduced by the excess; or*

- (b) Subject to (c), If there are multiple CAFs where the cost of Reinforcement is equal to the maximum cost of Reinforcement across all CAFs, the reduction referred to in (a) shall be distributed equally across those costs of Reinforcement; and
- (c) If the aggregate costs of Reinforcement associated with (a) or (b) above less the excess is less than zero (the “residual excess”, expressed as an absolute value), the costs of Reinforcement after the reduction are floored at zero; and

where this limb (c) applies, the costs of Reinforcement not referred to in (a) or (b) shall be reduced for the residual excess as follows;

- (i) Distributed proportionally across any cost of Reinforcement that is both (i) less than the maximum cost of Reinforcement to be apportioned and (ii) greater than the High-Cost Project Threshold; or
- (ii) If (c)(i) does not apply, distributed proportionally across all other costs of Reinforcement to be apportioned.

Option 5: Cap Reinforcement proportional to unadjusted Customer CAF contribution (subject to zero floor)

Subject to Paragraph 1.28B, for a Generation Connection and at the Voltage Level of the Point of Connection only, if the aggregated costs of Reinforcement less the High-Cost Project Threshold are greater than zero (the “excess”), the costs of Reinforcement to be apportioned shall be reduced by the excess proportionate to the CAF contribution to be paid by the Customer relative to the total CAF contributions to be paid by the Customer for all costs of Reinforcement, in accordance with the following formula:

$$RCA = RC - E \times \left(\frac{RC \times CAF}{\sum_{i=1}^n RC_i \times CAF_i} \right)$$

Where:

RCA means the cost of Reinforcement to be apportioned

RC means the cost of Reinforcement

E means the excess (as defined in Paragraph 1.28A)

CAF means the Security CAF or Fault Level CAF as applicable to the cost of Reinforcement

n means the number of costs of Reinforcement to be apportioned

Insert paragraph 1.28B

For any CAF contribution calculated in accordance with Paragraph 1.28A, if the amount to be paid by the Customer is less than zero, this Paragraph 1.28B shall apply instead and the cost of Reinforcement to be apportioned for each CAF shall be reduced proportionally by the excess, in accordance with the following formula:

$$RCA = RC - E \times \left(\frac{RC}{\sum_{i=1}^n RC_i} \right)$$

Option 6: Cheapest for the Customer

For a Generation Connection and at the Voltage Level of the Point of Connection only, if the aggregate costs of Reinforcement less the High-Cost Project Threshold are greater than zero (the "excess"), the costs of Reinforcement to be apportioned shall be reduced (in aggregate) by the excess such that the total apportioned costs of Reinforcement to be paid by the Customer is the lowest reasonable solution.