

Modifications 236/236a - Nationally Diversified Load Factors

Workgroup Report

Prepared by Transco and British Gas Trading for Capacity Workstream

Summary

The Network Code (section H4.3.3) specifies three "Nationally Diversified Load Factors" for non-daily-metered loads, as follows:

0-2500 thms/yr (0-73.2 MWh/yr)	36%
2500-25000 thms/yr (73.2-732 MWh/yr)	39%
25000-75000 thms/yr (732-2196 MWh/yr)	43%

Transco have carried out annual analyses of NDM loads and profiles based on data recorder data for small loads and datalogger data for larger loads. The overall average results from the last 3 years show that the NDLF (36%) for the 0-2500 thms/yr band is approximately correct, but that the 39% and 43% assumed for the 2500-25000 thms/yr and 25000-75000 thms/yr bands are too high.

This means that the existing NDLFs cause reduced costs to non-domestic customers and (relatively) increased costs to domestic customers, leading to a cross-subsidy. Based only on the NDM demand estimation results from 1997 (which may only be indicative) the scale of the annual cross-subsidy has been estimated as being about £24 million per year.

It is proposed that an alternative to the existing NDLFs be found. Simply removing the Nationally Diversified Load Factors and substituting the unscaled national average load factors from annual NDM analyses would lead to price volatility, so a damping mechanism is proposed. This would result in more reflective transportation charges, without introducing significant levels of price volatility.

Even so, a single step-change from the existing non-domestic NDLFs of 39% and 43% to levels of around 34% and 37% would have substantial impacts. It is therefore recommended that in order to effect a change that reduces the level of cross subsidy but that does not cause such a dramatic change to transportation charges, these NDLFs are only changed by 2 percentage points to 37% and 41% respectively.

For 1998/9 charging purposes the NDLFs that would be used are 36% / 37% / 41% respectively. Further analysis work should be conducted by Transco, and proposals brought forward to the Capacity Workstream with a view to adopting a firmer long term basis for the values of the NDLFs.

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Background

- 1 The Network Code (section H4.3.3) describes three "Nationally Diversified Load Factors" for non-daily-metered load, as follows:

0-2500 thms/yr (0-73.2 MWh/yr)	36%
2500-25000 thms/yr (73.2-732 MWh/yr)	39%
25000-75000 thms/yr (732-2196 MWh/yr)	43%

Load factor estimates are generated each year from load analyses. The resulting NDM end user category (EUC) load factors within each of the three load bands are then scaled to the three overall/average factors above, on a national basis.

- 2 The three factors date from before the Network Code -

"As regards charging for transportation and storage the important parameters are load factors, 1-in-20 peak day demands and the shapes of load duration curves. Table 1 gives load factors by load band for 1993/94, derived from Regional returns" [Load Research for Transportation & Storage Charging, British Gas, November 1993]

..... and Table 1 gives the 36%, 39% and 43% averages.

- 3 Transco have carried out annual analyses of NDM loads and profiles based on data recorder data for small loads and datalogger data for larger loads. The corresponding results have been -

Load band Thms/yr	0-2500	2500-25000	25000-75000
Existing NDLFs	36%	39%	43%
Results from 1995 analyses	33.2%	29.8%	35.7%
Results from 1996 analyses	36.4%	35.4%	41.2%
Results from 1997 analyses	36.5%	32.7%	35.6%
Results from 1998 analyses	34.7%	32.5%	34.7%

(The 1995 analyses were based on a very small sample size and on data over a very short duration (10 weeks in some cases). Therefore, the 1995 results should not be taken into consideration in these deliberations.)

The results for the years 1996 to 1997 for the 0-2500 thms/yr load range suggests that the average load factor is slightly greater than the existing NDLF value of 36%. However, taking the 1998 results into account gives an average load factor of 35.9% over the three years 1996 to 1998.

For the 2500-25000 thms/yr and 25000-75000 thms/yr bands, results from all three years, 1996 to 1998, suggest that the existing NDLF values are too large. The differences between the results of the analysis and the NDLFs have been significant.

Load band thms/yr	2500-25000	25000-75000
Existing NDLF	39%	43%
Range from 1996-8 analysis	32.5-35.4%	34.7-41.2%

Cross-Subsidy

- 4 The consequences of maintaining NDLFs for non-domestic NDM load bands which are higher than the actual load factors are that the domestic sector bears too large a share of transportation exit capacity charges and non-domestic NDM loads bear too small a proportion. In essence, total predicted transportation income is based on (*inter alia*) load forecasts generated by Transco, allowable revenue for this level of load, a desired split of revenue between customer charges, commodity charges, entry capacity and exit capacity charges. There is then a split of the exit capacity charges between consumption ranges. If, for example, the total peak-day demand associated with the non-domestic NDM sectors is too small, then if nothing else changed as well, this sector will bear insufficient costs and the others will bear too much. If, alternatively, or as well, the domestic peak-day demand is overestimated, this sector will bear extra costs and others will be under-charged.
- 5 This means that the existing NDLFs are increasing domestic costs to a degree and reducing non-domestic substantially, leading to a cross-subsidy. On the basis of using the 1997 results in place of the NDLFs, domestic transportation charges would on average be over-charged by 0.2 p/thm. and the cross-subsidy would be about £24 million per year.

Options for change

- 6 The NDLFs act as a scaling factor, adjusting the "raw" NDM EUC load factors from the NDM analysis undertaken each spring. This process has three main effects:
 - ♦ NDLFs are used to scale 'raw' NDM EUC load factors used for the forthcoming gas year. Therefore, for example, the results of the 1997 NDM analysis determined the NDM EUC load factors introduced on 1 October 1997
 - ♦ Since the consultation process relating to the NDM proposals concludes at the end of August each year, and Transco produces transportation prices and pricing

proposals (which are released for consultation in early May) for introduction on 1st October, the **unscaled** national average load factors coming out of each year's NDM analysis are not available at the time prices are formulated. However, since NDM EUC load factors are scaled to NDLFs, these NDLFs can (and are) used in the pricing calculations to ensure consistency between pricing and NDM EUC load factors.

- ♦ If the use of NDLFs (whatever their values) were to be discontinued, this consistency between price setting and NDM EUC load factors would be broken.

7 The option of eliminating NDLFs altogether would result in the unscaled 1998 results being used for the 1998/9 NDM EUC load factors but, without a fresh price recalculation and consultation, the 1998/9 transportation charges would be based on the currently applicable NDLFs. This would lead to the very inconsistency that the existence of NDLFs was intended to overcome.

8 However there are two other important issues in respect of this form of implementation -

- ♦ use of "raw" results from the NDM analyses would introduce a degree of volatility in prices and costs, which is not justified in the light of the precision of the statistical analyses - therefore a degree of "damping" is appropriate.
- ♦ a "one-step" implementation could (depending on the "damping" approach) imply significant changes for certain non-domestic NDM loads, so a phased implementation may be better.
- ♦ additionally, removal of NDLFs removes the mean by which the timing mismatch between pricing proposals and the annual NDM proposals process is overcome.

9 It is also necessary to consider whether any other special transition arrangements are appropriate for 1998.

Volatility

10 Simple removal of the Nationally Diversified Load Factors would lead to problems as already set out above. The annual results over the three years 1996 to 1998 above show that the non-domestic **unscaled** national average load factor has varied from 32.5% to 35.4% for the 2500-25000 thms/yr consumption range and from 34.7% to 41.2% for the 25000-75000 thms/yr consumption range. Such changes would have affected capacity charges from one year to the next, **had NDLFs not been used to scale to**. The domestic unscaled national average load factor has been more stable, changing by at most 1.8 percentage points from one year to another during the three year period 1996 to 1998.

11 It is therefore recommended that continued use of a damping mechanism is justified, such that any year's analysis results influence the NDM load factors and (as soon as possible) the charges, but that more than one year's results are taken into account so as to mitigate the impact of estimates which are unduly high or low.

12 Modification 236a contained the specific proposal that each year the three nationally diversified load factors should be set to the average of the value used previously and the value estimated from the new analyses. To illustrate, if this had been in use from 1996/7 the values would have been as follows -

(Note 1995 analysis is excluded due to the small sample size and limited duration of the analysis done that year)

Average NDLF calculation

Load Band Thms/yr	0-2500	2500-25000	25000-75000
Network Code NDLFs	36%	39%	43%
Results from 1996 analyses	36.4%	35.4%	41.2%
Averages, used as 1996/7 values	36.2%	37.2%	42.1%
Results from 1997 analyses	36.5%	32.7%	35.6%
Averages, used as 1997/8 values	36.4%	35.0%	38.9%
Results from 1998 analyses	34.7%	32.5%	34.7%
Averages, used as 1998/9 values	35.6%	33.7%	36.8%

13 Alternatively, some form of averaging method would result in more stable alternatives to the current NDLFs and more reflective transportation charges. The most straightforward averaging method would be a simple average of the results from the last three full years of analysis (including the current year's results). If this approach was adopted the applicable NDLFs for 1998/9 would be:

Load Band Thms/yr	0-2500	2500-25000	25000-75000
Network Code NDLFs	36%	39%	43%
Three year averages for 1998/9	35.9%	33.5%	37.2%

Capped changes

14 A single step-change from the existing non-domestic NDLFs of 39% and 43% to levels of around 34% and 37% would have substantial impacts. For example, Transco have estimated that for each load band, taken in isolation, a 1% reduction in load factor would lead to an increase in capacity charges of approximately 1.2%. However, if specific charges rise, then the general overall charge level could well fall slightly to retain

the same overall revenue recovery. Therefore, for a change applied to all load bands the impact is likely to be reduced slightly. To limit the effect of a step change in load factors on transportation charges, it is recommended that the changes in each of the three NDLFs be capped each year at 2 percentage points. Therefore the non-domestic NDLFs could not for 1998/9 be lower than 37% and 41% (and would in fact take these values).

15 Discussion within the Capacity Workstream and written representation from one shipper showed that shippers with a largely non-domestic portfolio are opposed to any changes that would increase their costs in 1998/9. Arguments against early change include:

- ♦ many end user contracts for 1998/9 are already settled, and further changes to the transportation charges at this stage will reduce the profit margins,
- ♦ the uncertainty and volatility of the reported load factors suggests that further investigations should be undertaken before any pricing on Network Code changes are implemented,
- ♦ the extent of discrimination is difficult to estimate and may be very small.

16 Against this there is the evidence that the results for the period 1996 to 1998 show that the NDLFs for the 2500-25000 thms/yr and 25000-75000 thms/yr sectors are significantly overstated. This suggests that a degree of cross subsidy exists and having identified this discrimination that it would be wrong not to make changes that would reduce or eliminate this cross subsidy.

Recommended changes - Network Code

17 Taking all of the above into account, the following is recommended;

- ♦ At section H 4.3.3
 - i. the NDLF for the 0-2500 thms/yr (0 to 73,200 kWh) load band be left unchanged at 36%
 - ii. the NDLF for the 2500-25000 thms/yr (73,200 to 732,000 kWh) load band be reduced to 37%
 - iii. The NDLF for the 25000-75000 thms/yr (732,000 to 2,196,000 kWh) load band be reduced to 41%
- ♦ Transco investigates further the issue of NDLF variability, discusses the technical aspects of the results of such investigations at the Demand Estimation Sub-Committee and reports back to the Capacity Workstream on conclusions reached, before the end of 1998. Capacity Workstream would then consider whether a further modification to the Network Code would be appropriate.

Estimated Impacts of Proposals in 1998/9

- 18 Attached as an appendix A to this paper is a table illustrating the new NDM EUC load factors that would be calculated if this modification were to be effected. There is a timetable for issue of the NDM EUC load factors and the approval of any proposed changes and the implementation of the agreed factors in Transco systems. Changes to load factors may also affect shipper systems.
- 19 Using the factors as proposed above the impact on transportation charges would be as described below. The table shows the possible effect of the changed NDLFs on the level of transportation charge change that might be experienced from October 1998.

Potential impact on Transportation charge payable from October 1998

Shipper NDM portfolio % of load above 2500 thms/yr	Price change with current NDLFs	Price change with proposed NDLFs	Difference. Additional increase
100 %	2.2%	4.5%	2.3%
70%	1.9%	3.5%	1.6%
50%	1.8%	2.9%	1.2%
40%	1.7%	2.6%	0.9%

The first data column indicates the change in transportation charges anticipated to take effect in October 1998 as calculated using the existing NDLFs. An assumption has been made of a 50:50 split of the portfolio load between the two larger NDM load bands.

The second data column illustrates the potential change in transportation charges if the NDLFs proposed here for 1998/9 were applied.

The first row illustrates the effect of a shipper with no domestic consumers in an NDM portfolio. The subsequent rows show the effects on shippers with an increasing proportion of domestic consumers in their NDM portfolio. With a totally domestic portfolio (all consumers less than 2500 thms/yr) the effect of this modification would be zero as the NDLF for that load band remains unchanged and therefore the charges are unchanged from those currently proposed.

NDM EUC Load Factor Changes

As specified in Section H 4.3.3 of the Network Code, for small NDM end user categories (EUCs) (0-2196 MWh pa), NDM EUC Load Factors are scaled to nationally diversified load factors (NDLFs); currently 36% for the 0-73.2 MWh pa consumption range, 39% for the 73.2-732 MWh pa consumption range and 43% for 732-2196 MWh pa consumption range.

The small NDM EUC load factors in Transco's NDM Proposals for 1998/99 (published 26th June 1998), reflect this scaling to NDLFs as currently set out in the Network Code.

Modification Proposal 236, currently being discussed proposes changing two of these NDLFs values; specifically to: 37% for the 73.2-732 MWh pa range and 41% for the 732-2196 MWh pa range.

Should **this specific change** be formally adopted, the NDM EUC load factors for small NDM EUCs in the consumption ranges 73.2-293 MWh pa, 293-732 MWh pa and 732-2196 MWh pa will change from those in Transco's NDM proposals dated 26th June 1998.

In these circumstances, the affected EUCs would be :

xx:E9802B

xx:E9803B

xx:E9803W01

xx:E9803W02

xx:E9803W03

xx:E9803W04

xx:E9804B

xx:E9804W01

xx:E9804W02

xx:E9804W03

xx:E9804W04

where xx denotes the two character LDZ identifier.

For the avoidance of doubt, please note that NDLFs do not have any effect on NDM Profiles and NDM Profiling Parameters for any EUCs.

The tables on the following pages set out the NDM EUC load factors proposed for gas year 1998/99 for the affected EUCs, along with the altered values that would apply if two of the currently applicable NDLFs were amended to the values stated above as a result of adoption of Modification Proposal 236. The load factors are expressed as fractions (eg. 0.357 is 35.7%).

APPENDIX A

Transco - Demand Estimation**23rd July 1998**

Transco's 1998/99 NDM
Proposals (26/06/98)
[NDLFs : 36%/39%/43%]

Effect of Draft. Mod.
Proposal 236 (as at 23.07.98)
[NDLFs: 36%/37%/41%]

<u>EUC Name</u>	<u>Load Factor Values</u>	<u>Load Factor Values</u>
SC:E9802B	0.451	0.428
NO:E9802B	0.322	0.305
NW:E9802B	0.361	0.343
NE:E9802B	0.357	0.338
EM:E9802B	0.354	0.336
WM:E9802B	0.323	0.306
WN:E9802B	0.361	0.343
WS:E9802B	0.297	0.281
EA:E9802B	0.376	0.357
NT:E9802B	0.451	0.428
SE:E9802B	0.457	0.434
SO:E9802B	0.303	0.287
SW:E9802B	0.324	0.308
SC:E9803B	0.479	0.455
NO:E9803B	0.383	0.363
NW:E9803B	0.412	0.391
NE:E9803B	0.438	0.416
EM:E9803B	0.413	0.392
WM:E9803B	0.401	0.380
WN:E9803B	0.412	0.391
WS:E9803B	0.383	0.363
EA:E9803B	0.425	0.403
NT:E9803B	0.437	0.415
SE:E9803B	0.441	0.418
SO:E9803B	0.373	0.354
SW:E9803B	0.382	0.362
SC:E9803W01	0.754	0.715
NO:E9803W01	0.693	0.657
NW:E9803W01	0.693	0.657
NE:E9803W01	0.728	0.690
EM:E9803W01	0.728	0.690
WM:E9803W01	0.728	0.690
WN:E9803W01	0.693	0.657
WS:E9803W01	0.731	0.694
EA:E9803W01	0.761	0.722
NT:E9803W01	0.761	0.722
SE:E9803W01	0.761	0.722
SO:E9803W01	0.731	0.694
SW:E9803W01	0.731	0.694

Transco's 1998/99 NDM
Proposals (26/06/98)
[NDLFs : 36%/39%/43%]

Consequent to Draft Mod.
Proposal 236 (as at 23.07.98)
[NDLFs: 36%/37%/41%]

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Transco - Demand Estimation

<u>EUC Name</u>	<u>Load Factor Values</u>	<u>Load Factor Values</u>
SC:E9803W02	0.576	0.547
NO:E9803W02	0.515	0.489
NW:E9803W02	0.515	0.489
NE:E9803W02	0.532	0.505
EM:E9803W02	0.532	0.505
WM:E9803W02	0.532	0.505
WN:E9803W02	0.515	0.489
WS:E9803W02	0.503	0.477
EA:E9803W02	0.536	0.508
NT:E9803W02	0.536	0.508
SE:E9803W02	0.536	0.508
SO:E9803W02	0.503	0.477
SW:E9803W02	0.503	0.477
SC:E9803W03	0.406	0.385
NO:E9803W03	0.329	0.312
NW:E9803W03	0.329	0.312
NE:E9803W03	0.359	0.341
EM:E9803W03	0.359	0.341
WM:E9803W03	0.359	0.341
WN:E9803W03	0.329	0.312
WS:E9803W03	0.342	0.325
EA:E9803W03	0.364	0.345
NT:E9803W03	0.364	0.345
SE:E9803W03	0.364	0.345
SO:E9803W03	0.342	0.325
SW:E9803W03	0.342	0.325
SC:E9803W04	0.327	0.310
NO:E9803W04	0.264	0.251
NW:E9803W04	0.264	0.251
NE:E9803W04	0.271	0.257
EM:E9803W04	0.271	0.257
WM:E9803W04	0.271	0.257
WN:E9803W04	0.264	0.251
WS:E9803W04	0.256	0.243
EA:E9803W04	0.289	0.275
NT:E9803W04	0.289	0.275
SE:E9803W04	0.289	0.275
SO:E9803W04	0.256	0.243
SW:E9803W04	0.256	0.243
	Transco's 1998/99 NDM Proposals (26/06/98) [NDLFs : 36%/39%/43%]	Consequent to Draft Mod. Proposal 236 (as at 23.07.98) [NDLFs: 36%/37%/41%]
<u>EUC Name</u>	<u>Load Factor Values</u>	<u>Load Factor Values</u>
SC:E9804B	0.494	0.471
NO:E9804B	0.395	0.376

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NW:E9804B	0.425	0.405
NE:E9804B	0.452	0.431
EM:E9804B	0.426	0.406
WM:E9804B	0.413	0.394
WN:E9804B	0.425	0.405
WS:E9804B	0.395	0.376
EA:E9804B	0.438	0.418
NT:E9804B	0.451	0.430
SE:E9804B	0.454	0.433
SO:E9804B	0.385	0.367
SW:E9804B	0.394	0.375
SC:E9804W01	0.777	0.741
NO:E9804W01	0.714	0.681
NW:E9804W01	0.714	0.681
NE:E9804W01	0.750	0.715
EM:E9804W01	0.750	0.715
WM:E9804W01	0.750	0.715
WN:E9804W01	0.714	0.681
WS:E9804W01	0.754	0.719
EA:E9804W01	0.785	0.748
NT:E9804W01	0.785	0.748
SE:E9804W01	0.785	0.748
SO:E9804W01	0.754	0.719
SW:E9804W01	0.754	0.719
SC:E9804W02	0.594	0.566
NO:E9804W02	0.531	0.506
NW:E9804W02	0.531	0.506
NE:E9804W02	0.548	0.523
EM:E9804W02	0.548	0.523
WM:E9804W02	0.548	0.523
WN:E9804W02	0.531	0.506
WS:E9804W02	0.519	0.494
EA:E9804W02	0.552	0.526
NT:E9804W02	0.552	0.526
SE:E9804W02	0.552	0.526
SO:E9804W02	0.519	0.494
SW:E9804W02	0.519	0.494
Transco's 1998/99 NDM Proposals (26/06/98) [NDLFs : 36%/39%/43%]		Consequent to Draft Mod. Proposal 236 (as at 23.07.98) [NDLFs: 36%/37%/41%]

<u>EUC Name</u>	<u>Load Factor Values</u>	<u>Load Factor Values</u>
SC:E9804W03	0.418	0.399
NO:E9804W03	0.339	0.323
NW:E9804W03	0.339	0.323
NE:E9804W03	0.370	0.353
EM:E9804W03	0.370	0.353
WM:E9804W03	0.370	0.353

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Transco - Demand Estimation

WN:E9804W03	0.339	0.323
WS:E9804W03	0.353	0.336
EA:E9804W03	0.375	0.358
NT:E9804W03	0.375	0.358
SE:E9804W03	0.375	0.358
SO:E9804W03	0.353	0.336
SW:E9804W03	0.353	0.336
SC:E9804W04	0.337	0.321
NO:E9804W04	0.272	0.260
NW:E9804W04	0.272	0.260
NE:E9804W04	0.280	0.267
EM:E9804W04	0.280	0.267
WM:E9804W04	0.280	0.267
WN:E9804W04	0.272	0.260
WS:E9804W04	0.264	0.251
EA:E9804W04	0.298	0.284
NT:E9804W04	0.298	0.284
SE:E9804W04	0.298	0.284
SO:E9804W04	0.264	0.251
SW:E9804W04	0.264	0.251