

Structure of Charges Implementation Steering Group

Connection Scenarios

At the December ISG it was identified that it would be helpful to select some real connections projects to enable the practical implications of the proposals to be assessed

Identified scenario	Characteristics	Alternative
New LV service cable connected to existing LV main	Most basic connection	
3 phase LV connection to speculative commercial units	Connection is made to existing LV fuseway at existing substation	Connection requires larger transformer at substation to provide additional capacity
Medium sized housing estate requiring a new distribution substation and an extension to an existing HV main	Housing estate comprises a mixture of electrically heated flats and gas heated houses.	Existing HV main requires reinforcing due to additional load
Commercial connection for LV customers requiring additional HV, combined with the establishment of an HV substation for an HV customer	Existing HV main is cut and new main facilitating connection of HV customer substation and new HV network looped in	
Additional industrial load (6.5MVA from 2MVA)	Requires 2 new circuit breakers at primary substation and 2 new customer circuit breakers	33/11kV transformers require replacement
Connection of 0.8MW landfill gas generator	2km of HV cable attached to extensive overhead network	Overhead network requires reinforcement to manage voltage rise introduced by generator
30MW 33kV generator with direct connection to 33kV switchboard	Sole-use 33kV cable connection provided for generator back to existing switchboard	15 year old switchboard requires replacement due to increased fault level
100MW generator connected to 66kV network	Extensive off-site reinforcement required, including dealing with fault level issues on EHV customer equipment	

For each of these scenarios two alternatives have been identified. The objective of all the scenarios is to seek to answer the question of who pays, when do they pay and how much.

Scenario 1

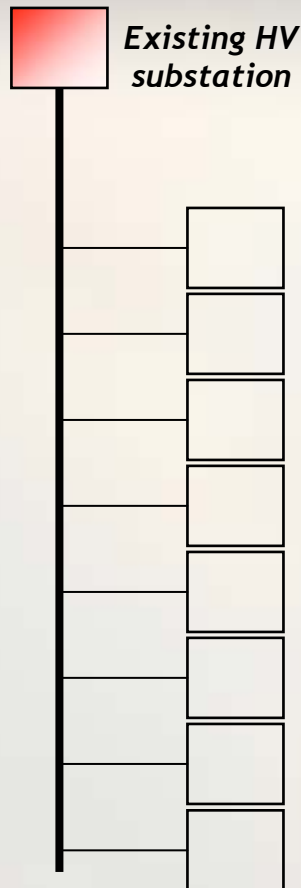
New service cable - 3 phase connection 15kVA cell phone mast



Indicative costs		
Service costs only	40m WF95 cable 25m WF35 cable	£3,000 £2,000
Admin, Design, Jointing, Supervision, Contractor Liaison, Drawings etc		£900
Total		£5,900

Scenario 2

8x 20kVA 3 phase connections to speculative commercial units - size of individual connections determined by developer

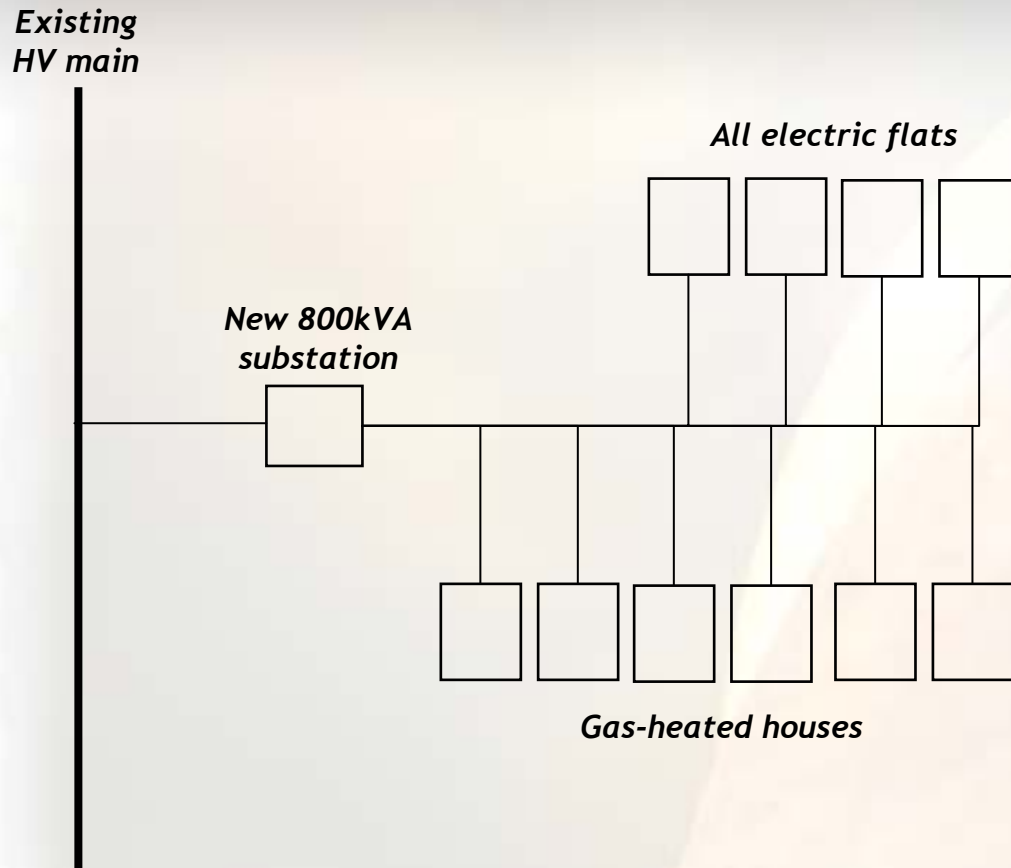


Indicative costs		
Mains cable	80m WF185 cable	£5,800
Service costs	50m WF35 cable	£1,300
Admin, Design, Jointing, Supervision, Contractor Liaison, Drawings, Testing, Project Management etc		£1,800
Total		£8,900

The alternative scenario here would be consider the case that the HV substation capacity requires increasing to provide the speculative connections

Scenario 3

New housing estate comprising a mixture of electrically heated flats and gas heated houses

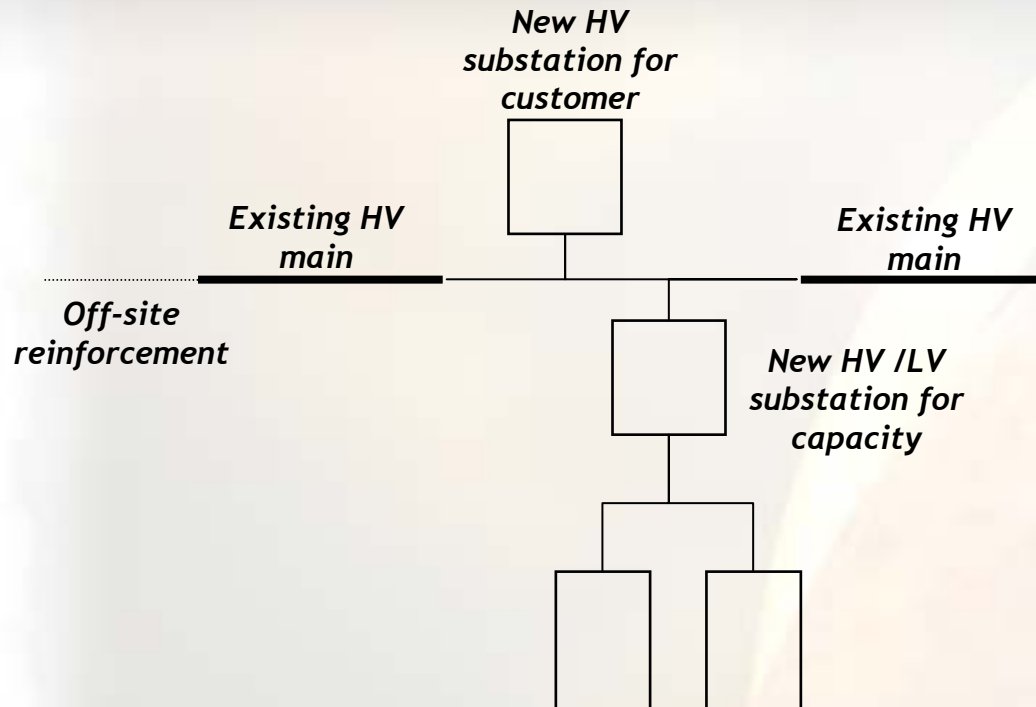


Indicative costs		
Mains cable	HV LV	£6,000 £23,000
Service costs		£10,000
Plant and building and civil		£18,000
Admin, Design, Jointing, Supervision, Contractor Liaison, Drawings, Testing, Project Management, Wayleaves etc		£4,500
Total		£61,500

The alternative scenario in this case would be that the development, because of the decision of the developer to put in electric housing creates the need for off-site 11kV reinforcement

Scenario 4

Commercial new connection at both HV and LV, involving some off-site reinforcement all for the same customer



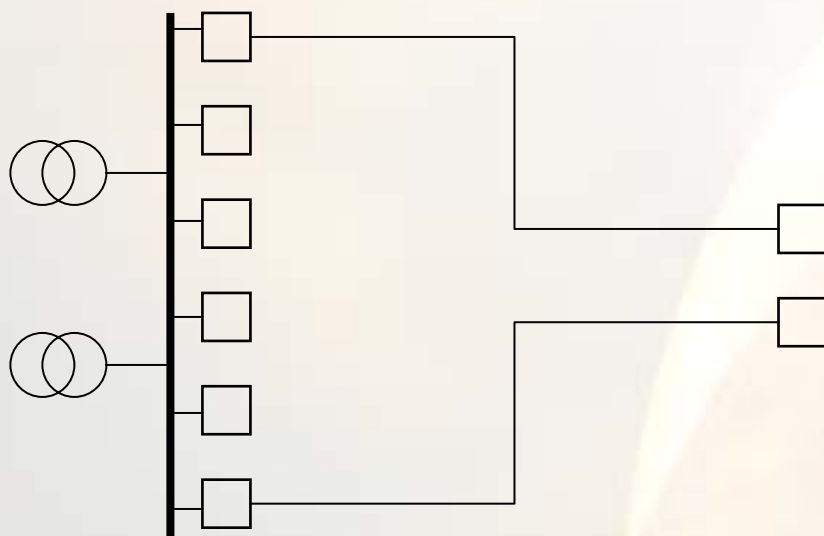
Indicative costs		
Mains cable	HV	£22,000
	LV	£3,300
Service costs		£6,000
Plant and building and civil		£30,000
Admin, Design, Jointing, Supervision, Contractor Liaison, Drawings, Testing, Project Management, Wayleaves etc		£4,500
Total		£65,800

Off-site reinforcement work paid for by DNO at £16,000

Scenario 5

Increase in industrial load requirement from 2MVA to 6.5MVA

Existing 11kV switchboard

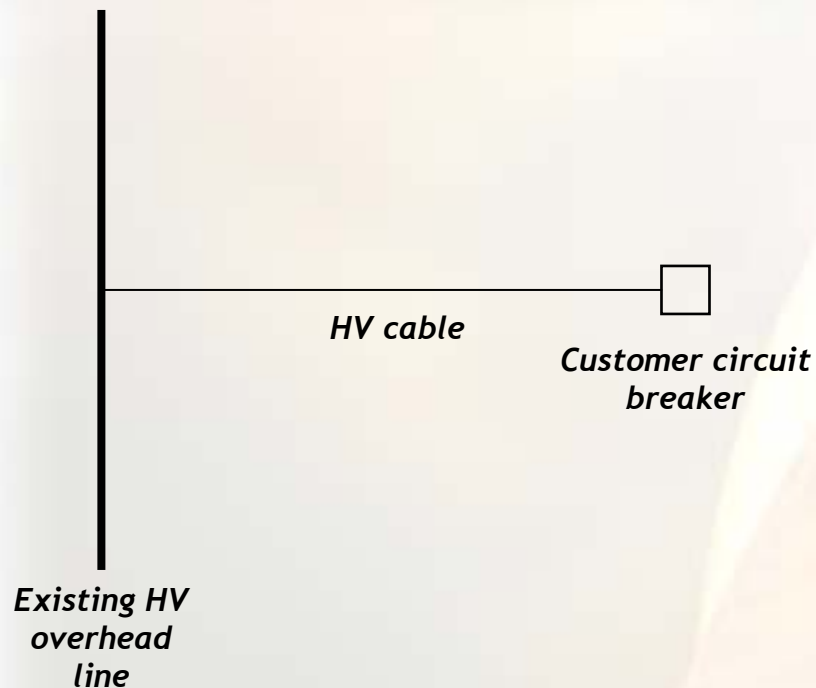


Indicative costs	
HV Mains cable 2x 1.8km WF300	£210,000
Plant and building and civil	£130,000
Admin, Design, Jointing, Supervision, Contractor Liaison, Drawings, Testing, Project Management, Wayleaves etc	£17,000
Total	£357,000

Alternative scenario would require replacement of the 33/11kV transformers with protection at a cost of £0.5m

Scenario 6

2km of HV cable for a 0.8MW landfill gas generator, connected to extensive overhead network



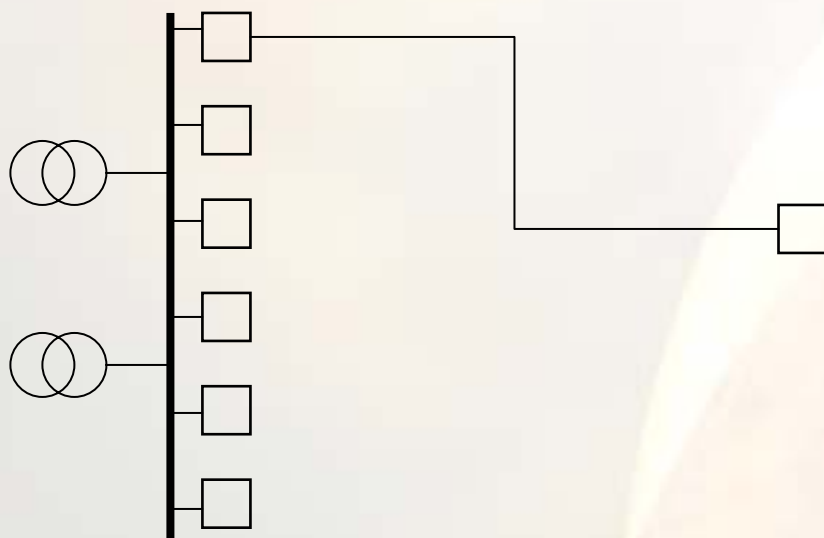
Indicative costs	
HV Mains	£45,000
Plant	£13,500
Admin, Design, Jointing, Supervision, Contractor Liaison, Drawings etc	£2,900
Total	£62,400

Alternative scenario would require the existing HV overhead line network to be reinforced to deal with the voltage rise introduced by the generator - costs £60,000

Scenario 7

Connection of a 33kV 30MW generator with 1.8km of 33kV cable

Existing 33kV switchboard

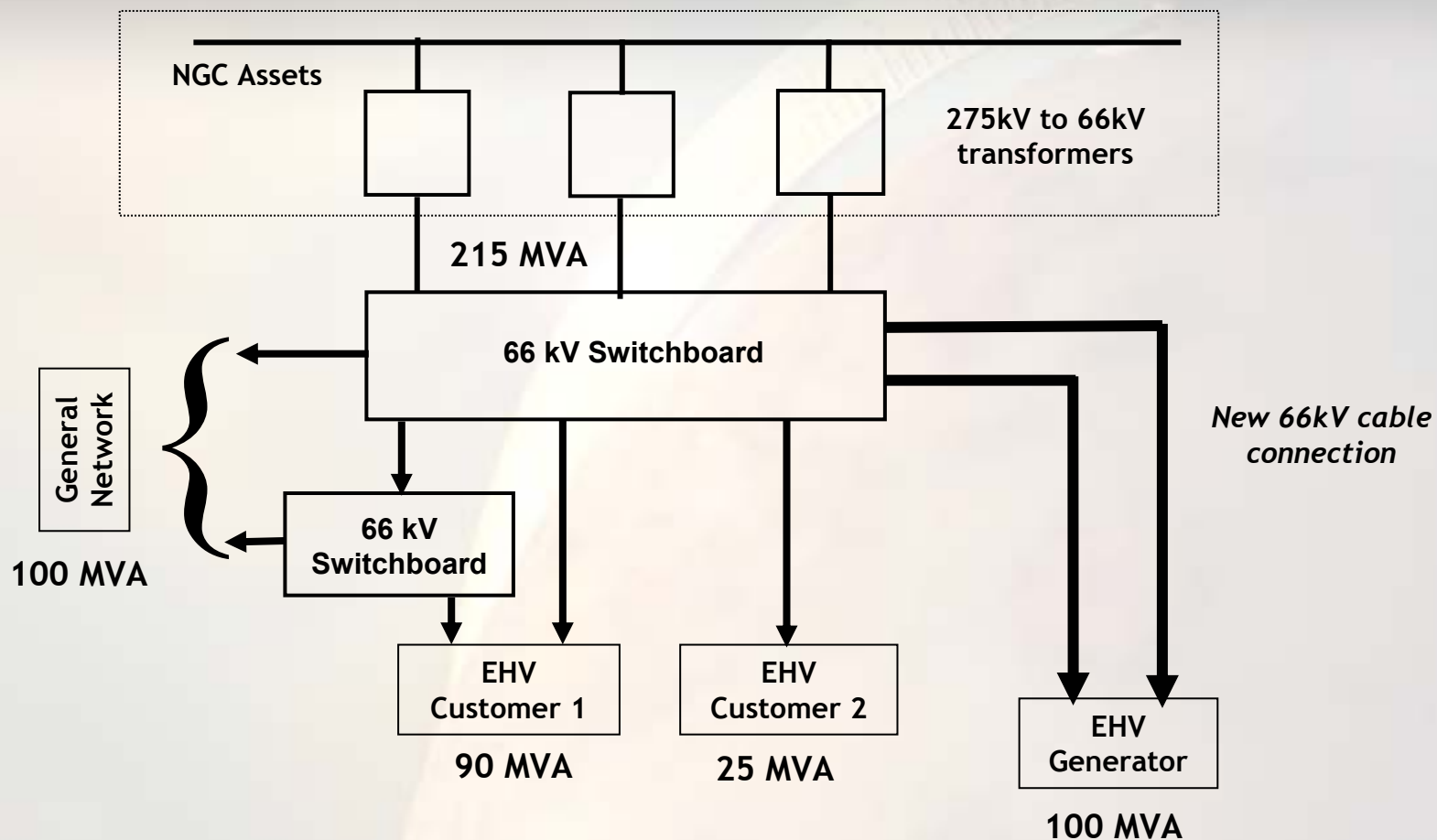


Indicative costs	
1.8 km 33kV cable	£525,000
EHV Plant and protection	£144,000
Total	£669,000

Alternative scenario would require replacement of the 33kV switchboard to increase fault level capability - costs of £800,000

Scenario 8

Connection of a 66kV 100MW generator giving rise to significant shared asset reinforcement (£6m) - also impacting on existing EHV customer installations



This scenario requires that NGC assets are changed to enable connection of the generator, that EHV customers own switchboards and the DNO 66KV network are reinforced / changed to deal with the fault level increase