

**OFFICE OF GAS AND ELECTRICITY MARKETS
PRODUCTIVITY IMPROVEMENTS IN DISTRIBUTION
NETWORK OPERATORS: FINAL REPORT SUBMITTED BY
CAMBRIDGE POLICY ASSOCIATES LTD (CEPA)
(NOVEMBER 2003)**

*Comments submitted by CE Electric UK Funding Company (CE),
Northern Electric Distribution Ltd (NEDL) and
Yorkshire Electricity Distribution plc (YEDL)*

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OFFICE OF GAS AND ELECTRICITY MARKETS PRODUCTIVITY IMPROVEMENTS IN DISTRIBUTION NETWORK OPERATORS: FINAL REPORT SUBMITTED BY CAMBRIDGE POLICY ASSOCIATES LTD (CEPA) (NOVEMBER 2003)

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- 1 The view of CE, NEDL, and YEDL in response to the CEPA's November 2003 Final report (the CEPA report) are set out below.

The use of total factor productivity (TFP) and partial factor productivity (PFP) estimates in setting price controls

- 2 We can see the attraction for regulators of using TFP rates to assist in price control reviews as proposed by CEPA. However, a robust TFP based assessment requires that the input data is sound and account has to be taken of the fact that the retail price index element of RPI-X regulation already captures economy-wide productivity improvements. The efficiency factor should reflect only those improvements that may be expected above those achieved in the economy as a whole. However, as we approach the fourth price control review since privatisation it is appropriate to ask why it is considered necessary to try to estimate the achievements that may be made in the future by distribution network operators (DNOs). There is a general consensus that those efficiency gains that were easiest to achieve have now been secured. CEPA's Dr Pollit indicated at an Ofgem workshop that there were two reasons why regulators might try to anticipate efficiency gains at a price control review. The first was to ensure that the future of incentive regulation was politically sustainable: capturing only the known gains from the prior period left a potential political problem if incentive regulation was perceived by the public to give companies too easy a challenge. The second reason advanced by Dr Pollit was that there was evidence that setting companies harsher Po/X factors correlated with greater subsequent cost reduction.

- 3 With respect to the first observation, we believe that there is little prospect of significant, let alone excessive, out-performance after three price control reviews and after we have already reduced operating costs by 60 per cent since privatisation.

- 4 With respect to the second observation the only reason why it might be justifiable to set tougher Po/X factors to encourage greater efficiency would be if the capital markets were incapable of driving out efficiencies. The level of the Po/X factor does not affect the incentive properties of a price control. Of course, setting Po/X factors for all companies by reference to the cost of 'frontier' companies may force companies to adopt a different and higher risk profile. It would, however, be a mistake to direct regulatory policy towards that end without full consideration of whether customers desire such an outcome.

- 5 We are therefore not convinced of the need to anticipate gains at a price control review.

CEPA's general approach

- 6 CEPA presents in the paper estimates of recent historical productivity trends from several industries in several countries:

Britain	Electricity transmission
	Water and sewerage
	Rail
	Telecoms
	Electric, gas, and water
Norway	Power distribution
France	Electricity, gas, and water
Germany	Electricity, gas, and water
United States	Power distribution
	Electricity
	Gas
	Electric, gas and water

- 7 CEPA appears to have done most of the calculations itself. CEPA also reports 'forward looking' estimates of DNO productivity growth from investment analysts and comparator companies in certain capital-intensive non-utility industries.
- 8 CEPA chooses from this very wide range of productivity trend two estimates that it feels represent reasonable upper and lower bounds and declares the midpoint of this range to be its best guess of the DNO TFP trend in the next few years.
- 9 It is entirely reasonable to present results of empirical research using historical data to support productivity trend projections. However, CEPA's general approach is flawed in several important respects. One such flaw is in its focus on recent British experience.
- 10 One problem with a British focus is that it is difficult to calculate a *long run* productivity trend using the available data. After all, the data that we have relates to a period during which the former publicly owned enterprises were privatised and placed under a form of regulation that strongly encouraged the containment of operation and maintenance (O&M) expenses. Hence, productivity growth would reflect substantial movement towards the efficiency frontier as well as a shift in the frontier. The pace of movement towards the frontier achieved in the last ten years probably cannot be sustained in the next five years. CEPA acknowledges this problem. It notes (p 56), for example, that 'Clearly there have been a number of special factors that have meant that DNO productivity was particularly high. There was enormous potential to cut costs in the early years following privatisation.... it is unlikely that trend rates for the next price control period will continue to be as high as the historical trend suggests.'
- 11 A Malmquist index could be potentially useful in this regard to the extent that it could accurately measure frontier shifts in British utility industries. However, accurate Malmquist indexing is very problematic and involves many of the same methodological controversies encountered in benchmarking. Alternatively, recourse could be had to the results of research on productivity trends in other countries where substantial movement towards or away from the frontier is not expected. For example, the TFP trend of US power distributors would be relevant since these companies have not been subject to privatisation and hence will not have been subject to a 'privatisation effect'.

- 12 The available data for productivity measurement in Britain is also problematic. One factor that may be affecting the CEPA analysis is the differences in the reporting of costs as between the distribution businesses and other businesses of the companies concerned. Furthermore, TFP trends will also be distorted by differences that may have occurred over time in the treatment of costs as operating costs or as capital costs. It seems likely that CEPA will have been unable to correct for these differences since their report seems to be based on data published in regulatory accounts. Moreover, at the meeting held on 9 March CEPA's representative conceded that CEPA had taken no steps to correct for different degrees of risk taking on the part of DNOs (e.g. taking on higher insurance deductibles) during the period covered by CEPA's analysis. Failure to reflect such changes will lead to a systematic overestimate of productivity growth.
- 13 Another serious problem is that the data that is necessary for the construction of an accurate perpetual inventory equation for the capital stock has not been gathered. Data for the calculation of long-run productivity trends for gas distribution was not available to the authors at all. In the water utility industry, meanwhile, productivity has been slowed in the last decade by efforts to upgrade product quality.
- 14 A second flaw in CEPA's basic approach is its failure to have due regard to the results of other academic studies and expert investigations, preferring instead to rely on its own findings. Since economists have been measuring energy utility productivity trends for more than twenty years there is a wide literature on the subject which CEPA ignores. Productivity studies have also been released by several government agencies. Several regulatory agencies have acknowledged productivity trends in the process of establishing X factors for price controls.
- 15 A third problem with CEPA's basic approach is the presentation of productivity results from an excessively broad range of industries. Our consultants, Pacific Economics Group (PEG), have more than thirty man years of research experience in this area. PEG personnel have assessed productivity trends in power generation, transmission, and distribution and in gas transmission and distribution. PEG find productivity trends tend to be fairly similar in the gas and electric power distribution industries. This is not surprising since these industries have in common capital intensive technologies,

unremarkable technological change, gradual output growth, and a need to make investments at regular intervals to extend service to horizontally expanding metropolitan areas. Other network industries do not necessarily have similar technology trends, demand growth, or investment patterns. For example, productivity growth has typically been more rapid in the telecoms industry due to rapid technological change and demand growth. Productivity growth also appears to have been much more rapid in railways (outside Britain).

- 16 PEG do not consider productivity trends in the power generation industry to be relevant either. In comparison to power distribution, this industry is considerably less capital intensive, has enjoyed brisk technical change in recent years, and is more subject to periodic imbalance between capacity and demand. The power transmission industry, meanwhile, has if nothing else a different investment pattern such that periods of rapid investment and declining productivity are followed by periods of slow investment and rapid productivity growth. PEG also question why productivity trends in the capital intensive non-utility industries presented by CEPA are relevant.

CEPA's approach to the use of productivity research in regulation

- 17 CEPA acknowledges (p iv) that:

‘estimates of the historical trend in productivity, *adjusted for any exceptional factors*, are a useful guide to future performance (emphasis added).’

and that (p iii):

‘Over the longer term, when performance of the DNO's has significantly converged, it can be appropriate for the ‘X’ factor in an RPI-X formula to approach expected TFP growth, less the expected TFP growth of the economy.’

- 18 However, in CEPA's view (p iii):

‘The performance of the DNOs are unlikely to have converged to a sufficient extent, so while estimates of TFP and [partial factor productivity (PFP)]... growth may not be used directly in determining price controls, they can inform

Ofgem about the possible scope for efficiency savings available to DNOs as a group over the forthcoming price control period.'

19 Relatedly (p 4):

'A TFP approach to setting X factors is only really appropriate when company costs have converged on an efficiency frontier, or at least have been given the opportunity to do so.... Trend TFP growth...ought to distinguish between movements towards the frontier and movements of the frontier. If it does not do this, an X factor based on trend growth would be unfair to frontier firms that would not be able to achieve 'catch up' efficiency savings available to firms behind the frontier. This would ultimately adversely affect consumers.'

20 CEPA then concludes (p 5) that:

'For British DNOs, it is unlikely that efficiency has converged to such an extent. This means that it is not appropriate for expectations of TFP to determine all price controls of DNOs. But a trend in TFP can provide a lower bound for appropriate X factors, and indicate the appropriate level of X for a regulated firm that is on the efficiency frontier. Productivity trends, therefore provide regulators with a tool to assess efficiency that can supplement other assessments.'

21 We agree that the divergence of apparent performance in the DPCR3 period suggests that it may be too difficult to set X factors on the basis of TFP trends. However, for reasons we have set out in our responses on methods of assessing relative efficiency we do not believe that DNOs are likely to achieve convergence in the future any more than firms in competitive industries do. Read in conjunction with CEPA's previous report for Ofgem it would seem that CEPA recommends that benchmarking approaches can determine the 'efficient frontier' at DPCR4 and that CEPA's TFP study can inform a judgment about the movement of that frontier. We believe that CEPA is wrong in both respects. The efficient frontier cannot be ascertained from the methods used by CEPA and the CEPA TFP study is likely to overstate the savings that can be made from that position.

- 22 The research CEPA presents in the report is also inconsistent with its own reasoning. The lower bound for the X factor should be the estimate of the frontier shift. This could in principle be obtained from Malmquist index research using British data or Tornqvist index results using data from other countries where there has been less technical change. In this study, however, CEPA does not present Malmquist index results and seems, instead, to be 'guesstimating' the overall productivity trend of the industry rather than its frontier shift. The result of such an inquiry is then clearly not a plausible 'the lower bound' of the future X factors.
- 23 Trends in TFP are unlikely to assist in determining efficient costs because the significant rate of TFP gains achieved during the period since privatisation are not an indication of the likely future trend.
- 24 CEPA considered both PFP and TFP measures and both the possibility of comparing firms at a specific date and also comparing performance over time.
- 25 In relation to partial productivity measures CEPA note that:

'one cannot sum up the efficiency savings that these measures give for each function and suggest that the total efficiency saving is achievable for the company as a whole. This is to neglect the fact that companies may choose to substitute one type of expenditure for another hence giving them best performance on some measures but not on others leaving best performance on all measures simultaneously unachievable.' (p 25).

- 26 This point is general and applies to any technique applied to a sub-set of total costs, or potentially to total costs not allowing for quality differences.

US productivity research

- 27 CEPA's research on US power distribution productivity raises a number of concerns.

28 The methodology used by CEPA has marked disadvantages compared to the methods typically used in US studies. These are:

- The treatment of the capital stock is crude. A perpetual inventory equation is used but the formula seems to be flawed in a manner that exaggerates depreciation and thereby leads to an upward bias in the TFP growth trend estimate.
- Data for only 50 companies is used. PEG inform us that in the US this would be regarded as a rather small sample.
- The explanation of the methodology is too brief to be fully understandable to the reader. For example, CEPA does not explain how it carries out the step, 'estimate the ratio of the CCA asset value to HCA asset value in the starting year for which we are using FERC Form 1 data (1990).' Yet that can have a major impact on results.

29 CEPA presents only *its own* estimates for the US power distribution industry. Yet numerous robust estimates are available of US power distribution TFP trends, including estimates approved by regulators in several jurisdictions. PEG found, in contrast to CEPA's 2.6 per cent trend estimate, the average productivity trend acknowledged by US regulators for power distributors is much lower. The average productivity trend acknowledged by North American regulators for gas distributors is only 0.54 per cent. The latest available estimate for US power distribution (prepared by PEG in recent testimony for San Diego Gas & Electric) is only 0.5 per cent. It is also noteworthy that CEPA finds that the PFP of power distribution *assets* grows four times more slowly than the PFP of *opex* inputs. PEG inform us that this is the opposite of the results typically achieved by experienced US practitioners.

30 CEPA also reports a productivity estimate, using NIESR data, of 1.9 per cent for the US electricity industry as a whole. The relevance of this result may be questioned since, as noted above, the productivity trend of the US electric utility sector as a whole has grown considerably more rapidly than its power distribution subsector. The result for gas

distribution is probably more relevant to the DNOs' price control and this is only 0.3 per cent.

CEPA's use of British TFP rates

31 We also have some concerns about the following aspects of CEPA's treatment of British TFP rates:

- the claim that 'significant reductions were to be expected as part of the price control cycles' is controversial and requires further substantiation;
- it is not clear why the result of the analyst survey, which produces a TFP trend estimate of 1.5 per cent, is not given more weight; and
- the statement that the calculated trend for NGC is an 'understatement' is speculative and unsubstantiated.

Selecting a trend from the available numbers

32 From these questionable trend calculations CEPA proceeds to select an upper and lower bound to the expected productivity growth of the DNOs and to take the midpoint of these numbers as its best estimate. The upper bound estimate of expected DNO TFP growth is CEPA's 3.4 per cent estimate of the recent historical trend in the TFP of the UK utilities sector. The lower bound is CEPA's 1.4 per cent estimate of the productivity trend of the German utilities sector. The midpoint between these estimates is CEPA's 'central estimate' of 2.4 per cent. With regard to the PFP of O&M inputs, CEPA identifies upper and lower bounds of 2.0 per cent and 5.0 per cent respectively. This produces a 'central estimate' of 3.5 per cent.

33 CEPA's approach to choosing an upper and lower bound, then calculating the midpoint, is highly questionable. It makes more sense to consider the most relevant estimates and then compute the *average* of these. In our view, the most relevant estimates generated by CEPA are as follows:

United States	Power Distribution		2.2%
Britain	Power Distribution	Frontier Shift	1.14%
	Power Distribution	Analysts' Survey	1.4%
United States	Gas Distribution (1990-99)		0.3%
Norway	Power Distribution		0.2%

The average of these estimates is 1.04 per cent.

34 Even if CEPA's approach to the 'upper and lower bound' and the numbers used by CEPA were to be adopted by Ofgem, CEPA's choices for the upper and lower bound estimates seem poor ones. With regards to the upper bound, the use of Tornqvist index results for Britain is generally inadvisable for the reasons discussed above. It might be more sensible to use the productivity trend for NGC. A sensible lower bound would be either the power distribution productivity trend for the Norwegian power distribution sector or the productivity trend for U.S. gas distribution, which is quite similar. The average of these upper and lower bounds is about 1.35 per cent.

35 We referred above to the widely available data on TFP trend estimates from respected sources. An alternative to using the CEPA data would be to take an average of all of the reasonable estimates from these authoritative sources. PEG inform us that the average of the power distribution productivity trends acknowledged by regulators which they have considered is 1.2 per cent.

CEPA's conclusions on TFP growth

36 CEPA present their findings on a range of TFP indicators in sectors that have some relevance to the DNOs. These are summarised in the table on page v of the Executive Summary of CEPA's report. In this table (and in its source on page 55) CEPA report TFP growth for NGC of 4.3 per cent. This appears to be a typographical error since CEPA's own analysis indicates a TFP growth in the range 2.4 per cent to 2.6 per cent for NGC.

- 37 If this is an error, and if it is corrected, the range of estimates in related sectors is very much narrower than CEPA suggest. Most lie in the range of 1.4 per cent to 3.4 per cent (although the Norwegian distribution sector is much lower at 0.2 per cent).
- 38 Moreover, the selection of comparative TFP from the range of studies available may be biasing the results. For example, we understand that NERA found that the annual TFP growth rate of US power companies was 1.4 per cent during the period from 1972 to 2000. CEPA reached a conclusion that during the period 1992 to 2001 the TFP growth rate in this sector was 2.6 per cent.
- 39 CEPA's conclusion that TFP for the DNOs can be estimated at 4.2 per cent is significantly higher than the TFP trends in the other sectors which have been considered. We believe that a conclusion that would treat DNOs as such an outlier must be subject to serious doubt.
- 40 Considered in the context of the available alternative studies the 2.4 per cent estimate for TFP growth arrived at by CEPA seems to be higher than the evidence would support.
- 41 For these reasons we believe that Ofgem should treat cautiously the recommendations made in CEPA's report.