January 2001

Report on Distribution and Transmission Performance 1999/2000

1. Introduction

1.1 All licensees who operate transmission or distribution systems are required to report annually on their performance in maintaining system security, availability and quality of service. This information provides a picture of the continuity and quality of supply experienced by final customers. Information is available for each of the years since Vesting in 1990. This year's report continues to incorporate year-by-year comparisons to help identify trends in companies' performance.

1.2 The figures submitted by the companies for 1999/2000 show that, in general, the standard of supply for customers has been maintained. There are nonetheless differences between companies. Ofgem provides no guarantee as to the accuracy or validity of the information contained in this report.

1.3 There are also differences within companies. From 1995/96 companies have supplied disaggregated performance data as part of their Quality of Supply Reports. This enables customers to get a better picture of how different parts of company networks perform. As in previous years' reports, instead of single average performance figures for companies, this report contains performance data for each separate operating area within each company. Targets for performance achievement between 2000 and 2005 have been set for companies as part of the revised price controls which came into effect in April 2000. A summary table is included showing the targets together with companies performance against the targets set in the previous price control period.

1.4 The recent distribution price control review gave consideration to quality of supply issues including the way in which standards are set and data is reported. It concluded that it will be important to ensure that robust and consistent data is available from all companies. This work is continuing as part of the Information and Incentives Project (IIP). To date, the IIP has reviewed the data reported by the companies and found that there are significant differences between companies and over time both in the way that the data is accumulated and in its accuracy. In December 2000 the draft regulatory instructions and guidance, to apply to distribution businesses, which will improve the consistency and set minimum reporting accuracy requirements were published for consultation.

1.5 Arrangements will also be put in place for the first time to enable an audit of this data to be carried out on behalf of Ofgem. The IIP will also review the reporting arrangements for companies including the best way which information on network performance should be made publicly available. Further details are available via Ofgem's web site.

1.6 Each company's Quality of Supply report for 1999/2000 is publicly available. The reports give more detailed information about company targets and spending plans.

Security and Availability of Supply

1.7 This report begins with information on the overall security and availability of supply, measured in terms of the number of interruptions and supply minutes lost experienced by customers connected to the distribution systems of the fourteen distribution companies. Information is also given on the quality of service, in terms of restoration times achieved, provided by these companies.

1.8 The quality of supply experienced by customers is influenced by the performance of all stages of electricity supply: generation, transmission and distribution. However, the number of supply failures caused by failure or lack of generation has usually been extremely small, and the contribution from transmission system failures has also been minor. Distribution systems are by far the most significant determinant of the quality of supply experienced by final customers.

Distribution Systems

1.9 The numbers of interruptions on each company's distribution system in 1999/2000 are examined and compared. The performance of the High Voltage (HV) network is particularly significant. Further analysis shows how this performance varies for the overhead and underground HV networks for each company.

Transmission Systems

1.10 There are three transmission licensees in Great Britain - the National Grid Company (NGC) in England and Wales and the two Scottish companies, ScottishPower and Scottish and Southern Energy. Transmission systems transport large amounts of energy and are normally designed to continue to provide supply in the event of single or even multiple circuit failures.

1.11 The number of incidents that result in a loss of supply to final customers is extremely small. Information is given for 1999/2000 and this is compared with previous performance for NGC and the two Scottish companies. The average energy that would have been supplied without such outages is also given.

1.12 One measure of the performance of a transmission system is the percentage of the time during which the system is not available for use. System unavailability is shown for the three transmission systems and for the three interconnectors.

1.13 Transmission companies have been asked to provide a classification of the causes of transmission system unavailability. These causes are system maintenance, system construction, connection of users and system faults.

Standards of Supply Quality

1.14 It is a statutory requirement on the transmission and distribution companies to keep voltage and frequency within prescribed limits, in all but exceptional circumstances. Transmission system operators reported on incidents which caused excursions outside the prescribed limits for both frequency and voltage. Distribution system operators provided details of complaints by customers who were receiving voltage outside statutory limits. In these instances, companies need to consider whether local reinforcement of the distribution system or other measures may be needed.

Analysis

1.15 The figures supplied give an overview of system performance in 1999/2000. Statistics extracted from companies' figures have been used to provide diagrammatic comparisons of performance. Figures 1 to 15, and 25, relate to security and availability experienced by customers, and the factors affecting

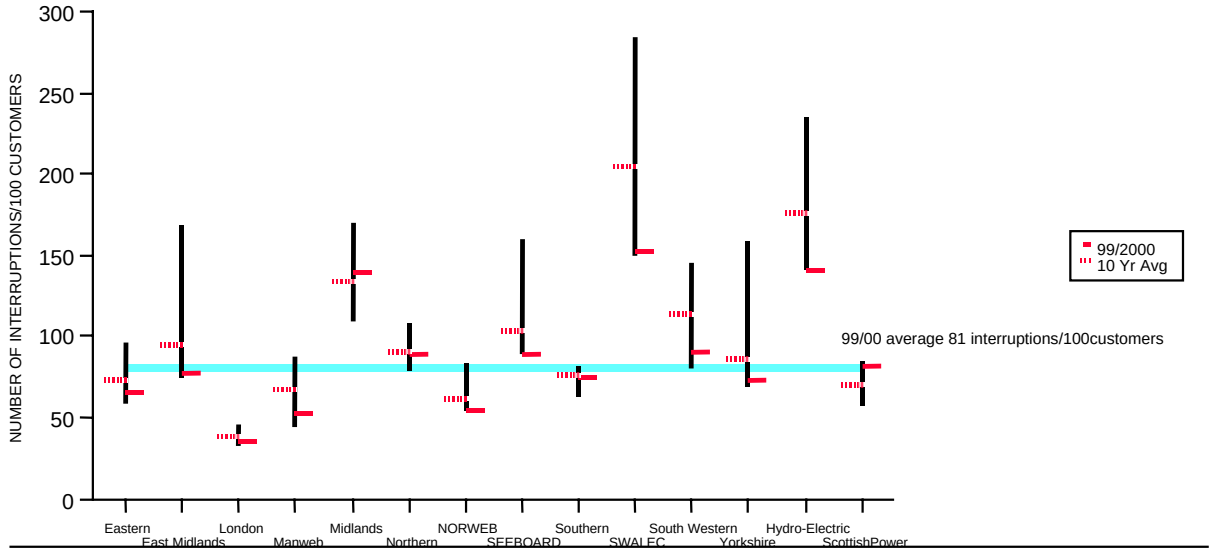
these aspects of performance. Figures 16 to 24 show transmission system performance.

1.16 The format chosen for many of the graphs is similar to that used previously. The 10 year average and 1999/2000 results for each company are shown as horizontal bars. Vertical bars indicate ranges, either highs and lows of performance in the last 10 years, or the different performances of different operational units within each company.

2. Security

SECURITY - Supply Interruptions per 100 connected Customers – Figure 1

Vertical line indicates range over 10 years



Security (Figure 1)

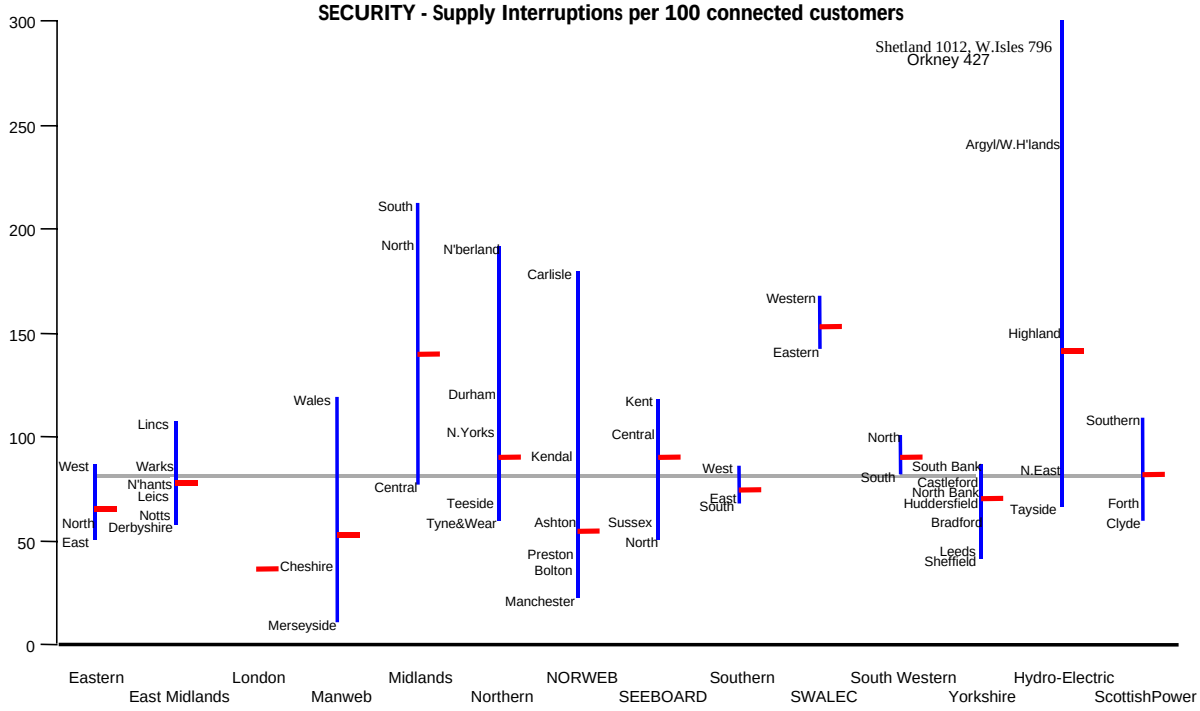
2.1 Figure 1 presents data on interruptions of supply. For each company, the figure shows the number of supply interruptions per 100 customers in 1999/2000, the average for the last 10 years and the range of annual figures over the last 10 years.

2.2 The data covers all interruptions, including those caused by bad weather, faults and pre-arranged shutdowns for maintenance and construction.

2.3 For 12 companies, the number of interruptions in 1999/2000 was lower than their 10 year average. SWALEC, Midlands and Hydro-Electric continue to have the highest proportion of supply interruptions. London, Manweb, and Norweb have the lowest. Hydro-Electric and Norweb reported figures which are equal to or better than those of the last nine years. As in previous years, some companies (South Western and ScottishPower) submitted additional data which excluded the effects of particular periods of bad weather. These are not significantly different from the figures shown in Figure 1. Manweb said that its new fault reporting systems have led to an increase of up to 12% in this year's figures.

2.4 The broad horizontal band shows the average for all companies for 1999/2000 (81 interruptions per 100 customers). This is slightly worse than the average of 78 interruptions per 100 customers in 1998/99.

Disaggregated company results 1999/2000 – Figure 2

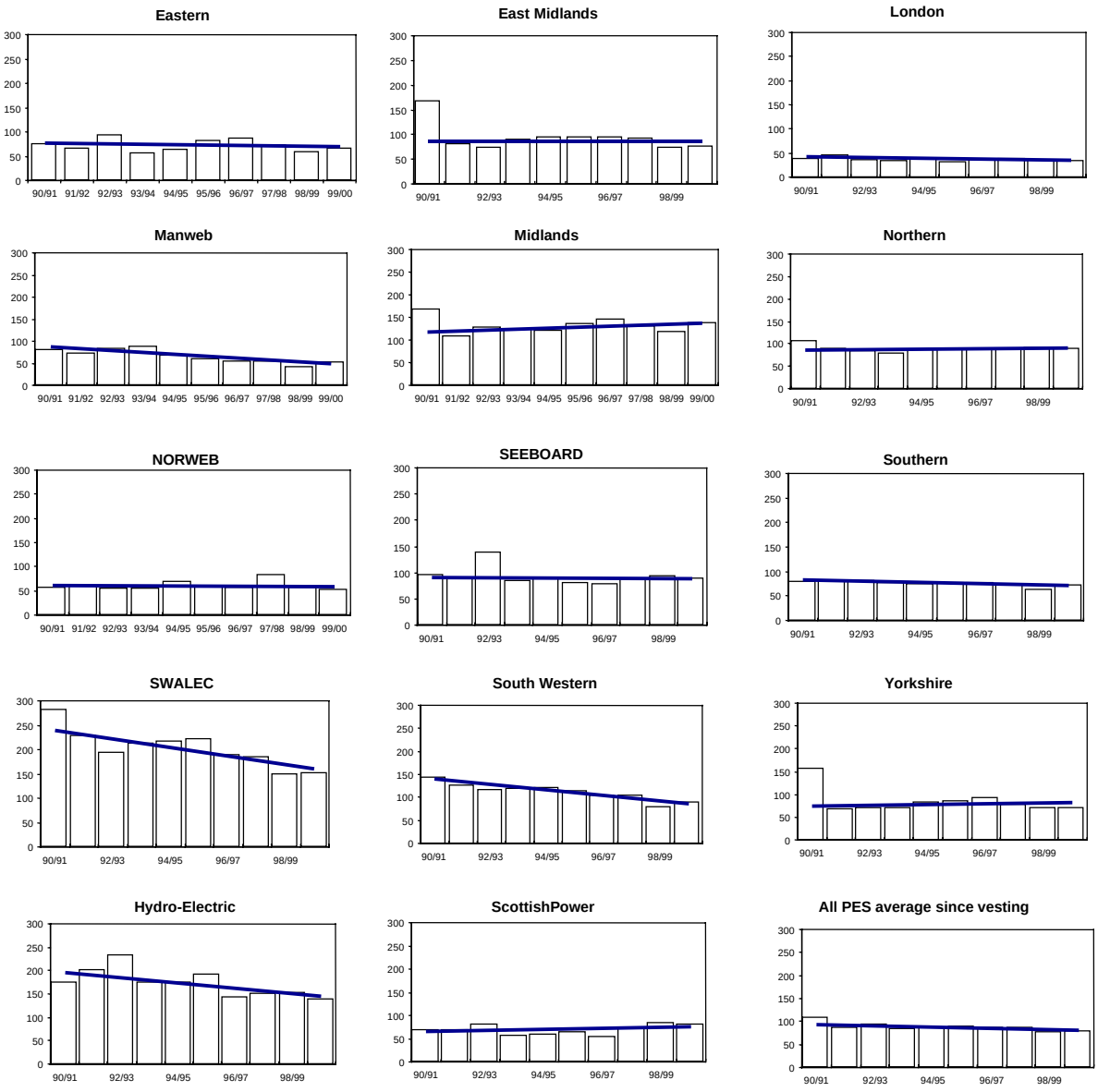


Security Disaggregated by Company Organisation Unit (Figure 2)

2.5 Companies provided security data broken down by company operating units. All companies except London have more than one operating unit, varying between two for SWALEC and South Western and seven for Hydro-Electric and Yorkshire.

2.6 Customers can experience varying performance depending on where they are in a company's area. The management units which exhibit the best performance tend to be those which include a larger proportion of urban territory. As in last year's report, Merseyside region (MANWEB) shows the lowest number of interruptions (10.9 per 100 customers) for 1999/2000. Various regions of Midlands, Northern and Hydro-Electric show the highest numbers.

2.7 The horizontal band shows the average for all companies in 1999/2000 (81 interruptions per 100 customers).



Security Trends (Figure 3)

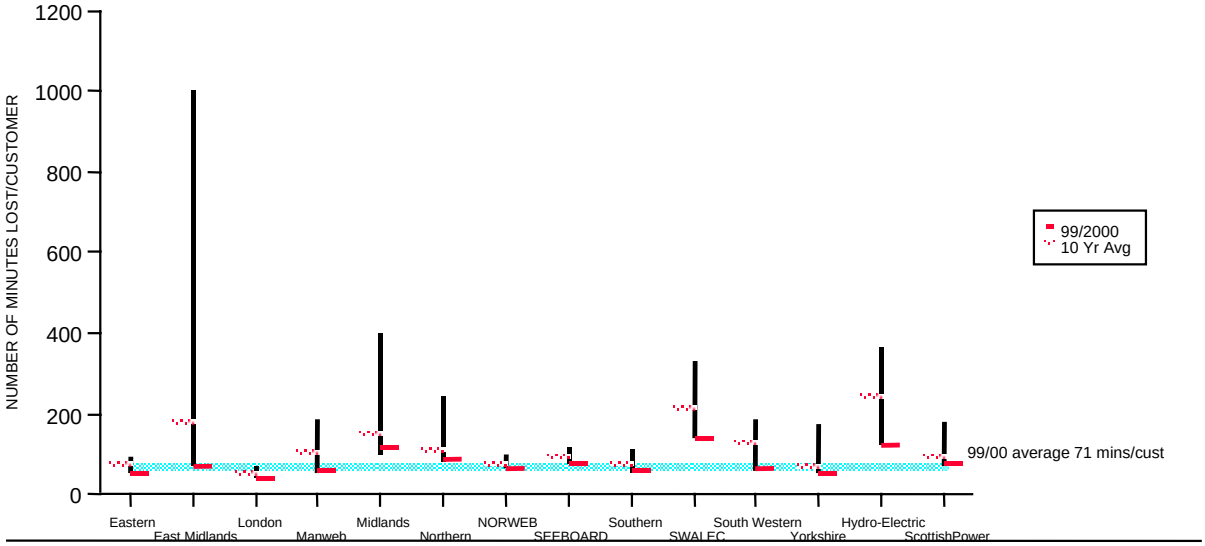
2.8 Figure 3 shows the security of supply as measured by the number of interruptions per 100 customers served by each distribution company in the ten years since Vesting. In 1999/2000 six companies had a better performance than in 1998/99.

2.9 These graphs include a straight line which shows the trend in performance over the ten years since Vesting. The trend analysis for a company excludes years where the company's performance was affected by extreme weather. Five companies show an improving trend while the others show no improvement or a slight worsening in performance.

3. Availability

AVAILABILITY - Minutes Lost per connected Customer – Figure 4

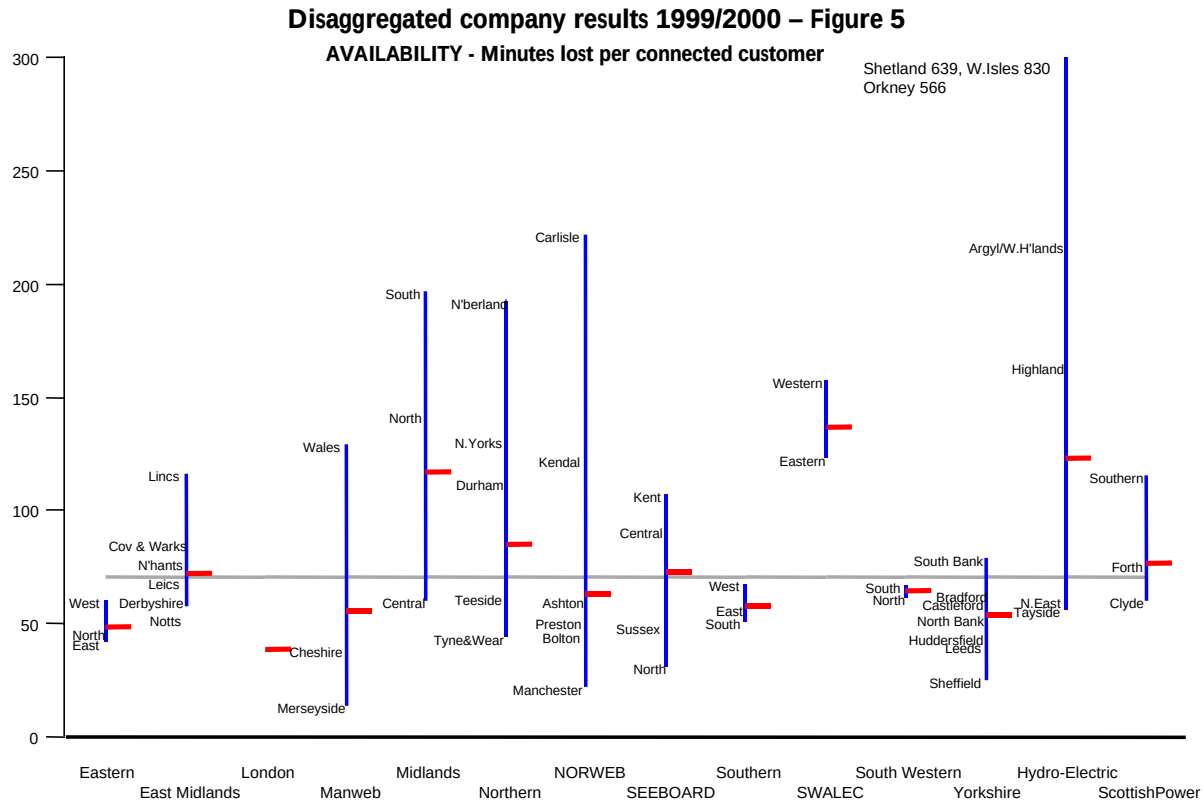
Vertical line indicates range over 10 years



Availability (Figure 4)

3.1 Figure 4 displays for each company the average number of minutes off-supply experienced by its customers. The figures for 1999/2000 range between 39 (London) and 137 minutes (Swalec). All companies reported figures which were better than their 10 year average result. Five companies recorded their best results for 10 years. As with Security, Manweb said that new fault reporting systems have led to an increase of up to 12% in this years figures.

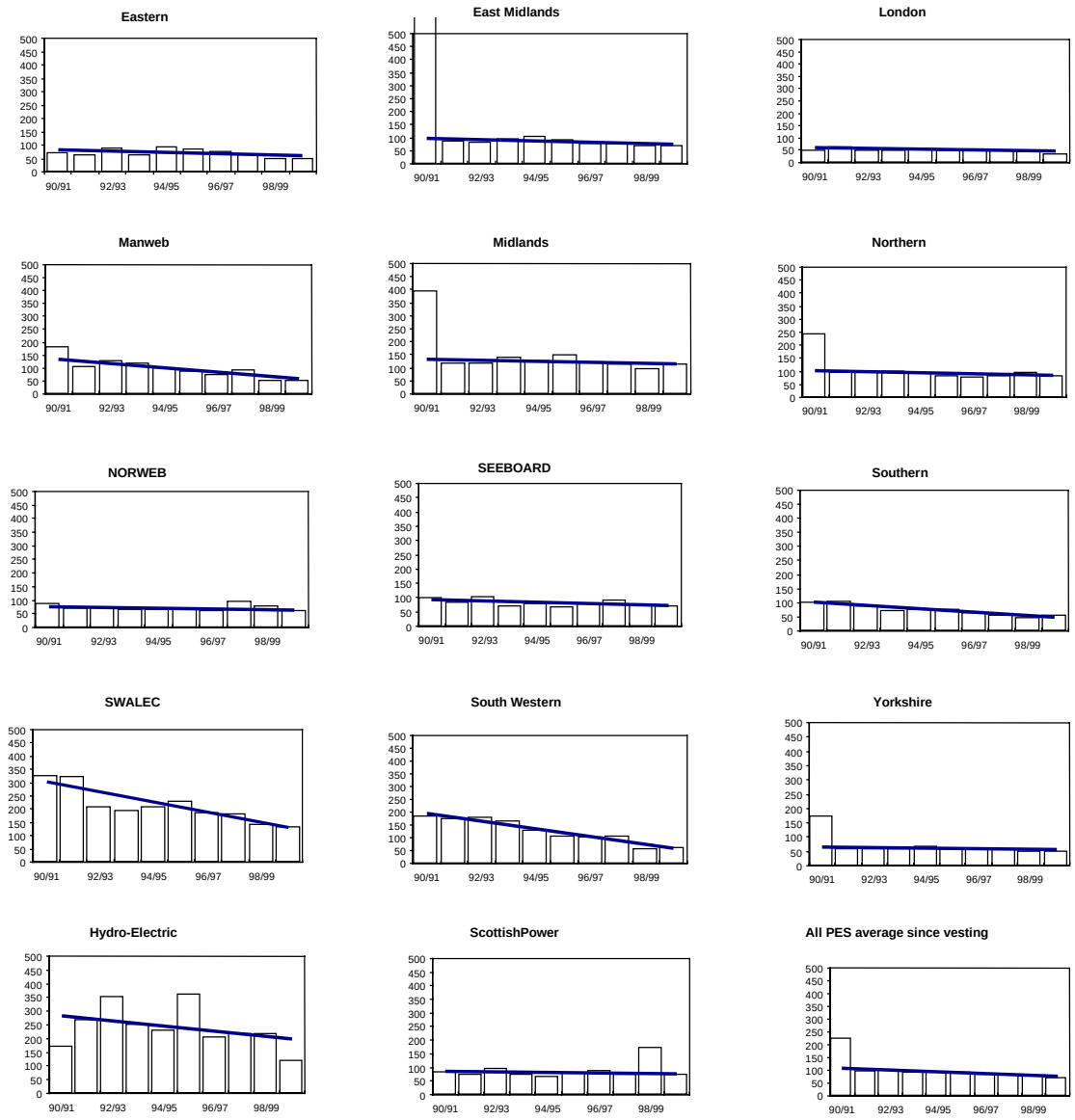
3.2 The broad horizontal band shows the 1999/2000 average for all companies, this was 71 minutes per customer, significantly lower than the average of 81 minutes per customer in 1998/99.



Availability Disaggregated by Company Organisation Unit (Figure 5)

3.3 As for security, companies provided availability data for each of their operating units expressed in minutes lost per connected customer. Restoration of supplies in remote areas and those with low population density can sometimes be delayed by difficult terrain and longer distances between company depots and customers. Some companies say they are targeting this by investing in network automation and remote control; details can be found in their Quality of Supply Reports.

3.4 The horizontal band shows the 1999/2000 average for all companies (71 minutes per customer).



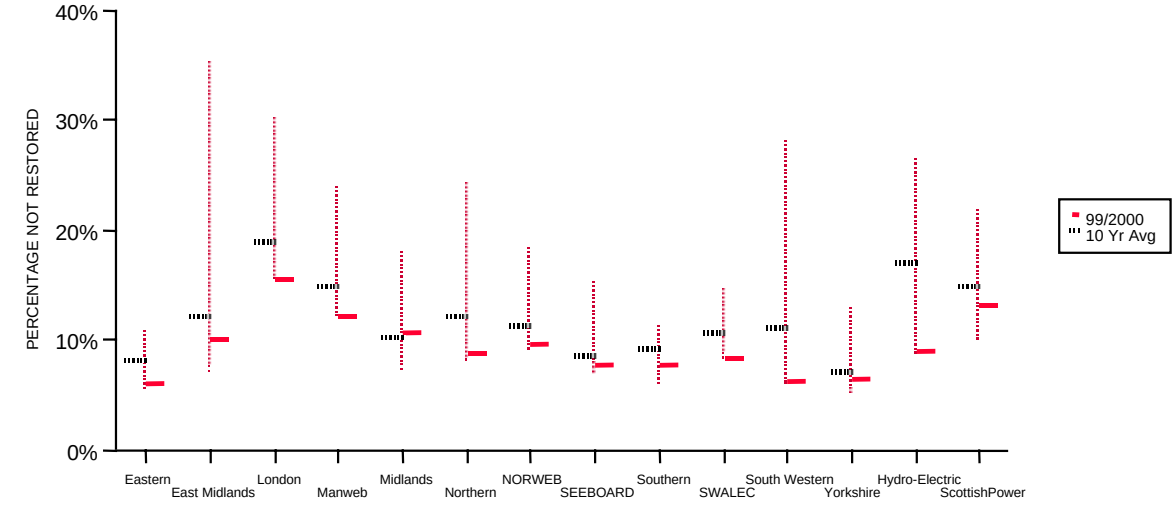
Availability Trends (Figure 6)

3.5 Figure 6 shows the average number of minutes off-supply per customer served by each distribution company in the ten years since Vesting. London have the lowest minutes lost per customer and Swalec and Hydro-Electric the highest. Seven companies performed better in 1999/2000 than in 1998/99.

3.6 As with Security trends shown above, the underlying trends are represented by the straight line on each graph which excludes severe weather effects. All companies show an improving trend in availability performance in the ten years since Vesting.

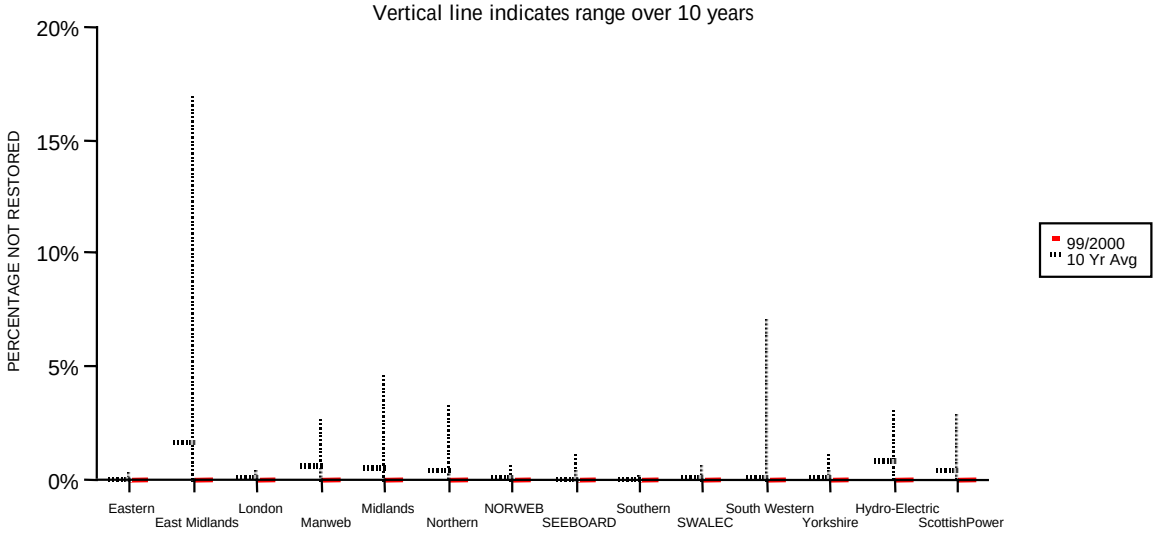
RESTORATION OF SUPPLY - Percentage of Interruptions Not Restored within 3 hours - Figure 7

Vertical line indicates range over 10 years



RESTORATION OF SUPPLY - Percentage of Interruptions Not Restored within 24 hours – Figure 8

Vertical line indicates range over 10 years



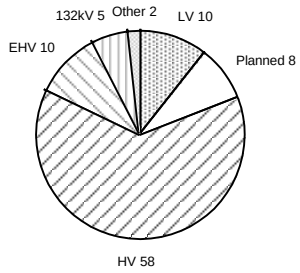
Restoration of Supply (Figures 7 and 8)

3.7 Figures 7 and 8 show the companies' performance in restoring interruptions to supply within three hours and 24 hours. All companies except Midlands performed better than their 10 year average figure for three hour restorations. Five companies achieved their best performance figures in the last 10 years. Overall, 91% of interruptions were restored within 3 hours.

3.8 Virtually all interruptions (over 99%) were restored within 24 hours, as shown in Figure 8. Hydro-Electric achieved its best performance figure for the last 10 years.

Security 1990/2000 – Figure 9

Number and sources of supply interruptions per 100 customers

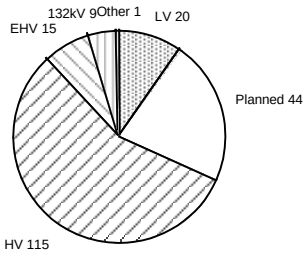


Average of 93 interruptions per 100 customers

Note: "Other" includes generation and transmission

Availability 1990/2000 – Figure 10

Number and sources of minutes lost per customer



Average of 205 minutes per connected customer

Note: "Other" includes generation and transmission

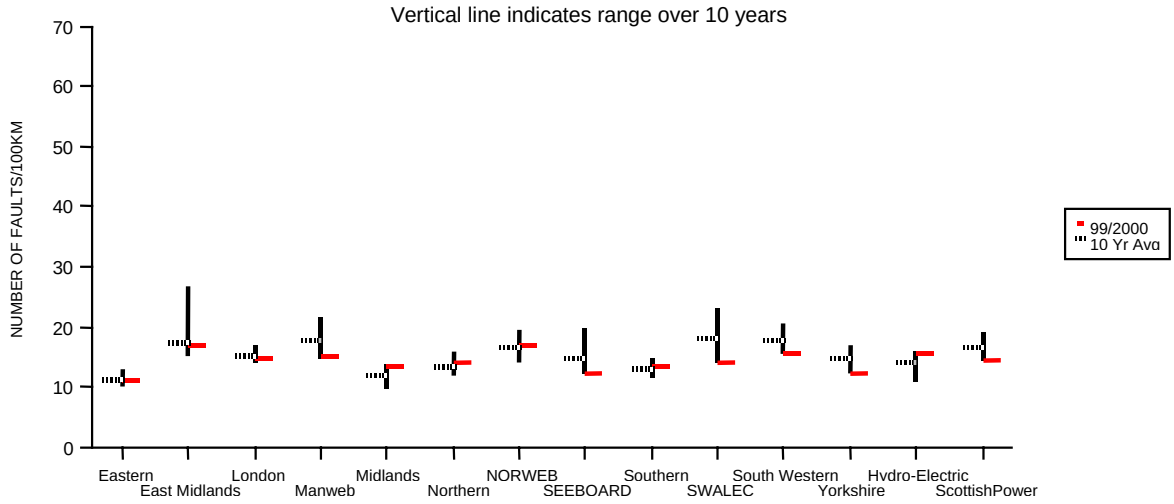
Number and Sources of Interruptions and Minutes Lost (Figures 9 and 10)

3.9 Figures 9 and 10 show the contribution to the average number of supply interruptions and overall minutes lost per customer of lack of availability of different parts of the supply system. Generation shortfalls and transmission system failures are included in these figures – together they account for only about one per cent of the shortfalls experienced by customers. These charts are based on the average figures for the last 10 years, for all companies. They demonstrate the crucial role of the distribution system, particularly the HV (generally 11kV) distribution system, in the security and availability of supply experienced by customers. Almost all planned interruptions to supplies occur due to work on the LV and HV networks. These results are not significantly different from previous years.

3.10 The HV system has a large impact on overall system performance because much of it does not have duplicate or alternative supplies and each fault can affect a large number of customers. In general, the higher voltage systems (EHV, 132kV and transmission systems) have duplicate supplies so that most faults at these voltages do not result in an interruption of supply to customers. Each LV fault does not affect as many customers as those at HV. Improvements in the control and operation of HV systems, to reduce the number and duration of circuit outages due to planned work and faults, could bring significant improvements in overall levels of performance. Some companies have reported initiatives in these areas in their Quality of Supply Reports.

Overall Distribution Systems Performance

OVERALL RELIABILITY - Number of Faults per 100km of Distribution System (Mains only) – Figure 11

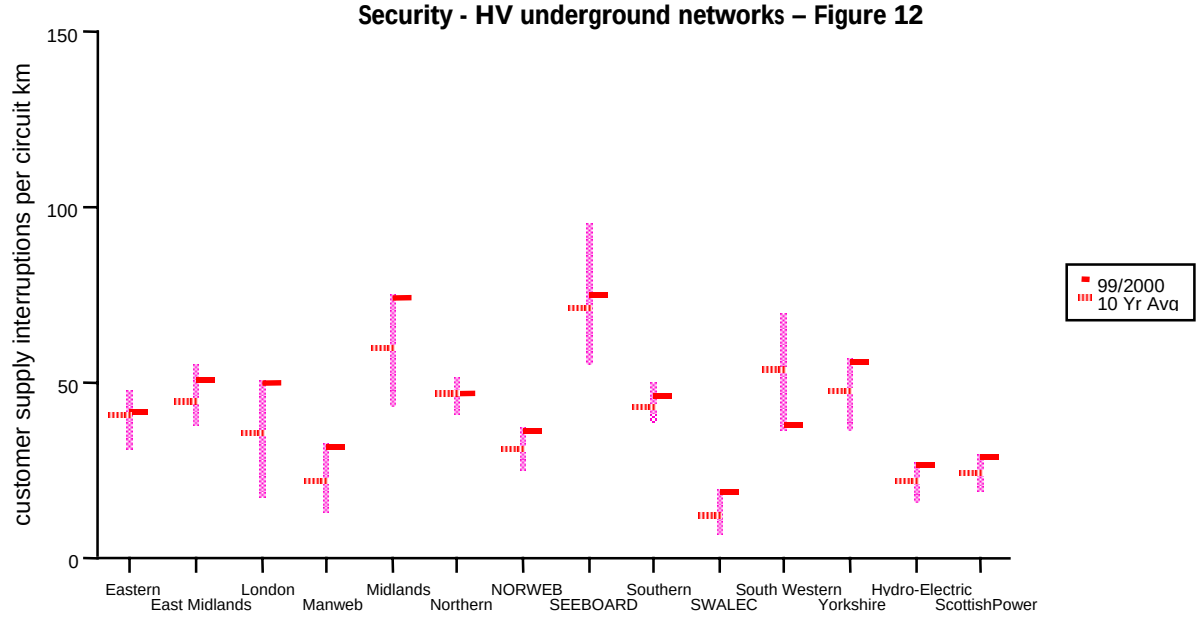


Overall Reliability (figure 11)

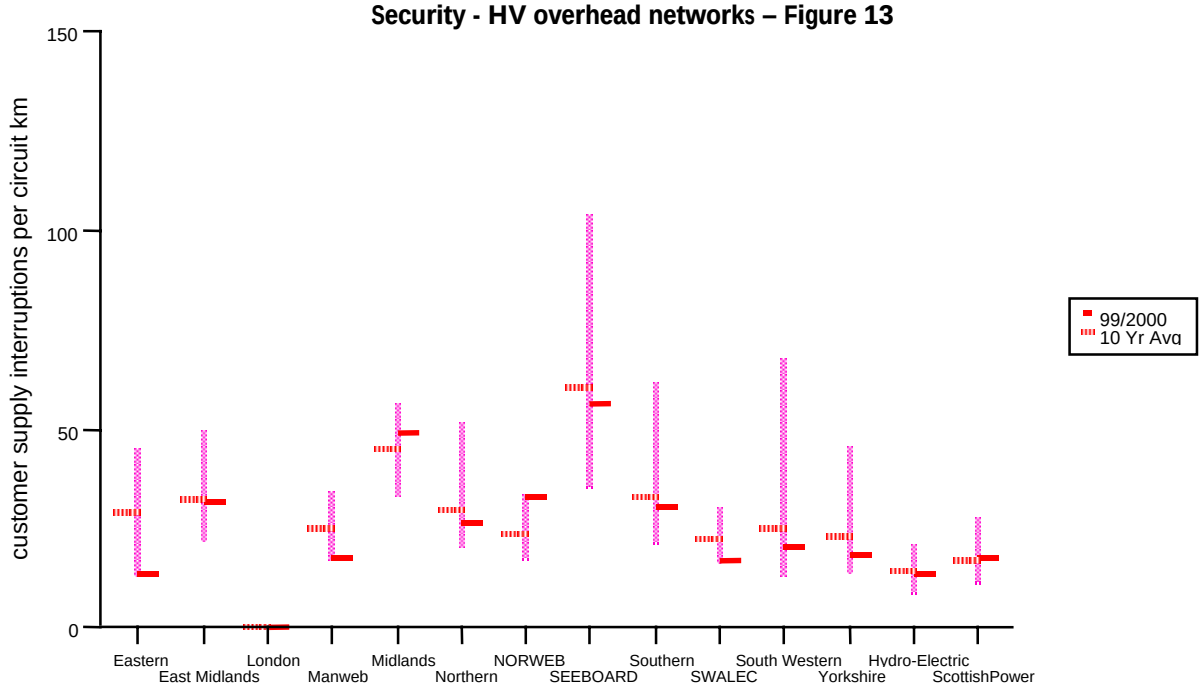
3.11 Overall reliability of distribution system performance is defined as the number of faults per unit length of network. This length of the network is taken as being the length of the mains only, excluding service cables which connect each customer to the mains. This is because reliable data on the length of service cables is not always available. The information on the mains, which is generally the network that supplies more than one customer, is more accurate. In making comparisons between companies it should be noted that the Scottish companies' 132kV circuits are classified as part of their transmission networks and are therefore not included in this analysis, whereas for RECs these circuits are part of their distribution networks.

3.12 Nine companies performed better than their 10 year average figure. Five reported their best results for the 10 year period.

Security - HV underground networks – Figure 12



Security - HV overhead networks – Figure 13

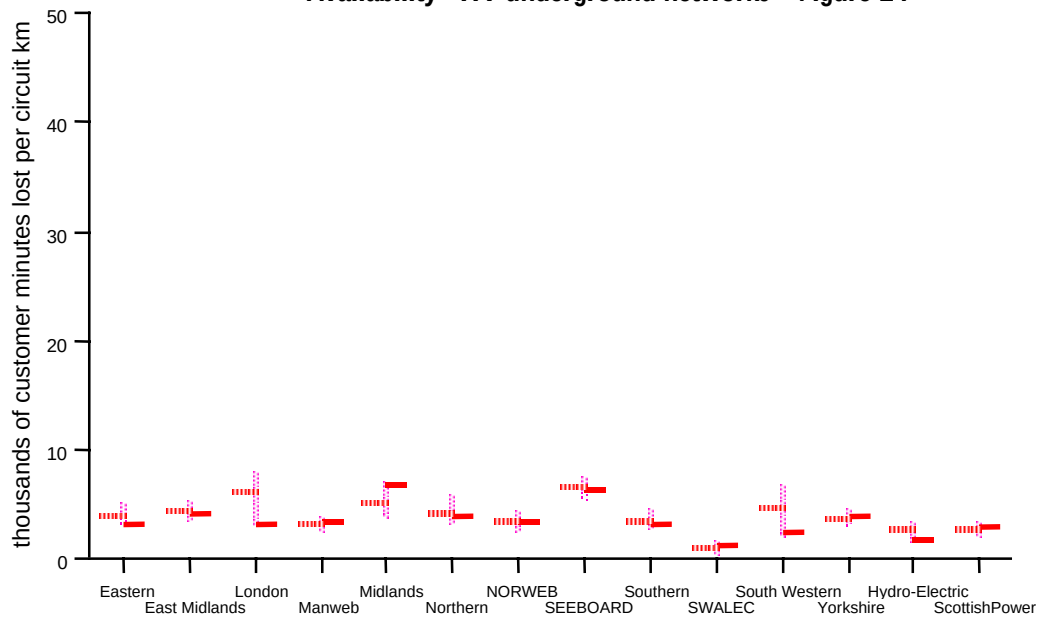


Security of HV Underground and Overhead Networks (Figs 12 and 13)

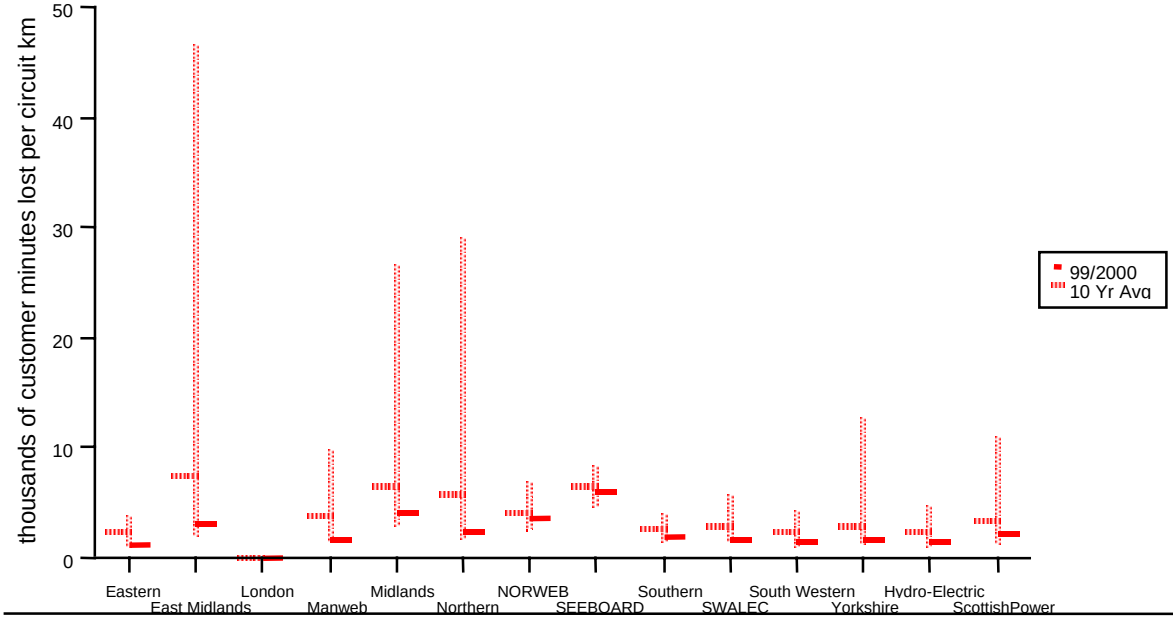
3.13 Figures 12 and 13 show the number of customer interruptions per circuit km arising from faults on the HV underground and overhead distribution systems.

3.14 On underground systems two companies reported better results than their 10 year average. On the overhead networks, ten companies reported better results than their 10 year average. Three companies reported their lowest number of HV overhead interruptions per circuit km in the last 10 years while Norweb reported its highest numbers for HV overhead networks.

Availability - HV underground networks – Figure 14



Availability - HV overhead networks – Figure 15

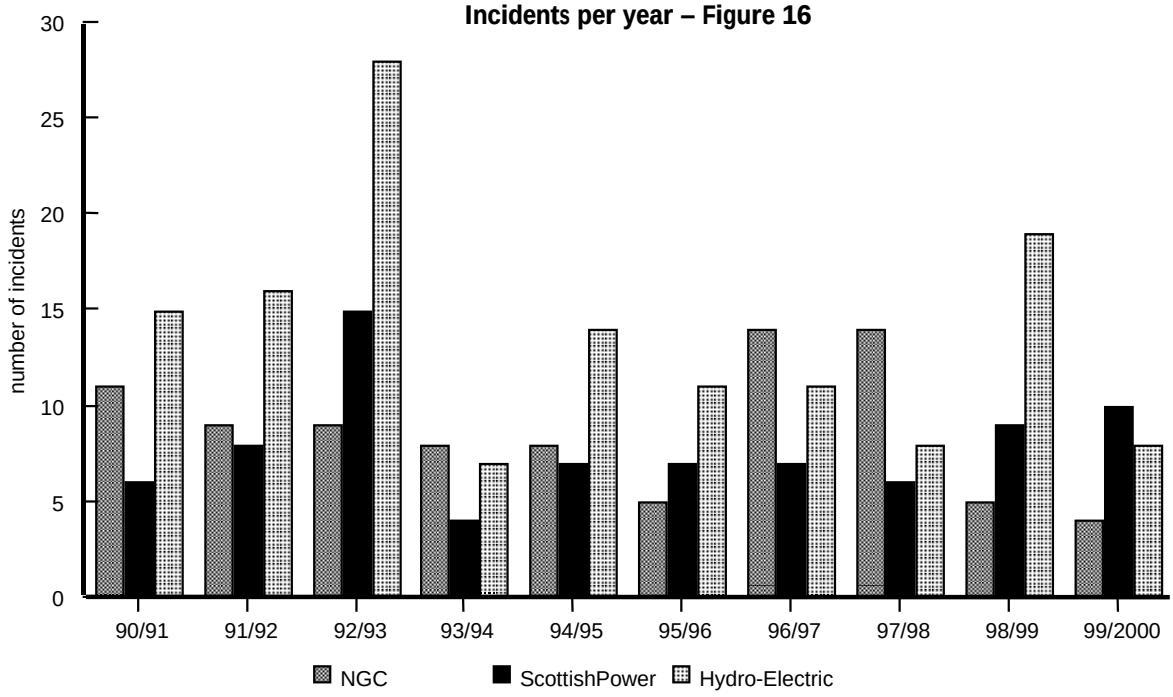


Availability of Underground and Overhead Networks (Figs 14 and 15)

3.15 Underground circuit availability performance in 1999/2000 was better for most companies than their 10 year average performance. Three reported their best performance in 10 years while Midlands reported its worst. Over the past 10 years overhead circuit availability performance has been far more variable than underground circuit availability, reflecting the effects of weather conditions. Three companies reported their best results in 10 years.

4. Transmission System Performance

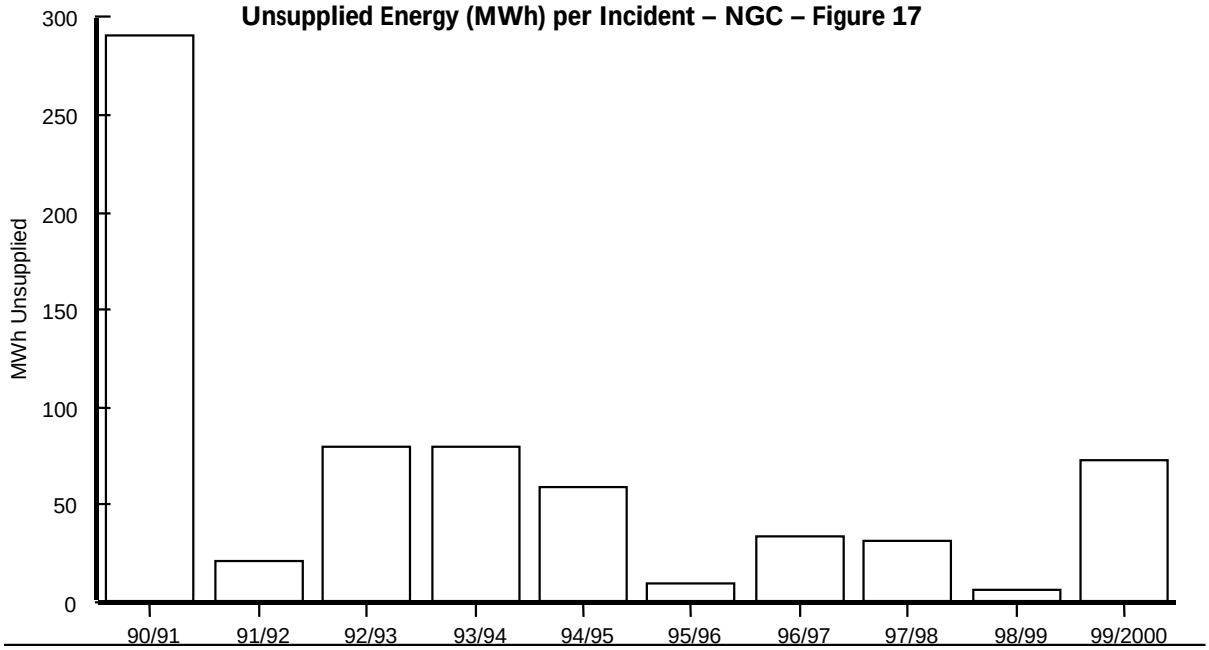
Incidents per year – Figure 16

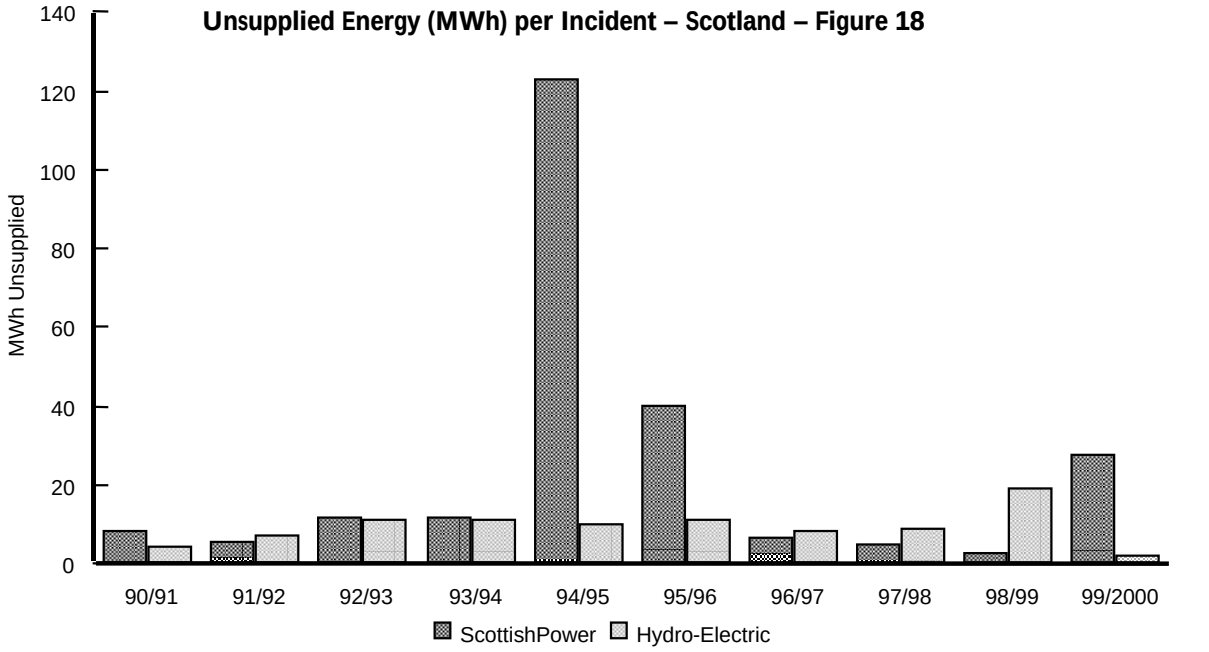


4.1 Figure 16 shows the number of incidents when there was a loss of supply to one or more customers because of faults on the transmission system.

4.2 NGC said that, of the four incidents reported, one incident was due to lightning and one incident was classified as due to connection arrangements chosen by customers at single customer sites, customer system configuration or faults on other adjacent systems.

4.3 ScottishPower reported more incidents and Hydro-Electric reported fewer incidents (ten and eight, respectively) than in recent years.

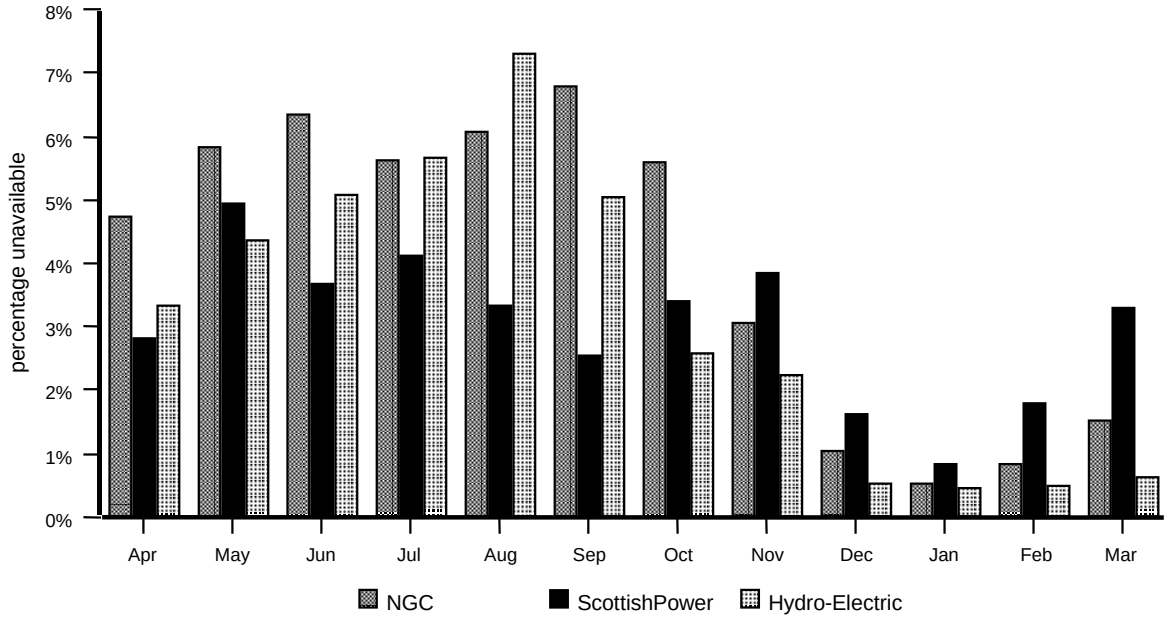




Unsupplied Energy per Incident

4.4 Figures 17 and 18 display the average amount of energy that is not supplied for the incidents recorded in Figure 16. In past years, the unsupplied energy per incident is generally higher in England and Wales than in Scotland, primarily reflecting the differences in load density.

Transmission System Unavailability – Figure 19

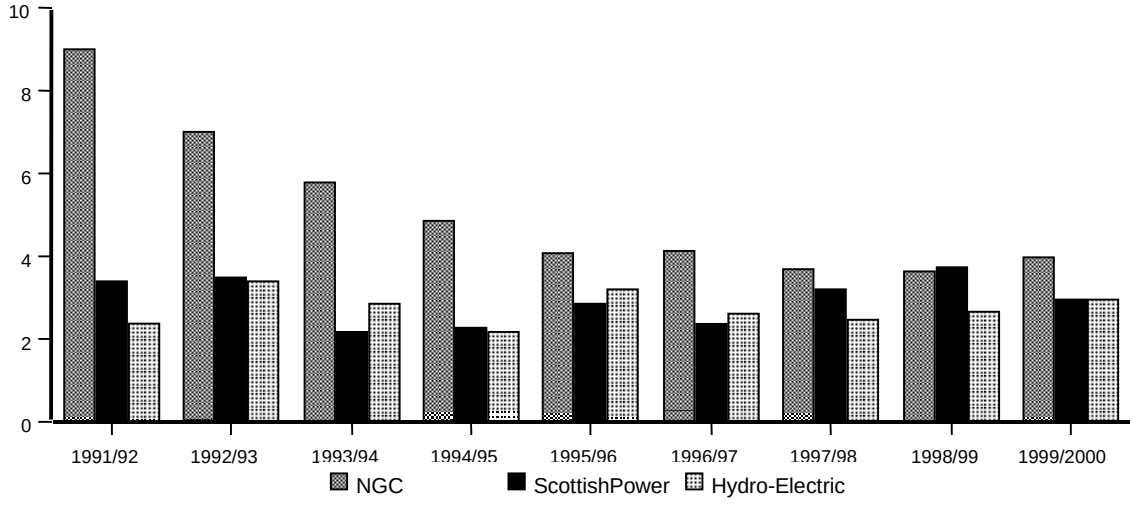


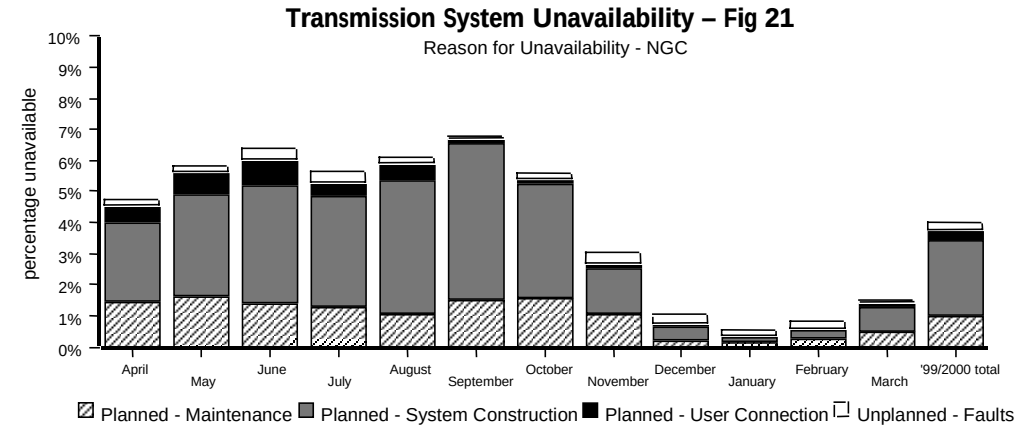
Transmission System Unavailability (Figure 19)

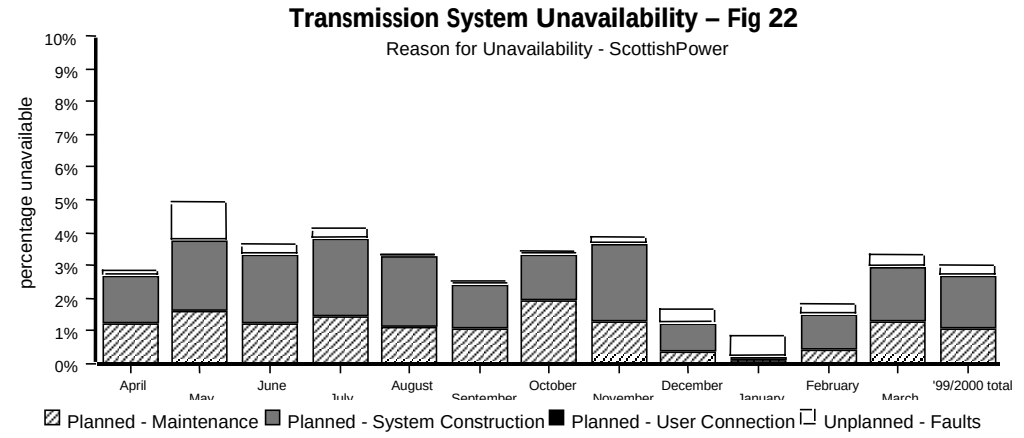
4.5 Figure 19 shows the monthly pattern of the time for which transmission circuits are out of service. The highest unvavailabilities occur during maintenance work, which is generally scheduled for the summer when overall electricity demand is at its lowest.

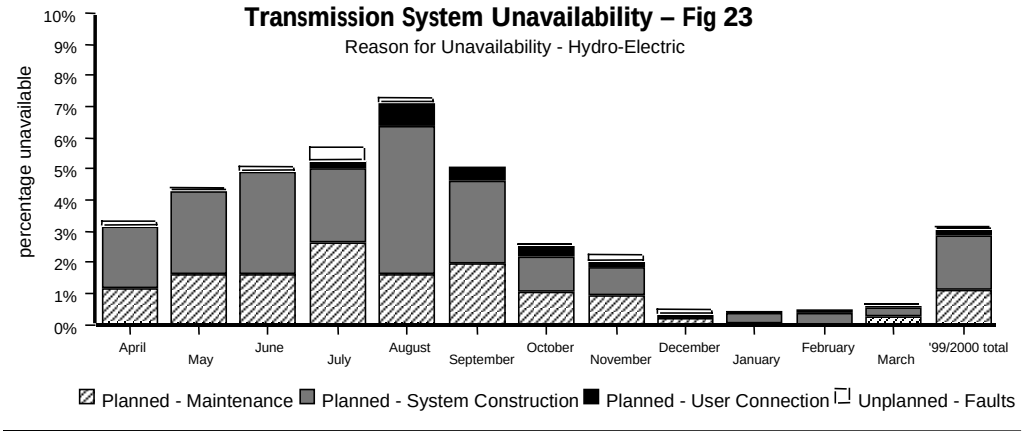
4.6 Trends of annual unavailability are shown in Figure 20 below. NGC's unavailability has fallen in recent years. NGC has said that its initiative to reduce transmission uplift is reducing annual unavailability through the better planning of system outages.

Annual Unavailability – Figure 20









Reasons for Transmission Unavailability (Figures 21 to 23)

4.7 Figures 21 to 23 show the monthly unavailability for the transmission companies. These are categorised as follows:

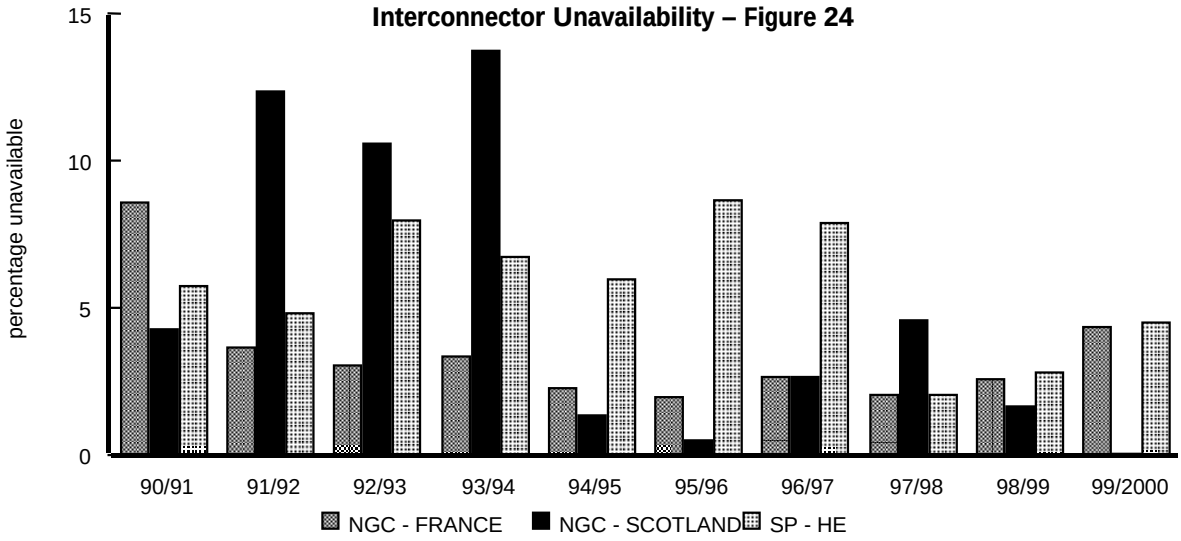
Transmission System Maintenance

Transmission System Construction

User connection to the transmission system (i.e. work on assets dedicated to one user)

Transmission System Faults

Most of the unavailability results from factors which are planned and are within companies' control, and these causes of unavailability are reduced during the winter months.



Interconnector Unavailabilities (Figure 24)

4.8 Figure 24 presents the levels of unavailability of the transmission system interconnectors at the geographic boundaries of the three transmission systems.

5. Standards of Supply Quality

Frequency

5.1 The electricity system in Britain is interconnected and all customers experience a common frequency. NGC is responsible for keeping system frequency within the statutory limits of ±1%. NGC reported that there were no frequency excursions outside statutory limits during 1999/2000.

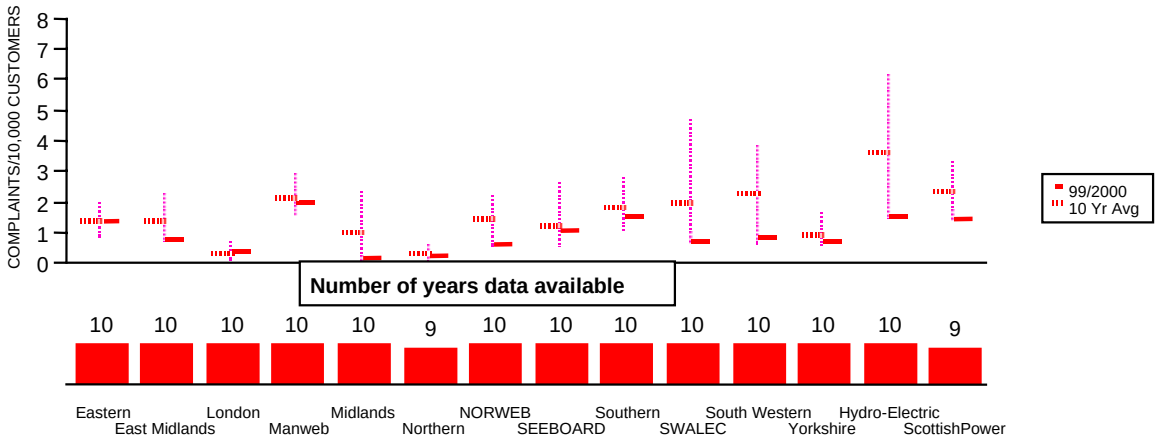
Transmission System Voltage

5.2 Transmission system voltages must comply with limits of variation set out in the Electricity Supply Regulations and Grid Codes. NGC reported no occasions when voltages went outside prescribed limits in 1999/2000. ScottishPower reported one such voltage excursion.

Distribution System Voltages

Verified Voltage Complaints per 10,000 Connected Customers – Figure 25

Vertical line indicates range since recording started



Verified Voltage Complaints (Figure 25)

5.3 Companies reported the number of voltage complaints which they received during the year and which resulted from supply voltages being outside the statutory limits. Not all companies have statistics going back for the previous 10 years. Six companies reported their best year.

5.4 On 1 January 1995, the nominal supply voltage in Britain changed from 240V +/- 6% to 230V, +10%, -6%, that is, the permitted voltage range changed from 225.6V-254.4V to 216.2V-253.V.

Distribution Systems Quality of Supply

5.5 As mentioned earlier, the Companies produce annual Quality of Supply reports which include their own targets for improved performance and details of actual capital expenditure compared with Ofgem's assumptions made at the price control review.

Distribution Systems Quality of Supply Targets

5.6 The tables below show summaries of company targets for improvements in numbers of supply interruptions and numbers of customer minutes lost. Revised targets for 2005 were set at the recent price control. Individual companies' Quality of Supply reports contain fuller details of company objectives and also describe how companies intend to improve quality of supply for their worst-served customers.

SECURITY PERFORMANCE AND TARGETS				
Number of interruptions per 100 customers	1990-95 average performance	Company year 2000 targets	1995-2000 average performance	Company year 2005 targets
Eastern	73	70	75	68
East Midlands	103	87	88	85
London	40	30	37	30
Manweb	80	Between 50 & 60	55	43
Midlands	131	109	136	116
Northern	91	Between 85 & 90	90	83
NORWEB	60	55	63	55
SEEBOARD	101	82	88	78
Southern	79	70	74	65
SWALEC	228	189	181	152
South Western	127	87	99	81
Yorkshire	91	78	81	78
Hydro-Electric	194	147	158	140
Scottish Power	69	Between 55 & 65	73	65

AVAILABILITY PERFORMANCE AND TARGETS				
Number of customers minutes lost per customer	1990-95 average performance	Company year 2000 targets	1995-2000 average performance	Company year 2005 targets
Eastern	78	66	68	64
East Midlands	276	73	80	71
London	56	40	49	40
Manweb	19	Between 65 & 75	75	58
Midlands	182	86	122	96
Northern	128	93	87	77
NORWEB	76	64	74	64
SEEBOARD	90	60	78	67
Southern	91	60	62	55
SWALEC	256	191	177	117
South Western	169	93	89	56
Yorkshire	85	56	58	54
Hydro-electric	257	210	227	195
ScottishPower	81	Between 65 & 75	100	71

Distribution companies' network data

5.7 To assist in the evaluation of distribution system performance statistics the table below sets out details of the networks of the distribution companies as at 31 March 2000 (customers numbers are as at 30 September 1999).

Company	Area sqkm	Customers ('000s)	Overhead (Circuit km)	Underground (Circuit km)	Transformers in Commission	
					Number	Aggregate Capacity (MVA)
Eastern	20,300	3,338	35,116	55,168	62,814	38,643
East Midlands	16,000	2,400	24,049	44,053	41,969	33,658
London	665	2,060	41	30,261	13,592	19,469
Manweb	12,200	1,401	21,477	23,947	41,857	17,227
Midlands	13,300	2,260	24,078	35,758	49,340	25,111
Northern	14,400	1,461	17,265	26,861	23,858	13,266
NORWEB	12,500	2,203	13,923	44,825	32,185	31,159
SEEBOARD	8,200	2,139	12,266	32,736	32,585	24,496
Southern	16,900	2,681	27,828	44,912	53,013	42,727
SWALEC	11,800	989	18,658	14,357	38,755	12,387
South Western	14,400	1,344	29,277	18,699	49,273	20,066
Yorkshire	10,700	1,995	15,817	39,739	30,993	30,177
Hydro-Electric	54,390	640	30,447	14,142	47,934	10,065
ScottishPower	22,950	1,880	24,448	40,337	39,983	23,355
TOTAL	**228,705**	**26,791**	**294690**	**465,822**	**558,151**	**341,806**

Further Information

5.8 This report is a summary of the information provided by the distribution and transmission system licensees. In some cases, companies chose to submit commentaries and explanations in support of their figures.

5.9 Copies of the report submitted by the companies are available at cost from the Ofgem library, 9 Millbank, London SW1P 3GE.

5.10 Details may also be obtained from each reporting company.