

Appendix A: Description of LDZ methodology

A1 Overview

The LDZ charging functions are based on the peak day consumption at a site rather than an explicit link to the pressure tier of the system to which the load is connected. This approach avoids inconsistencies that may arise if neighbouring sites, with similar peak day's quantities of gas consumed, are actually connected to different pressure tiers.

The methodology is based on average costs rather than marginal costs. Essentially the methodology involves the calculation of the average cost of using each of the main pressure tiers of the LDZ combined with the probability of a load of a given peak day quantity utilising each tier. The fitting of equations to these costs, using regression analysis, generates the charging functions.

- Charges for using the distribution system have a capacity and a commodity element with a 50:50 split – both the capacity and commodity charges are functions of the peak day quantity.
- The probability of loads using the pressure tiers is derived from a survey of load connection and transportation information. The survey collated data on the tier of connection of a number of loads subdivided into a number of AQ consumption bands. The survey also collated the expected usage of higher tiers by loads exiting through lower tiers.
- The low pressure (LP) system is the largest asset group within the distribution system and a more detailed model is used which subdivides the pressure tier into a number of tiers categorised by pipe diameter.
- Once typical charge data for loads of a given size has been calculated, regression analysis is performed to determine continuous charging functions for unit rate capacity and commodity charges.

A2 Tier Costs

The first step in calculating the charges is to identify the costs of each of the tiers. These costs are then scaled so that they sum to the target revenue for the LDZ. By calculating the relative costs of using the system the charges can then reflect these costs to generate the required revenue.

A2.1 Determination of Tier Costs

The LDZ networks contain a series of pipe networks split into four main pressure tiers:

A2.1.1 LDZ Pressure Tiers

Pressure Tier	Operating Pressure
Local Transmission System (LTS)	7 – 38 bar
Intermediate Pressure System (IPS)	2 - 7 bar
Medium Pressure System (MPS)	75 mbar – 2 bar
Low Pressure System (LPS)	Below 75 mbar

Not all the LDZs contain IPS pipelines. The Low Pressure System itself accounts for 220,000 km out of the total 270,000 km of LDZ pipeline.

In order to provide a more cost reflective basis for charging, the LP systems are sub-divided, based on pipe diameter, into six sub-tiers as shown below.

A2.1.2 Low Pressure Sub-Tiers

LP Tier	Metric Load Bands	Imperial Load Bands
LP6	<90mm	<4 inch
LP5	90- 125 mm	4 to 5 inch
LP4	125mm to 180mm	5 to 7 inch
LP3	180mm to 250mm	7 to 10 inch
LP2	250mm to 355mm	10 to 14 inch
LP1	>355mm	>14 inch

The direct flows into each sub tier are found from the distribution of flows across the pressure reduction stations. The flows out of each sub-tier are calculated from the sum of the connected loads. The inter-tier flows can then be calculated from the differences between flows into and flows out of each tier. From this data the probability of using each higher tier is calculated.

The total asset value is known for the Low Pressure system but not for each of the sub-tiers however the total replacement costs for all pipelines within each of the sub-tiers is known. The percentages of Total replacement costs for each sub-tier are shown in the following table and they are used within the methodology to attribute the total LP system cost to each of the sub-tiers.

A2.1.3 LP System Sub-Tier Replacement Costs

Tier	Pipe Diameter	Percentage of Total Replacement Costs
LP1	>355mm	12.3%
LP2	250- 355mm	12.7%
LP3	180-250mm	10.5%
LP4	125-180mm	15.8%
LP5	90-125mm	26.1%
LP6	<=90mm	22.6%
	Total	100%

The principle underlying the LDZ charging methodology is that charges should reflect the average use of the network made by customers of a given size, rather than the actual use made by a particular customer. The latter methodology would be too complex to be a practical basis of charging. Analysis has shown that there is a good correlation between customer size and offtake tier. Large customers are typically supplied from higher-pressure tiers and small customers from lower pressure tiers. Such an approach avoids inconsistencies that may arise if neighbouring sites of similar size are actually connected to different pressure tiers.

A2.1.4 Determination of Tier Cost

Pressure	% Total ABC	Cost (£M)	
LTS	15.7%	193.8	96.9
IPS	5.4%	66.1	33.0
MPS	16.2%	198.8	99.4
LPS	62.7%	772.4	386.2
TOTAL		1231.0	615.5

The split of LPS costs down to sub-tier level is based on the total replacement cost of each sub-tier. Table A2.1.5 shows the percentage of the total LPS replacement cost attributable to each sub-tier. ABC data is not available on a sub-tier basis.

A2.1.5 Determination of LP System Sub-Tier Cost

		% Total Replacement Cost	Cost (£M)	
LP1	>355mm	12.3%	95.0	47.5
LP2	250-355mm	12.7%	98.1	49.0
LP3	180-250mm	10.5%	81.1	40.6
LP4	125-180mm	15.8%	122.0	61.0
LP5	90-125mm	26.1%	201.6	100.8
LP6	<90mm	22.6%	174.6	87.3
TOTAL			772.4	386.2

A5 CSEP Methodology

The methodology for calculating LDZ transportation charges to CSEPs is the same as for standard LDZ charges with the exception that the connection probability data used to calculate the tier costs is based uniquely on CSEP data.

A6 Setting the Charging Function

To provide a workable basis for charging individual customers of differing sizes the average costs of utilising the LDZ network, as set out in table A4.1.1, are plotted. A function is fitted to the data points using regression analysis weighted by the consumption within each band. This function must then be scaled so that when applied to all supply points connected to the Transco network it will generate the desired target revenue.

A6.1 Function Form

At present the function is in the form of a single log with a straight-line element for the domestic (<73.2 MWh) load band. It is proposed that a power function with two fixed costs covering the domestic and the 73.2 - 732MWh bands should be adopted.

A6.2 Minimum Charge

Previous analysis of large loads connected to the LTS indicated that they use 69% of the LTS assets. This proportion has been used to set the minimum charge for loads connected to the LDZ as the charging function may imply charges that are not cost reflective for the largest connected loads. The minimum LDZ charge is calculated as 69% of the average LTS usage costs. The annual consumption, which when applied to the charging function results in this charge, is used as the lower bound for which the minimum charge applies.