



Commission for Electricity Regulation

An Coimisiún um Rialáil Leictreachais

**Determination of  
Distribution Allowed Revenues**

**CER/01/128  
28September**

## Introduction

The purpose of this determination is to set out the Commission for Electricity Regulation's (CER) conclusions of the maximum allowed revenues to ESB Distribution during January 2001 to December 2005 which will form the basis of approved Distribution Use of System charges during this period. In arriving at this determination the Commission for Electricity Regulation (CER) engaged NERA and PB Power in carrying out the review of distribution allowed revenue.

The CER in its consultation paper of October 1999 set out the regulatory principles underpinning the year 2000-transmission and distribution price controls.<sup>1</sup> In that paper, the CER set out its belief that economic regulation of the distribution business should:

- enable the businesses to attract capital investment;
- encourage efficiency in operations and investment; and
- minimise the extent of regulatory intervention in the day-to-day decision-making of the businesses.

Consistent with these key principles, the aim of this price control is to ensure that ESB Distribution's revenues for its distribution activities enable it to recover:

- the appropriate proportion of the costs directly or indirectly incurred in carrying out any necessary works; and
- a reasonable rate of return on and recovery of the capital represented by such costs.

---

<sup>1</sup> Commission for Electricity Regulation (October, 1999), *Draft Principles for the Regulation of Distribution and Transmission Revenues: a Consultation Paper*, CER/99/04.

## 1. Form of Regulation

The CER has chosen a CPI-X framework on the basis that it is:

- consistent with the achievement of the regulatory objectives of encouraging efficiency in operations and investment, enabling customers to share the benefits of efficiency savings, ensuring a reasonable rate of return on investments, and cost-effective regulation;
- preferable to other approaches to profit-sharing, such as sliding scale regulation or banded rates of return, as such schemes would involve detailed monitoring of costs and profits and high regulatory costs;
- preferable to rate of return regulation with prudential reviews, as commonly used in the US, as this approach would not provide sufficient incentives to efficiency;
- supported by a substantial body of regulatory experience world-wide (e.g. Australia, the Netherlands, Norway, Spain and the UK).

The CER stated its intention to regulate transmission and distribution revenues in a way that gives incentives to ESB to make efficiency gains. The means of providing financial incentives for efficiency gains under CPI-X regulation is to allow ESB to retain for some period actual efficiency savings made in relation to forecast expenditures.

### 1.1. Determination of Allowable Revenues

In deciding ESB Distribution's allowed revenues during the price control, the CER determined:

- the value of the regulatory asset base (RAB) on which ESB Distribution's return is based;
- the method of depreciation that enables ESB Distribution to recover the cost of its investments in an economically efficient manner;
- the appropriate rate of return on the assets employed in the distribution business;
- the efficient level of operating costs for the distribution business.

While the CER determined the allowed revenues for the purpose of setting tariffs it is the role of the distribution business to manage the allowed revenues in the most efficient manner to determine maximum benefits for the customer.

### 1.2. Regulatory Asset Base

The CER has chosen replacement cost to determine the RAB (Regulatory Asset Base) as an appropriate means of valuing distribution assets and hence determining the RAB.

Valuing the regulatory asset base using a replacement cost approach will allow costs, and hence prices, to be in line with new entrant or economic prices. These prices will:

- provide appropriate signals for demand, including the location of new demand;
- allow fair competition for new entrants, where practical;
- minimise the risk of stranded assets (with any consequential effect on the cost of capital of new investment).

Failing to value assets at their current replacement cost could result in tariffs that may be higher or lower than they would be under competitive market conditions. If tariffs are higher, this may encourage uneconomic by-pass of the distribution system through, for example, investment in captive generation. If tariffs are lower, it will distort the allocation of the costs of the business between current and future customers. These distortions will promote inefficient consumption and investment.

For these reasons, CER's preference was to value assets at their current replacement cost. This has been approximated by taking the historic (acquisition cost) value of the assets (as submitted by ESB Distribution), revaluing them at today's prices using the CPI, and depreciating using an economic depreciation profile (i.e., one that incorporates the effect of technical progress – obsolescence - and expected usage of capacity - redundancy).

## **2. Depreciation Methodology**

### **Modern equivalent asset (MEA) valuation**

The CER has valued both existing assets and new assets on the same basis so as to best proxy new entrant pricing.

The CER has deemed a 40-year asset life to be appropriate for network assets, 50 years for premises, 5 years for tools, 7 years for vehicles, 5 years for IT, 10 years for office equipment and fixtures and fittings and 10 years for telecomms assets.

The CER appreciate, that an accurate assessment of true economic depreciation is a complex exercise and could result in some degree of inaccuracy. This is because, economic depreciation profiles allocate the original capital cost of a project over its useful life, taking account of: the shape of the expected output profile through its life; the expected trend in output prices; the expected pattern of running costs over its life and the cost of capital. The CER has therefore opted for a relatively simple method to calculate the regulatory depreciation.

The CER has chosen straight-line depreciation over the *declining* balance approach as the latter method, never fully depreciates the asset. This is because the depreciation is calculated as a proportion of the declining value of the asset. Furthermore, due to the nature of the design life of network assets and the load profile of the use of network asset, the straight-line method was considered to be a reasonable representation of depreciation for network assets.

## **3. Allowable Revenues**

The CER opted for a cash flow approach to the calculation of allowable revenues. It is the most accurate measure of the revenues a company needs in order to finance its activities. Respondents to the consultation paper showed overwhelming support for CER's proposal to use a cash flow approach to determine allowable revenues, with the use of financial indicators as a crosscheck on the viability of the results.

### **3.1. The Operation of the CPI-X Mechanism**

The CER stated its intention to regulate transmission and distribution revenues in a way that gives incentives to ESB to make efficiency gains. The means of providing financial incentives for efficiency is to allow ESB to retain for some period actual efficiency savings made in relation to forecast expenditures.

#### **Defining “efficiency savings”**

The CER wishes to distinguish at each review between cost savings which are due to factors outside the control of the regulated business (i.e., windfall gains or losses) and those which are controllable (i.e., due to efficient management). Uncontrollable factors would include items such as:

- errors in demand forecasting leading to over or under-recovery;
- changes in the customer base although the CER has provided for amendment for this in its proposals;
- changes in pass through costs such as business rates or those the CER has proposed to re-examine based on firm costed proposals such as the MRS (market opening) system so as to ensure such systems are fit for purpose and do not inhibit the appropriate separation of businesses.

The CER has decided that efficiency gains and losses should be treated symmetrically; i.e., any overspend is treated as a negative carry-over but that any saving should be assessed relative to the revenue cap.

#### **Retention of savings**

The CER has determined a five-year rolling retention of efficiency savings in both capex and opex on the basis that this will provide stable and sufficient incentives towards efficiency.

### **3.2. The Revenue Formula**

While the CER has determined the allowed revenues for each year in the regulatory period, some changes to the allowed revenue will be required to take cognisance of changes from forecast assumptions. These changes will include variations in: the numbers of customers connected; CPI; customer minutes lost, system energy losses, pass through costs and revenues actually collected.

The revenue which the distribution business will be allowed to retain in any given year is set out in Appendix A. The table shows the allowed revenues ( $B_t$ ) in year 2000 prices. These revenues incorporate efficiencies that the CER expects ESB Distribution to achieve during the regulatory period.

### **3.3. System Energy Losses**

The CER has decided to give ESB explicit incentives to reduce distribution line losses. Estimated losses in the distribution network in 2000 (at 1,275GWh) were equivalent to about 7% of total units distributed. This was almost 7% below the level in 1995 (as a percentage of units distributed). The allowed loss level set out in Appendix A assumes that losses as a percentage of units distributed will continue to fall at about 1½% a year over the control period.

In principle, the value of a lost unit to an end-customer is the end-user price he faces – since the user has to buy the generation, transmission and distribution cost of that unit to replace it. ESB Distribution should therefore be given a strong incentive to reduce losses. Setting the value of losses ( $P_{Lt}$ ) equal to the end-user tariff would give it a strong incentive, but customers would see no benefit. For this reason, and because loss reduction will largely occur fortuitously as a consequence of measures ESB Distribution will be taking anyway e.g., to improve the quality of supply, to replace and reinforce the network etc. It seems appropriate to set  $P_{Lt}$  at a lower value than the average end-user tariff. The CER has set  $P_{Lt}$  at [£30,000/GWh].

### 3.4. Continuity

In estimating the value of a Customer Minute Lost (CML) the value of a lost kWh of £5 has been used consistent with the value attributed to lost load (VoLL) by the CER. Therefore the value per CML is £170,000 based on 1.6 million customers using 17.7TWh in year 2000.

The CER has decided to cap the maximum amount of incentive (penalty) to 2% of allowed revenues in any given year to avoid excessive windfall gains or losses. The CER has decided to exclude major events such as storms from this calculation. The incentive (penalty) cap of +/-2% shall apply to the net combined incentives (penalties) for CML and Losses.

### 3.5. Year 2000 Underspend

The allowed revenue for 2001 is further reduced by £13m in respect of over-recovery in 2000.

The Capex was under-spent by £27 million (at 2000 prices) in 2000. The regulatory asset base (RAB) has therefore been adjusted to include *actual* investment in 2000 (i.e., £171 million), as opposed to investment allowed by the Commission in the 1999 price control (i.e., £198 million).

The rate of return (at 6.5%) and recovery of depreciation (assuming a 40 year life) on the £27 million allowed to ESB Distribution in 2000 and unspent is worth just over £3 million. This is the amount by which revenues in 2000 were over-recovered by ESB in respect of the capex under spend. This has been deducted from allowed revenues in the 5 year period beginning 2001.

There are, however, offsetting factors. Inflation in 1999 – 2000 turned out considerably higher (5.6% vs. 2%) than anticipated at the time allowable revenues were set for 2000. This means that the depreciation allowance was commensurately low as well. In the circumstances, the CER decided that no allowance in 2001 revenues be made for the under spend in capital expenditures in 2000.

### 3.6. Allowed Revenues for ESB's Distribution Business During 2001-2005

The following tables show the estimation of allowed revenues (and hence indicative tariffs) for ESB's distribution business during 2001 to 2005. The tables report data in constant (Year 2000) prices. Hence, all data, including tariffs, are expressed in real year 2000 terms.

Operating costs exclude ESB's estimates of network and non-network depreciation as the model calculates values of annual depreciation on network and non-network assets, using straight line depreciation. The *regulated* revenues are calculated using a 6.5% pre-tax real cost of capital, depreciation using the straight-line method and an efficiency coefficient (X) of -1% a year.

Based on these rates and the opex and capex allowed, the tariff calculations show that the real average unit tariff will reduce by 9% in 2002 with moderate reduction thereafter. These unit tariffs are based on ESB's forecast of load growth (shown as *throughput* in the table.)

**Table: Allowed Revenues**

<i>Allowed Revenues</i>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>
Allowed Operating Costs		152.0	142.7	140.7	143.8	146.1
Clawback		-28.7				
<i>Total Operating Costs</i>		<i>123.3</i>	<i>142.7</i>	<i>140.7</i>	<i>143.8</i>	<i>146.1</i>
Allowed Capex		211.3	233.3	249.5	265.4	262.4
Opening Assets		1,547.5	1,673.4	1,813.4	1,963.0	2,122.0
Capex		211.3	233.3	249.5	265.4	262.4
Depreciation		-85.4	-93.3	-99.9	-106.4	-110.9
Closing Assets		1,673.4	1,813.4	1,963.0	2,122.0	2,273.5
<i>Calculation of Annual Revenues</i>						
Depreciation		85.4	93.3	99.9	106.4	110.9
Operating Costs		152.0	142.7	140.7	143.8	146.1
Operating Profit		125.2	109.6	113.6	112.3	114.0
<b>Total Annual Revenues</b>		<b>362.6</b>	<b>345.6</b>	<b>354.2</b>	<b>362.5</b>	<b>371.0</b>
Units Distributed GWh		18,646	19,473	20,161	20,841	21,543
<b>Average Unit Tariff (p/kWh)</b>	<b>2.05</b>	<b>1.94</b>	<b>1.77</b>	<b>1.76</b>	<b>1.74</b>	<b>1.72</b>

**Note:** All monies are expressed in £millions in year 2000 prices.

The table shows that the opening value of assets, or the so-called regulatory asset base (RAB), to be £1547.5M in 2001. The reason for including year 2001 investments in the regulatory asset base at the beginning of 2001 is to avoid discounting the value of investments carried out during 2001. It is assumed that these investments take place at the beginning of the year.

The table shows that ESB will be allowed to earn £1.8B in regulated revenues over the five years, resulting in an average price of £1.72 pence/kWh distributed in 2005 from £2.05 pence/kWh in 2000.

## 4. Operations Expenditure

The table below provides a summary of the allowed operating costs including network depreciation and non-recurring exceptional costs. An allowance is made for storm costs in network repairs and maintenance. Proposed allowed operating costs for 2005 £146.1 which compares with an ESB forecast of £155.m and represents a saving of £9m in the final year. The proposals lead to savings compared with the ESB forecast, of £65.7 m in operating costs over the five year period.

To account for the timing of the implementation of the review the CER incorporated half of the forecasted operating costs submitted by ESB for the year 2001. However, the CER also assumed that ESB would have made some efficiency cuts during 2001 on the remaining operating expenditure, based on good business practice and various discussions that members of the CER have had with ESB. Any other appropriate adjustments required will be made at the end of the regulatory period.

The CER has converted submissions made by ESB to 2000 prices based on the following inflation rates of:

### Inflation Rates

2.41%	1997-98
1.64%	1998-99
6.8%	1999-2000 and
3.5%	The annual inflation rate assumed by CER for subsequent years.

This conversion to Year 2000 prices is only to enable comparison on a common basis as CPI-X regulation will be based on actual CPI inflation rates. The assumed future rates of inflation are also used as the basis for indexing the asset base for calculation of depreciation and return.

In examining operating costs the CER benchmarked ESB Distribution against a range of international comparators, normalising for differences between comparators, and has proposed efficiency savings equating to 50% of the gap between ESB Distribution and the most efficient comparators by 2005.

**TABLE : CER ALLOWED OPERATING EXPENDITURE**

Description	Allowed (2000 Prices)				
	2001	2002	2003	2004	2005
	£m	£m	£m	£m	£m
Network repairs and maintenance	65.6	63.1	60.3	58.6	60.1
Non capitalised planning & construction	8.7	8.6	8.4	8.2	8.1
System control	4.9	4.8	4.7	4.6	4.5
Customer meter operation	13.8	13.6	13.3	13.0	12.8
MRS setup costs - depreciation & other	0.6	1.8	3.0	3.6	3.6
MRS operating costs	0.4	1.0	1.6	2.2	2.9
Advertising and marketing	1.6	1.6	1.6	1.6	1.6
Customer records, service & billing	8.0	7.8	7.7	7.5	7.4
Revenue collection	0.3	0.3	0.3	0.3	0.3
Corporate overheads and administration	10.2	10.0	9.8	9.6	9.4
Rates and commercial costs	19.9	20.1	20.4	20.7	21.0
Insurance	3.8	3.8	3.8	3.8	3.8
Other	(1.1)	0.8	(0.2)	1.3	2.0
Profile Metering	0.3	0.4	0.4	0.5	0.5
Non-repayable line diversions	14.6	13.6	13.4	13.5	13.7
Network dismantling	7.5	8.6	9.7	10.4	10.2
<b>Total operating costs</b>	<b>159.1</b>	<b>159.9</b>	<b>158.2</b>	<b>159.4</b>	<b>159.1</b>
VSS adjustment	0.08	1.54	2.91	5.41	6.16
Adjustment for 2001 forecast operating cost	8.66				
Total operating costs including vss cashflows and non-network depreciation	<b>167.9</b>	<b>161.4</b>	<b>161.1</b>	<b>164.8</b>	<b>165.3</b>
Allowed non-network depreciation	<b>15.9</b>	<b>18.7</b>	<b>20.4</b>	<b>21.0</b>	<b>20.4</b>
<b>Total operating costs excluding network &amp; non network depreciation</b>	<b>152.0</b>	<b>142.7</b>	<b>140.7</b>	<b>143.8</b>	<b>147.7</b>

**NOTE:** The table includes the depreciation of non-network capital expenditure. Therefore the figures are not precisely comparable with those shown in the allowed revenues.

#### 4.1. THE CER Determination on Individual Operating Costs

**Non Trading Rechargeable (NTR) Costs** which are recoverable by ESB, should be excluded from the allowed operating costs. Non-trading rechargeable costs were reported to be £6.3m in 1999 and are forecast by ESB to rise to £7.2m in 2005, at 2000 prices.

**Profile Metering:** The cost of installing and operating profile metering for all customers with capacity above 100kVa has been included in allowed revenues.

**Note:** It should be noted that the installation of pre-payment meters is regarded as a supply revenue collection activity and excluded from Distribution metering costs.

The share of business rates borne by the distribution business is reviewed annually to take account of changes in the relative asset values of ESB's businesses so that rates are allocated between businesses on the same basis on which they are set for ESB as a whole. Network business rates are allowed at outturn cost on a year-by-year basis.

#### **Dismantling Costs:**

These are allowed at a pre-determined proportion of network reinforcement and non-load related investment as a whole as opposed to a proportion of the network renewal programme. The proportion of 5.3% will be adjusted for outturn of the associated capital investment on an annual basis to avoid windfall losses and gains which are not associated with efficiency. Efficiency improvements in the capital programme will be reflected in dismantling costs.

### **Non-repayable diversions**

These are allowed at a pre-determined proportion of gross new business investment (17%) and adjusted for outturn of the associated capital investment on an annual basis to avoid windfall losses and gains which are not associated with efficiency. Efficiency improvements in the capital programme will be reflected in diversion costs.

### **4.2. Controllable Costs**

The costs considered above are either not yet fully identified, non controllable by ESB, or dependent on the capital investment programme. Other costs are more controllable including the day to day operating costs of the distribution business.

It is noted that controllable costs are contained at around current levels in ESB forecasts. However overheads charges included in these costs increase by £8.5m over the period mainly due to non-network capital expenditure depreciation.

The CER believes that controllable costs referred to are suitable for application of incentives. In general it is estimated that a 2% reduction in the main areas of controllable costs is achievable with sufficient margin for ESB to be incentivised to reduce costs below that level.

### **Repairs and maintenance**

ESB indicated a backlog in substation maintenance, hazard maintenance and tree cutting which results in a step change in their forecast for the first year 2001 which the CER has allowed.

Tree cutting cost has increased to £10m per year and should be contained at this level throughout the period.

It is considered that a 2% reduction in fault costs should be available due to the tree-cutting programme.

The CER has decided that recurring storm damage costs of £2m per year, subject to 2% efficiency improvements are allowed in network repairs and maintenance costs.

### **Non Capitalised planning and construction**

There are greater opportunities for cost reductions in support costs and these are assumed to reduce at 2% per annum from the 2000 outturn of £8.9m.

### **System control**

ESB is in the process of introducing new technology into the control centre with a new operation management system. Such systems are normally self-financing as they allow control centre rationalisation. ESB appears to have the opportunity for cost reduction in this area, including centralising control and despatch operations and reductions in staff and facilities. Control costs are assumed to reduce at 2% per year from the 2000 outturn of £5m.

### **Customer Records Service and Billing**

Allowed customer service costs are included at £8.1m in 2000 with 2% per annum efficiency savings which are considered to be available from the new customer service arrangements and IT systems.

CER

## **Metering Costs**

Meter reading costs have been reduced at 2% per year from the 2000 outturn of £14.1m due to changes to less frequent meter reading periods and use of telephone systems and the proposed transform initiatives. Savings are therefore considered to more than offset the increase in customer numbers.

## **Other**

Wayleaves, forestry, insurance and “other” costs are retained at year 2000 levels, as there are few overheads and more limited scope for cost savings.

## **4.3. Corporate Overheads and Administration**

The CER has based allocation of corporate overheads and administration costs between businesses on turnover, profit, employees and assets in equal proportion. This methodology reduces the distribution business share of corporate costs from £14.7m to about £10.2m (excluding corporate affairs) Distribution assets are expected to fall in relation to ESB total assets. Therefore distribution’s share will therefore be expected to fall over the review period.

Corporate affairs expenditure mainly relates to corporate branding. Such expenditure is inappropriate for the distribution business. However £1 per customer is proposed as a reasonable expenditure on customer relations within the distribution business.

Corporate costs are therefore included at £10.2m in 2001 with a reduction of 2% per year thereafter taking into account changes in reallocation and the need to reduce corporate overheads to closer to benchmarked costs.

## **4.4. Allocation of Costs between distribution and supply**

The CER has fixed the allocation of distribution and supply costs as summarised below and determined that all metering remains a distribution activity, except for prepayment metering installation which will be charged to suppliers based on published charges.

From 2000 and for the forecast period ESB will allocate costs between distribution and supply as follows:

Meter operation and meter reading	100% distribution
Meter security	100% distribution
Prepayment meter installation	100% supply
Updating customer records	50% distribution and 50% supply
Duos billing	100% distribution
Billing end users	100% supply
Arrangements for payment	100% supply
Disconnection and reconnection	100% supply
Bad debts	100% supply
Call centre	Number of calls
Advertising and marketing	Virtually all supply

There are still a number of activities where distribution and supply are integrated. These are being reviewed by the CER.

#### **4.5. Transform Programme**

Details of the various costs are outlined in the CER Consultation Paper, Distribution Price Review Proposals, CER 0186/July

##### **Transform Cost Benefit Assessment**

ESB provided details of the VSS terms, having an average pay back period of five years. It is noted that although the average payback period is 5 years the payback period for staff in the 55 year old bracket is 6 years. With a five year payback the VSS project is £11m cash negative after five years. From the cost-benefit provided, it appears that ESB has not taken into account the cost of replacement services where it plans for services to be outsourced by contracted out meter reading. There is no cost benefit from releasing staff who would normally be expected to retire within the payback period. However ESB has indicated that it is unusual for staff to retire early. It is also noted that ESB and Eirgrid are anticipating recruiting staff for new responsibilities associated with market opening. There is therefore a weak economic case for the VSS package proposed taken in totality

The CER has made no allowance in respect of VSS payments. However, identified costs and benefits have been added back to ESB's proposed expenditure. This provides the appropriate incentive to engage in VSS if it is prudent and economic for the company to do so.

##### **Transform Information Systems**

ESB has provided information on the £64.2m (£58m at 2000 prices) of IT projects included in the transform programme.

The CER considers that ESB is able to justify only half the total IT costs for the transform project from £58m at 2000 prices to about £29m. The CER has allowed total IT costs of £7.5m per year at 2000 prices. However individual proposals must be approved by the CER to ensure that the systems are compatible with the requirements for separation of ESB's businesses.

#### **4.6. Proposed allowed non-network capital investment**

Non-network capital expenditure and associated depreciation is considered to be a controllable cost. ESB's depreciation rates for different types of non-network assets range from 5 years for IT systems, tools and office systems, 7 years for transport and between 5 and 30 years for telecoms investments, 50 years for premises and 10 years for fixtures and fittings. ESB has also indicated that building refurbishment costs are depreciated over 10 years. These depreciation rates are considered appropriate to the expected lives.

##### **Market Start-up Costs**

In recognition of the changing structure of the market ESB proposed changes to some of its systems, processes and procedures in relation to the collection and provision of data and other related areas. ESB proposed a total of £21m of operating costs at 2000 prices associated with new requirements from 2001 to 2005. These operating costs include depreciation on some £27.25m of the non-network capital expenditure proposed by ESB.

The CER has taken a prudent view of market start-up expenditure and proposes that capital costs are allowed at £18m of capital expenditure for pricing purposes but subject to separate consideration by the CER and adjusted to reflect the outcome of those considerations.

## CER

The CER has allowed market start-up operating costs and are included in line with ESB forecasts for pricing purposes but subject to separate consideration by the CER and adjusted to reflect the outcome of those considerations.

### **Separation of Businesses**

It is proposed to exclude the ESB forecast for separation of distribution and supply call centres at a cost of £5m in 2005 at 2000 prices, which are subject to the CER ring-fencing requirements.

### **Premises, Vehicles and Telecoms Systems**

ESB has reduced its original proposals for investment in premises from £24m to about £4m.

Fixtures and fittings are also reduced to historic levels of £0.2m per year from an ESB forecast of around £1m per year.

The CER anticipate that the requirement for vehicles will reduce by about £3.4m over the period due to greater use of contractors, further metering outsourcing and logistics and other efficiency savings.

“Other” non-network capital expenditure forecast includes about £1.7m per year on office equipment. “Other” also includes provision for a replacement telecom system in 2004 to 2005. This system appears to be dependent on technology maturing and finding other partners to share costs. The benefits of operating private telecommunications systems in the future is questioned and should be tested by a cost benefit analysis which would reduce costs in other areas.

The CER has not allowed the expenditure in telecom systems in 2004. ESB may however bring forward proposals for replacement or alternative means of provision at the appropriate time.

The CER has allowed £117.8m of non-network investment compared with an ESB forecast of £184.1m. This represents a saving of £66.3m.

## **5. CAPITAL EXPENDITURE**

The treatment of capital expenditure provides clear incentives for efficient investment and the maintenance of quality standards by;

- relying on the price control formula to provide incentives for efficiency for future investments.
- Examining (in future) whether differences between actual and forecast expenditures were due to unanticipated variations in prices or volumes, changes in quality of service, or efficiency gains. Forecast investment from the previous price controls, adjusted for these factors, will be included in the calculation of the opening asset balance for the next review period. The aim is to reward true efficiency savings while penalising any deterioration in service quality.

### **5.1. The Treatment of Customer Contributions**

The CER considered ESB's proposal and believe there are a number of issues to consider. Firstly the purpose of the determination is to set use of system charges for the next five years. It is therefore forward looking and considers the value of the assets now and in the future.

The CER wish to set prices that are economic for the use of the distribution system over the next five years. By economic the CER means prices that would reflect the cost that would be fully recoverable in a fully contestable market, i.e. new entrant prices. The CER believes in setting prices in this way it has the advantage of:

- Providing appropriate signals for demand
- Allowing fair competition between new entrants, where such competition is practical (e.g. gas or micro generation)
- Minimising the risk of stranded assets, with any consequential effect on the cost of capital.

This approach requires assets to be valued at the value a new entrant would be willing to place on the remaining service potential of existing assets, rather than building new ones. This value would reflect a number of factors, including the extent to which customers would make capital contributions to the cost of building new assets, if that is what the accounting policy dictates. Therefore new entrants would exclude customer contributions from their estimate of the value of the current assets.

In addition there is also the simple factual situation to bear in mind; that customers of ESB have contributed towards connection costs and will continue to do so. It is not for the CER to now decide that ESB should be allowed a return on these customer contributions in order to offset certain statutory constraints which ESB argue it has operated under the 1927 Act.

Therefore capital contributions are disallowed from the asset base.

### **5.2. Forecast Demand and Customer Numbers**

The CER note that no account has been taken by ESB of any change in demand due to any variation in the electricity tariff resulting from the review. The CER consider ESB's demand forecast to be reasonable.

## CER

The CER is of the opinion that ESB's forecast of an increase in the rate of new housing connections is over-optimistic and therefore, for the purposes of this review, we consider that a revised projection would be appropriate in which the net increase in farm, rural and domestic customers is constant at about 50,000 per year. This rate corresponds to a reduction of about 38,000 in the number of net farm, rural and domestic customers for 2005 from that forecast. The corresponding increase in gross numbers of customers would therefore be about 300,000 domestic customers and 20,000 non-domestic customers.

**Note:** The CER would like to point out that the revenue formula will provide for adjustments to be made should customer connections vary from those forecast, therefore any changes in the number of customer connected to the system will result in adjustments in allowed revenues.

The CER note that capital contributions currently recover 40% of the connection cost. The CER has decided to moderate this allowance uniformly over 10 years at the end of which the customer contributions would correspond to 50 percent of the new business. This is in line with ESB's proposals to have all MV and LV networks refurbished by 2010 and will result in customer contributions corresponding to 45% of new business by 2005.

### 5.3. Reinforcement Expenditure

The replacement of MV/LV transformers and upgrading of LV feeders is part of the Network Renewal Project (NRP) and for the purposes of the Distribution Price Control submission has been classified as non-load related expenditure.

ESB propose to undertake refurbishment of the rural medium and low voltage networks. This involves significant maintenance coupled with changes in the operating voltage of the medium voltage system from 10kV to 20kV. This has the added advantage of doubling the load carrying capabilities of the medium voltage network converted and reducing the associated network losses by 75%. ESB propose to refurbish 42% of these networks over the period of the review in addition to the 16% already completed at the end of 2000. In addition 34% of the medium voltage network will be converted to 20kV. Through this refurbishment ESB are proposing to improve the system performance with respect to reduction in losses, improved continuity, reduce the number of voltage complaints and provide additional network capacity. This is a significant program forming 35% of the proposed allowed reinforcement capital expenditure and 65% of the non-load related capital expenditure which is discussed later.

The main increases in load-related expenditure relate to the conversion of the rural MV network to 20KV and to 110kV reinforcements. It is observed that the requirement for 110KV substations and circuits increases in rural areas due to the conversion to 20kV while that of the 38kV network reduces.

The CER believes this expenditure to be adequate and necessary to provide acceptable levels of customer service in future. The CER expects that such refurbishment should be carried out, and in the eventuality that less than 85% of the Capex allowed in a particular year is not going to be spent, then an explanation as to why such reinforcement expenditure has not been carried should be reported to the CER.

In the event that during the five year period it becomes apparent that ESB-distribution are failing to carry out their allowed capital expenditure programme, the CER will consider appropriate claw-back to revise the allowed revenues to ESB In particular the CER believe that the allowed capital program for the network reinforcement should be completed.

#### 5.4. Continuity of Supply.

The CER has included incentives (penalties) in the price control formula to improve continuity targets. The CER acknowledges that the effects of severe weather can cause wide variations in the level of CML in any one year. The CER has decided to exclude days for the reported CML's incurred that are more than two standard deviations from the mean. This will exclude effects such as storms.

The CER also expect an annual report on continuity which is both robust and auditable. The incentive and penalty regime shall be based on these figures.

An evaluation of the proposed measures and costs as attributed by ESB shows a benefit to cost ratio of about 1.1 and that the annual cost per customer would £6. Whilst the cost to benefit ratio would provide a favourable indication of the proposed measures, the cost per customer may be regarded as high<sup>2</sup>. The corresponding value of energy saved is about £4 per kWh.

THE CER has decided that forecast expenditure on improving continuity performance should be allowed but against more stringent targets for 2005, namely:

- urban CML = 50 minutes
- rural CML = 350 minutes
- overall CML = 275 minutes

The CER considers this is reasonable in line with the capex allowed and believe that the target is modest and allows incentives to improve upon these targets.

The forecast expenditure on improving voltage quality has been allowed but voltage complaints should be reduced to at least half present levels by 2005.

ESB will be required to report annually on its continuity performance in a form to be agreed with the CER. ESB will be required to build up a comprehensive fault and interruption reporting database of both system performance indices and plant and equipment fault rates and repair times. The present system of collecting continuity data has not been reviewed in detail. The ESB will be required to develop continuity performance management systems appropriate to each class of customer in future. The CER will address this issue with ESB Distribution under its licence requirements.

The CER has included incentives (penalties) for over (under) achievement, noting that this would require the reporting of continuity performance to be robust.

---

<sup>2</sup> In Great Britain Ofgem has allowed £2.9 per customer per annum for improvements in continuity and in Victoria, Australia, the Office of the Regulator-General has allowed £7.2 for the same purpose.

**PROPOSED ALLOWED CAPITAL EXPENDITURE (£m YEAR 2000 Prices)**

<b>Categories</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2001 to 2005</b>
<b><u>LOAD RELATED EXPENDITURE</u></b>						
New Business	86	80	79	80	80	405
Reinforcements	85	94	89	95	94	457
Generation Connections	2	2	2	2	2	10
<b>Sub-total Load Related</b>	<b>172</b>	<b>176</b>	<b>170</b>	<b>176</b>	<b>176</b>	<b>872</b>
<b><u>NON-LOAD RELATED EXPENDITURE</u></b>						
Replacement:	34	51	80	92	90	347
Other (inc. Quality of supply)	13	12	9	8	8	50
Sub-total Non-Load Related	47	63	89	101	98	397
<b>Sub-total Load and Non-load related expenditure</b>	<b>229</b>	<b>243</b>	<b>263</b>	<b>277</b>	<b>275</b>	<b>1269</b>
Load and Non-load related expenditure - resource limit	219	250	267	298	301	1335
Non-Network	27	27	24	20	20	118
<b>Total Capex before Contributions &amp; Grants(gross)</b>	<b>256</b>	<b>270</b>	<b>286</b>	<b>298</b>	<b>295</b>	<b>1387</b>
Customer Contributions	-34	-33	-34	-35	-36	-172
Capital Grants	-2	0	0	0	0	-2
<b>Total Capex Net of Contributions &amp; Grants</b>	<b>210</b>	<b>233</b>	<b>249</b>	<b>261</b>	<b>258</b>	<b>1213</b>
Total Capex Net of Contributions & Grants less Non-Network expenditure	184	206	225	242	238	1095
VSS adjustment	0.7	0.2	1.0	3.5	4.3	10
<b>Total Capex with vss adjustments</b>	<b>211</b>	<b>233</b>	<b>250</b>	<b>265</b>	<b>262</b>	<b>1223</b>

### 5.5. Summary CAPEX

The findings of our review of distribution capital expenditure are summarised as follows:

1. The forecast gross capital expenditure represents increases in annual average expenditure of 39% on load-related expenditure and 119% on non-load related expenditure over the previous period. Looking forward, load-related expenditure represents about 63% of total forecast gross expenditure.
2. The forecast increase in energy demand (GWh) appears reasonable and in line with GDP predictions. However the forecast increase in domestic customer numbers appears to be high at 320 000. The CER has reduced the forecast increase in domestic customers to 280 000, a reduction of about 40 000 and representing a corresponding reduction of £46 million in new business expenditure.
3. Whereas the overall load-related expenditure appears to be of an order comparable with that elsewhere when benchmarked against value per customer, the expenditure on 110kV and 38kV reinforcements (£306 million of a total of some £525 million of load-related capital expenditure) is high. From a review of overall transformer capacity, it is considered that a lower level of reinforcement expenditure of £457 million is appropriate.
4. The CER has adjusted customer contributions and capital grants together from 40 per cent of new business expenditure, rising uniformly to 50 per cent over 10 years.

## CER

5. The forecast non-load related expenditure (£347 million) appears reasonable and appropriate. The largest item is the continuing program of rural MV/LV refurbishment renewal (£254 million).
6. The CER is of the view that the work that could be achieved by the forecast resources available to the load-related and non-load related programs is overstated by the equivalent of £46 million of capital expenditure. However as the revised projection of the level of (network) capital expenditure would itself be lower than that which could be achieved from our evaluation of ESB's proposed resourcing, no additional revision has been made to distribution capital expenditure in respect of resourcing.
7. The CER project a corresponding reduction in gross capital expenditure of about £180 million over the five-year period, accounted for by reductions of £46 million in new business expenditure, £68 million in reinforcement expenditure and £66 million in non-network expenditure.
8. The CER has decided that the allowed level of gross capital expenditure for 2001 to 2005 should be reduced as follows:

<b>Item</b>	<b>Proposed allowed Capex (£m)</b>	<b>Change on forecast (£m)</b>
Total Capital Expenditure Before contributions & grants	1387	-178
Total Capital Expenditure Net of Contributions & Grants	1213	-176
Total Capital Expenditure Net of Contributions & Grants, less Non-Network expenditure	1095	-111

9. The forecast expenditure on improving continuity performance should be allowed but against more stringent targets for 2005, stated in terms of minutes lost per customer per annum (CML), namely:
  - Urban network CML = 50 minutes
  - Rural network CML = 350 minutes
  - Overall network CML = 275 minutes

The CER has included incentives (penalties) in the price control formula for exceeding continuity targets and will be requesting report of quality of supply to monitor these closely. For this ESB will be required to report annually it's continuity performance.

## 6. Cost of Capital

It is important that the allowed rate of return should encourage efficient investment in the distribution network. At the same time, it must be recognised that ESB's networks are regulated monopolies and hence subject to less commercial risk than the generation and supply businesses.

Businesses are financed by a combination of debt and equity, so a business's cost of capital is estimated as the costs of its debts plus equity, weighted to reflect the business's optimal level of gearing, and taking into account the business's tax liabilities.

The cost of capital is assessed using the weighted average cost of capital (WACC). This is considered for ESB's transmission and distribution businesses.

The CER believes that a pre-tax rate of return of 6.5% is appropriate in this context. The following discussion presents the evidence and analysis on which this decision is based.

### Relevant Investor Market

In view of the relevance of Ireland's membership of the European Monetary Union, the "euro zone" which ensures that an investor can hold stock quoted on a "euro zone" stock market without incurring exchange rate risk ESB's cost of capital has been considered with respect to the European market.

### Weighted Average Cost of Capital

The WACC (weighted average cost of capital) has been used to determine the rate of return for ESB-distribution's total capital base.

Post-tax WACC =  $g \times r_d + (1 - g) \times r_e$  where,

$g$  = gearing = (debt/ debt + equity)

$r_d$  = the post tax cost of debt; and

$r_e$  = the post tax cost of equity

### Cost of Equity

The post-tax cost of equity is the return on equities (either through dividends or through an increase in the value of shares) that is required to persuade investors to bear the risk associated with the company's equity. There are essentially two ways of calculating the cost of equity, the Capital Asset Pricing Model (CAPM) and the Dividend Growth Model (DGM). To calculate ESB's cost of equity The CER followed regulatory precedent and used the more generally accepted financial model, CAPM, to determine equity costs.

The CER considered a wide range of evidence for the ERP, including historic, semi ex-ante, and surveys, the methodology relied more heavily on US survey evidence on the basis that it was more robust. The survey suggested that the ERP is likely to lie in the range of 5-7 percent. The CER has identified 5.4 % as the most appropriate rate for ESB's distribution and transmission businesses for this regulatory review period.

### Beta estimation

The estimate of ESB Distribution's beta is based on two network operator comparators, Viridian and NGC, as well as a wider set of integrated electricity companies.

## CER

The CER consider that it is more appropriate to use long-term estimates of comparator utility betas. This is because there is insufficient evidence to suggest the recent fall in utility betas will be permanent. On this basis, the CER conclude ESB's asset beta (i.e. ungeared beta) to lie in the range of 0.4, which leads to an equity beta of 0.80, on the assumption of 50% gearing.

On the basis of the 5 year averages of the comparators, and the wider set of integrated European utility companies, the CER concludes that ESB's beta value is approximately 0.41. The CER also notes that this conclusion is consistent with the recent Ofgem decision for NGC. Given that ESB has a 50:50 gearing this implies a beta in the region of 0.80 depending on whether one uses the MM or Miller approach. As has been discussed above given the taxation situation in Ireland this provides for only minor variation. The CER has used an average of these approaches.

## Tax

Since ESB's profits are taxed, the post-tax WACC must be adjusted for corporation tax levels to derive the pre-tax WACC.

The CER considers for this review to estimate a pre-tax cost of capital, using the statutory tax wedge. This is taken to be 12.5%, which is consistent with projected corporation tax rates in Ireland.

### 6.1. The Cost of Debt

The cost of debt is the sum of the risk-free rate (the real pre-tax rate required by investors in risk-free investments) and the company-specific debt premium (the margin over the risk-free rate which reflects the credit rating of the business).

The CER used debt costs for companies with a similar mix of assets to ESB, and facing similar commercial and regulatory risks, as relevant comparators in determining the appropriate cost of debt for ESB.

The CER used a 10 year German bond yield as a proxy for the risk free rate as it has the closest maturity to the long life of utility investments.

## Gearing

On the basis of inherent industry characteristics and regulatory precedent, which both suggest a relatively high gearing ratio, balanced by the evidence of ESBs present book gearing ratio and Ireland's lower tax environment, The CER conclude that the optimal level of gearing will be approximately 50%.

## Small Company Premium

ESB included an additional *small company premium* of 0.6%. This is incorporated in the post tax return on equity. This adjustment has been omitted from CER's calculation on the basis that the arguments for its inclusion are unconvincing. Academic evidence suggests that company size might be reflecting other factors such as cash-flow measures and past sales data. These are, in any case, incorporated in the estimate of the equity beta. Even if one accepts the existence of a size variable, it would hardly seem relevant for a company of the size of ESB. Academic articles examining the size premium (predominantly based on US stock data) tend to define small stocks as the lowest tenth percentile of the market, by market capitalisation. This equates to approximately US\$60million. ESB has a (book) equity value considerably in excess of this. The CER therefore does not consider ESB to be a small company.

### Proposed Cost of Capital for Transmission and Distribution Businesses

<b>Cost of Equity</b>	
Nominal return on risk-free	4.75%
Expected Inflation	1.70%
Risk-free rate	3.05%
ERP	5.4%
Asset beta	0.41
Debt	50%
Equity	50%
Equity beta	0.80
Post-tax return on equity	7.37%
Effective tax rate	12.50%
Pre-tax return on equity	8.42%
<b>Cost of Debt</b>	
Debt premium (over risk-free)	150
Cost of Debt	4.55%
<b>WACC</b>	
Real post-tax WACC	6.0%
Real pre-tax WACC	6.5%

Arising from these conclusions the Commission is issuing today, the 28<sup>th</sup> September 2001, its determination of the allowed revenues which shall form the basis of Distribution Use of System Charges from 2001 to 2005.

Tom Reeves

Member of the Commission.

## Appendix A

$$R_t = \left\{ \left[ \prod_{2001}^t (1 + CPI) \right] * [B_t + (P_{Ct} * (FC_t - C_t)) + P_L * (FL_t - L_t) + P_{CML} * (FCML_t - CML_t)] \right\} + \Delta P_t + K_{t-1} + K_{t-2}$$

$R_t$  is the maximum level of revenues allowed in period t and the revenues on which next years tariffs are based. It is expressed in £m.

$CPI$  is the annual average CPI for that year. (Forecast figures will be used for year t and t-1)

$B_t$  is the level of allowed revenues in real 2000 prices for the distribution business in year t. It is expressed in £m as shown in Table A below.

$P_{Ct}$  is the value of revenue, which is earned by ESB Distribution for each incremental customer connected to the system. The value is shown in year 2000 real prices in Table A below.

$FC_t$  is a revised forecast number of customers connected at the end of year t. This forecast is made before the end of year t-1 when determining next years allowed revenue.

$C_t$  is the total number of customers connected to the system at the end of year t as set down in Table A, and on which approved base revenues ( $B_t$ ) were determined.

$P_L$  is the amount of revenue per GWh that the Commission will allow ESB to retain (forego) for reducing (increasing) losses compared with allowed losses. The value is shown in Table A in year 2000 prices.

$FL_t$  is the revised forecast distribution losses in year t in GWh. This forecast is made before the end of year t-1 when determining next years allowed revenue.

$L_t$  is the distribution losses in year t in GWh as set down in Table A.

$P_{CML}$  is the amount of revenue per customer minute lost that the Commission will allow ESB to retain (forego) for reducing (increasing) the number of minutes lost per customer compared with what was assumed at the time the control was set. The value is shown in Table A in year 2000 prices.

$FCML_t$  is a combination of the actual and (revised) forecast average number of minutes lost per connected customer in year t. This forecast is made before the end of year t-1 when determining next years allowed revenue.

$CML_t$  is the average number of customer minutes lost in year t as set down in Table A.

$P_t$  is the change in pass-through costs from those included in  $B_t$ , as available when setting tariffs in year t. This includes, changes in business rates, MRS costs etc... which the CER has indicated will be allowed on a pass-through basis. These costs will be expressed in Nominal values in year t.

$K_{t-1}$  is the correction factor, which ensures that prices in year t are adjusted by an amount equal to the difference between what was actually charged in year t-1 and the forecast of what should have been charged, with interest payments added on.

## CER

$K_{t-2}$  is the correction factor which, ensures that prices in year t are adjusted by an amount equal to the difference between the revenues that have already been recovered and what should have been recovered in respect of year t-2, with interest payments added on.

$$K_{t-1} = [R_{t-1} + (P_{Ct} * (RFC_t - FC_t)) + P_{Lt} * (RFL_t - FL_t) + P_{CMLt} * (RFCML_t - FCML_t) - FR_t] * (1 + I_t)$$

$R_{t-1}$  is the maximum level of revenues allowed in period t-1 on which that year's tariffs were based. It is adjusted for the differences in forecast CPI and CPI<sub>t-1</sub>. It is expressed in £m.

$P_{Ct-1}$  is the value of revenue, which is earned by ESB Distribution for each incremental customer connected to the system. The value is as shown in year 2000 real prices. These are shown in Table A below and converted into nominal values for year t.

$RFC_{t-1}$  is the revised forecast number of customers connected at the end of year t-1. This forecast is before the end of year t-2.

$FC_t$  is the forecast number of customers connected to the system at the end of year t. This forecast is made at the end of year t-2 when determining the allowed revenues for year t-1.

$P_{Lt}$  is the amount of revenue per GWh that the Commission will allow ESB to retain (forego) for reducing (increasing) losses compared with allowed losses. The value is as shown in Table A in year 2000 prices converted to nominal values in year t.

$RFL_{t-1}$  is the revised forecast distribution losses in year t-1 in GWh. This forecast is made before the end of year t-1.

$FL_{t-1}$  is the forecast distribution losses in year t-1 in GWh. This forecast is made at the end of year t-2 when determining the allowed revenues for year t-1.

$P_{CML_{t-1}}$  is the amount of revenue per customer minute lost that the Commission will allow ESB to retain (forego) for reducing (increasing) the number of minutes lost per customer. The value is as shown in Table A (in year 2000 prices) converted into nominal values in year t-1.

$RFCML_{t-1}$  is the revised forecast average number of minutes lost per connected customer in year t-1. This forecast is made before the end of year t-1.

$FCML_{t-1}$  is the forecast average number of customer minutes lost in year t. This forecast is made at the end of year t-2 when determining the allowed revenues for year t-1

$I_{t-1}$  is the annual average three month Euribor rate in year t-1 adjusted for the difference in the European annual index and the Irish annual index for that year.

$FR_{t-1}$  is the revised forecast revenue which will be recovered in year t-1. This forecast is made before the end of year t-1.

$$K_{t-2} = [R_{t-2} + P_{Ct-2} * (AC_{t-2} - RFC_{t-2}) + P_L * (AL_{t-2} - RFL_{t-2}) + P_{CML} * (ACML_{t-2} - RFCML_{t-2}) - AR_{t-2}] * (1 + I_{t-2}) * (1 + I_{t-1})$$

## CER

- $R_{t-2}$  is the maximum level of revenues allowed in period t-2 on which that year's tariffs were based. It is adjusted for the differences in forecast  $CPI_{t-2}$  and actual  $CPI_{t-2}$ . It is expressed in £m.
- $P_{Ct-2}$  is the value of revenue, which is earned by ESB Distribution for each incremental customer connected to the system. The price is shown in year 2000 real in Table A below for each relevant year.
- $AC_{t-2}$  is the actual number of customers connected at the end of year t-2.
- $RFC_{t-2}$  is the revised forecast number of customers connected to the system at the end of year t-1. This forecast is made at the end of year t-2 when amending the revenues that ought to have been allowed for year t-1.
- $P_{Lt-2}$  is the amount of revenue per GWh that the Commission will allow ESB to retain (forego) for reducing (increasing) losses compared with allowed losses. The value is as shown in Table A in year 2000 prices converted to nominal values in year t-2.
- $AL_{t-2}$  is the actual distribution losses in year t-2 in GWh.
- $RFL_{t-2}$  is the revised forecast distribution losses in year t-2 in GWh. This forecast is made at the end of year t-2 when amending the revenues that ought to have been allowed for year t-1.
- $P_{CMLt-2}$  is the amount of revenue per customer minute lost that the Commission will allow ESB to retain (forego) for reducing (increasing) the number of minutes lost per customer. The value is as shown in Table A (in year 2000 prices) converted into nominal values in year t-2.
- $RFCML_{t-2}$  is the revised forecast average number of minutes lost per connected customer in year t-2. This forecast is made before the end of year t-2.
- $ACML_{t-2}$  is the actual average number of customer minutes lost in year t-2.
- $I_{t-1}$  is the annual average three month Euribor rate in year t-1 adjusted for difference in the European index and the Irish index in that year
- $I_{t-2}$  is the average three month Euribor rate in year t-2 adjusted for difference in the European index and the Irish index in that year.
- $AR_{t-2}$  This is the actual revenue recovered in year t-2.

**Table A: Parameter Values for Revenue Control Formula**

Year	$B_t$ (£m)	$P_{Ct}$ (£)	$C_{Ft}$ (in thousands)	$L_t$ (in GWh)	$P_{Lt}$ £/GWH	$CML_t$ (in minute)	$P_{CML}$ (in £)
2000			1,630.9				
2001	359.9	£67.78	1686	1,275	30,000	400	170,000
2002	346.3	£66.59	1740	1,275	30,000	370	170,000
2003	355.0	£65.40	1794	1,275	30,000	340	170,000
2004	363.3	£64.21	1848	1,275	30,000	310	170,000
2005	371.8	£63.04	1902	1,275	30,000	275	170,000

**Note:** All monies are expressed in year 2000 prices.

$B_t$  is the level of allowed revenues in £M real 2000 prices for the distribution business.

$P_{Ct}$  is the value of revenue, which is earned by ESB Distribution for each incremental customer connected to the system. The value is shown in year 2000 real prices.

$C_{Ft}$  is the forecast total number of customers connected to the system at the end of each year, and on which base revenues were determined.

$L_t$  is the forecast distribution losses in year in GWh.

$P_L$  is the amount of revenue per GWh that the Commission will allow ESB to retain (forego) for reducing (increasing) losses compared with allowed losses. The value is shown in year 2000 prices.

$CML_t$  is the forecast average number of customer minutes lost.

$P_{CML}$  is the amount of revenue per customer minute lost that the Commission will allow ESB to retain (forego) for reducing (increasing) the number of minutes lost per customer compared with what was forecast as  $CML_t$ . The value is in year 2000 prices.