

### Option 1 – DCP 172 Draft Legal Text

1.23 The costs of Reinforcement will be apportioned using one of two Cost Apportionment Factors (CAFs), dependent upon which factor is driving the requirement for Reinforcement:

- The ‘Security CAF’; and
- The ‘Fault Level CAF’

1.24 The following definitions are used in the application of the CAFs.

<b>Existing Capacity</b>	For existing Customers their Existing Capacity will be either:- a) the Maximum Capacity used in the calculation of their use of system charges; or b) for Customers who are not charged for use of system on the basis of their Maximum Capacity the lower of: • No. of phases x nominal phase-neutral voltage (kV) x fuse rating (A); and • The rating of the service equipment.
<b>Fault Level Contribution from Connection</b>	is the assessment of the Fault Level contribution from the equipment to be connected taking account of its impact at the appropriate point on the Distribution System. Where an existing Customer requests a change to a connection then the ‘Fault Level Contribution from Connection’ is defined as the incremental increase in Fault Level caused by the Customer.
<b>New Fault Level Capacity</b>	is the Fault Level rating, following Reinforcement, of the equipment installed after taking account of any restrictions imposed by the local network Fault Level capacity. For the avoidance of doubt this rule will be used for all equipment types and voltages.
<b>New Network Capacity</b>	is the secure capacity of the Relevant Section of Network following Reinforcement. This is our assessment of the resultant capacity and will be considered in respect of thermal capacity, voltage <del>drop</del> change and upstream restrictions and compliance with our relevant design, planning and security of supply policies. The equipment ratings to be used are the appropriate operational rating at the time of the most onerous operational conditions taking account of seasonal ratings and demand.
<b>Relevant Section of Network (RSN)</b>	is that part or parts of the Distribution System that can be used to supply you in both normal and abnormal running arrangements. There may be more than one RSN, e.g. at different voltage levels.
<b>Required Capacity</b>	is the Maximum Capacity agreed with the Customer. In the case of multiple connections (e.g. a housing development) it may be adjusted after consideration of the effects of diversity. Where an existing Customer requests

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	an increase in capacity then it is the increase above their Existing Capacity.
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- 1.25 The ‘Security CAF’ is applied, where the costs are driven by either thermal capacity or voltage (or both) as assessed against the relevant standard. This rule determines the proportion of the Reinforcement costs that should be paid by you as detailed below.

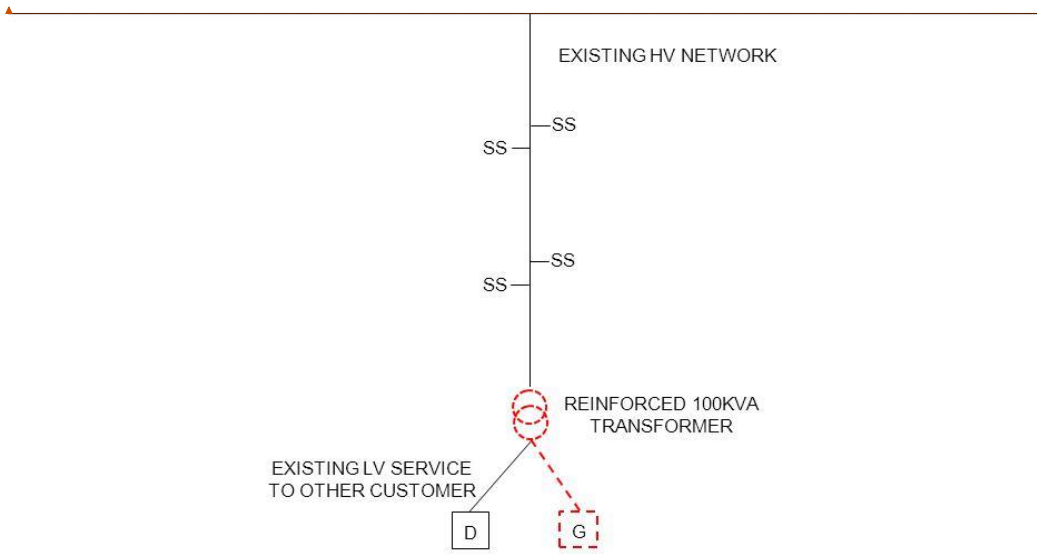
$$\text{Security CAF} = \frac{\text{Required Capacity}}{\text{New Network Capacity}} \times 100\% \quad (\text{max } 100\%)$$

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### Example X: New 25kVA Generation Connection, Voltage Rise Triggered Reinforcement

An existing Customer wishes to connect a new generator with a Required Capacity of 25kVA. The connection of the generator will require the local 25kVA pole mounted transformer to be reinforced with a 100kVA split phase transformer in order to keep voltage rise within acceptable limits. A new 95mm service cable is to be installed to the premises.

The Minimum Scheme is to provide a new service cable and to replace the 25kVA transformer at the local substation with a 100kVA transformer.



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### Reinforcement:

The RSN for the Reinforcement is the HV/LV transformer.

Security CAF calculation: the numerator in the CAF calculation is based upon the Required Capacity of the Customer, i.e. 25kVA. The denominator is based on the New Network Capacity following Reinforcement, this being the maximum generation that could be connected whilst keeping the voltage rise within acceptable limits i.e. 40kVA in this case.

Fault Level CAF calculation: This scheme does not have any significant Fault Level contribution to the existing shared use distribution network and Fault Level CAF is therefore not applicable here.

The Connection Charge for this Scheme is calculated as follows:

### Reinforcement:

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	<u>Cost</u>	<u>Apportionment</u>	<u>Customer Contribution</u>
<b><u>Non Contestable Work</u></b>			
<u>Replacement 100kVA transformer</u>	<u>£15,000</u>	<u><math>\frac{25}{40} \times 100\% = 62.5\%</math></u>	<u>£9,375</u>
<b><u>Total Reinforcement Cost</u></b>	<u>£15,000</u>		<u>£9,375</u>

**Extension Assets:**

	<u>Cost</u>	<u>Apportionment</u>	<u>Customer Contribution</u>
<b><u>Contestable Work</u></b>			
<u>Provision and installation of LV service cable</u>	<u>£1,500</u>	<u>n/a</u>	<u>£1,500</u>
<b><u>Non-Contestable Work</u></b>			
<u>LV joints to network</u>	<u>£500</u>	<u>n/a</u>	<u>£500</u>
<b><u>Total Extension Asset Cost</u></b>	<u>£2,000</u>		<u>£2,000</u>
<b><u>CIC Charges</u></b>			<u>£200</u>

**Total Connection Charge = £9,375 + £2,000 = £11,375**

**(Note – for clarity the generation £200/kW rule has been ignored in this example but would apply in respect of the costs illustrated. Refer paragraph 1.15.)**

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### Example Y: New 2MVA Generation Connection, Voltage Rise Triggered Reinforcement

A Customer wishes to connect a new generator with a Required Capacity for export purposes of 2MVA. The local 11kV feeder has a large amount of generation already connected and will need to be reinforced in order to keep voltage rise within acceptable limits. It is proposed to reinforce the existing 185mm 11kV underground cable with 300mm underground cable and install a new substation for connection of the 2MVA export capacity. The total length of the reinforced cable is 2km. The thermal rating of the 300mm underground cable is 8MVA. The 11kV underground cable on the other side of the normal open point is already 300mm and does not require to be reinforced.

The Minimum Scheme is to provide a new substation and to replace the 185mm 11kV cable with a 300mm cable.

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Security CAF calculation: the numerator in the CAF calculation is based upon the Security Capacity of the Customer, i.e. 2MVA. The denominator is based on the New Network Capacity following Reinforcement, this being the maximum generation that could be connected whilst keeping the voltage rise within acceptable limits i.e. 6MVA in this case.

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Fault Level CAF calculation: This scheme does not have any significant Fault Level contribution to the existing shared use distribution network and Fault Level CAF is therefore not applicable here.

The Connection Charge for this Scheme is calculated as follows:

#### Reinforcement:

	<u>Cost</u>	<u>Apportionment</u>	<u>Customer Contribution</u>
<b><u>Non Contestable Work</u></b>			
<u>2km 300mm 11kV cable</u>	<u>£200,000</u>	<u>2/6 x 100% = 33.3%</u>	<u>£66,666</u>
<b><u>Total Reinforcement Cost</u></b>	<b><u>£200,000</u></b>		<b><u>£66,666</u></b>

#### Extension Assets:

	<u>Cost</u>	<u>Apportionment</u>	<u>Customer Contribution</u>
<b><u>Contestable Work</u></b>			
<u>2MVA 11kV substation</u>	<u>£40,000</u>	<u>n/a</u>	<u>£40,000</u>
<b><u>Non-Contestable Work</u></b>			
<u>2 by 11kV closing joints</u>	<u>£5,000</u>	<u>n/a</u>	<u>£5,000</u>
<b><u>Total Extension Asset Cost</u></b>	<b><u>£45,000</u></b>		<b><u>£45,000</u></b>
<b><u>CIC Charges</u></b>			<b><u>£200</u></b>

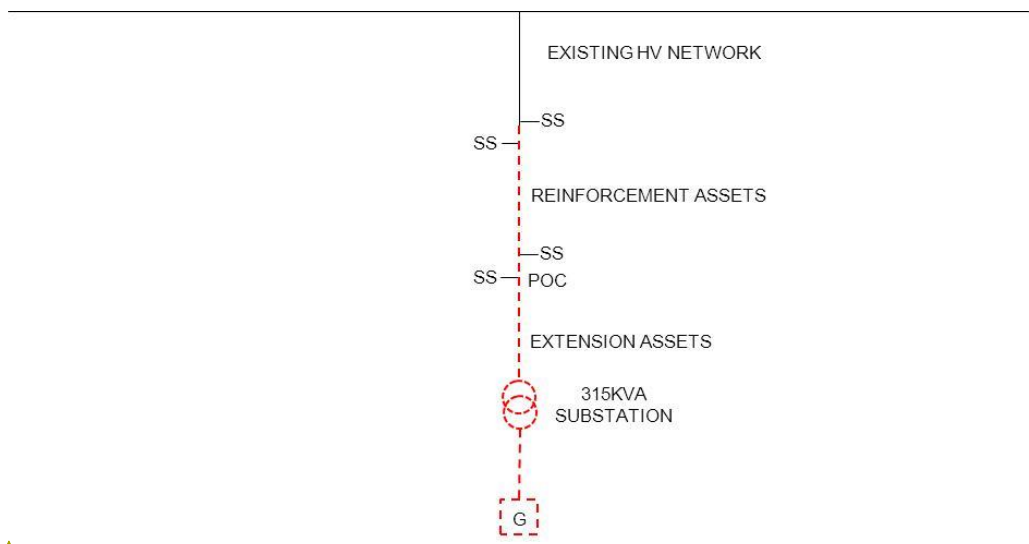
**Total Connection Charge = £66,666 + £45,000 = £111,666**

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### Example Z: New 250kVA Generation Connection, Voltage Rise Triggered Reinforcement

A Customer wishes to connect a new generator with a Required Capacity of 250kVA. The connection of the generator will require the local 11kV overhead line to be reinforced with 100mm conductor over part of its length in order to keep voltage rise within acceptable limits. The thermal capacity of the 100mm overhead line is 5MVA. The thermal capacity of the original 50mm overhead line is 3MVA. A new 315kVA ground mounted substation is to be installed at the premises. The overhead line is 1km in length but only 500m is required to be reinforced in order to keep voltage rise within acceptable limits.

The Minimum Scheme is to provide a new ground mounted substation and to replace part of the existing overhead line with 100mm conductor.



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### Reinforcement:

The RSN for the Reinforcement is the 11kV overhead line.

Security CAF calculation: the numerator in the CAF calculation is based upon the Required Capacity of the Customer, i.e. 250kVA. The denominator is based on the New Network Capacity following Reinforcement, this being the maximum generation that could be connected whilst keeping the voltage rise within acceptable limits. As the length of overhead line to be reinforced has been determined to accommodate the 250kVA requirement only, then this is also 250kVA in this case.



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Fault Level CAF calculation: This scheme does not have any significant Fault Level contribution to the existing shared use distribution network and Fault Level CAF is therefore not applicable here.

The Connection Charge for this Scheme is calculated as follows:

#### Reinforcement:

	<u>Cost</u>	<u>Apportionment</u>	<u>Customer Contribution</u>
<b><u>Non Contestable Work</u></b>			
<u>Replacement 11kV overhead line conductor</u>	<u>£25,000</u>	<u>250/250 x 100% = 100%</u>	<u>£25,000</u>
<b><u>Total Reinforcement Cost</u></b>	<b><u>£25,000</u></b>		<b><u>£25,000</u></b>

#### Extension Assets:

	<u>Cost</u>	<u>Apportionment</u>	<u>Customer Contribution</u>
<b><u>Contestable Work</u></b>			
<u>Provision and installation of 315kVA substation</u>	<u>£50,000</u>	<u>n/a</u>	<u>£50,000</u>
<b><u>Non-Contestable Work</u></b>			
<u>11kV joint to network</u>	<u>£1,000</u>	<u>n/a</u>	<u>£1,000</u>
<b><u>Total Extension Asset Cost</u></b>	<b><u>£51,000</u></b>		<b><u>£51,000</u></b>
<b><u>CIC Charges</u></b>			<b><u>£200</u></b>

**Total Connection Charge = £25,000 + £51,000 = £76,000**