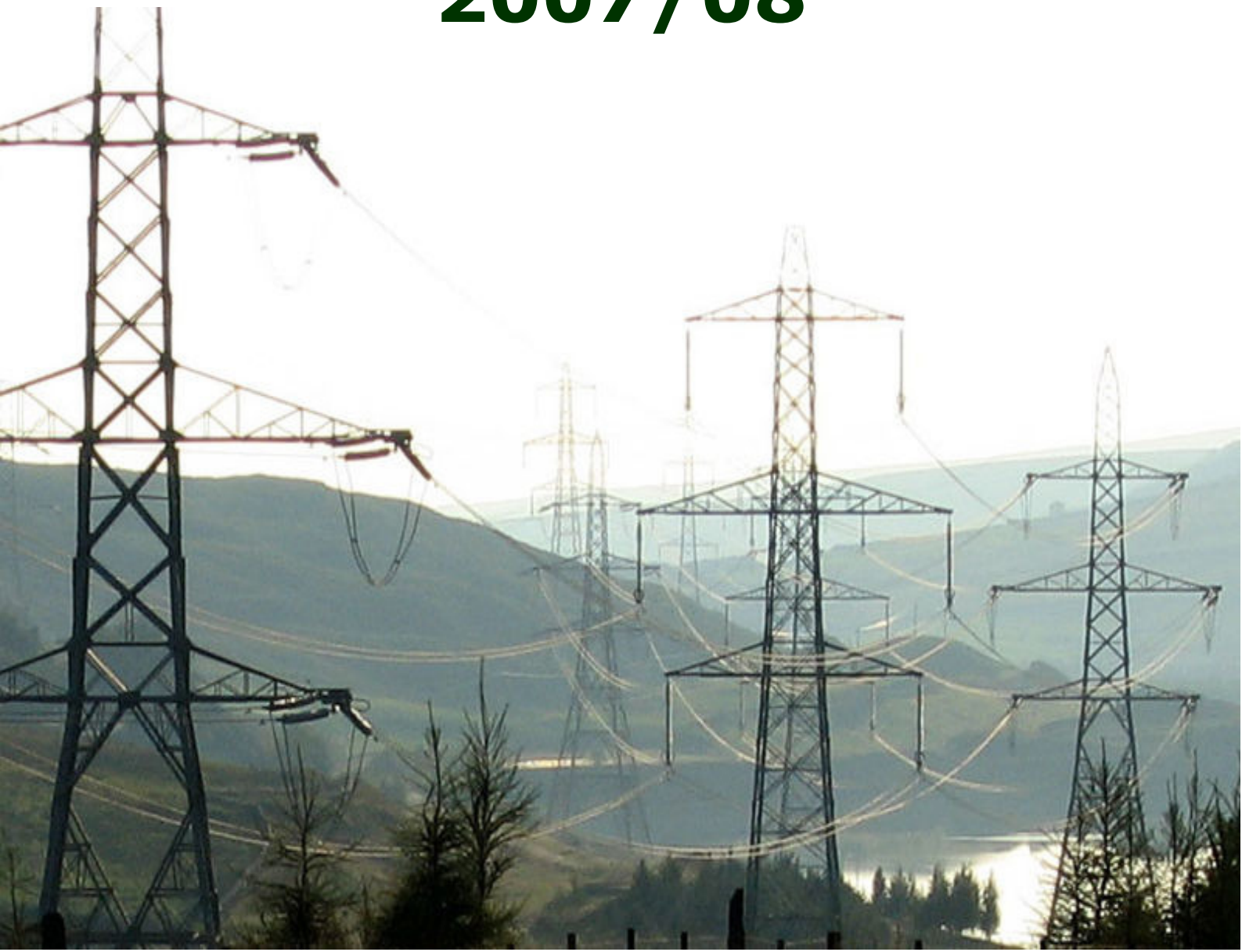
System Operator for Northern Ireland

TRANSMISSION SYSTEM PERFORMANCE REPORT

2007/08



SYSTEM OPERATOR FOR NORTHERN IRELAND LTD

TRANSMISSION SYSTEM PERFORMANCE REPORT

FOR THE YEAR 2007/08

Prepared October 2008

CONTENTS

EXECUTIVE SUMMARY

SONI has prepared this Transmission System Performance Report in accordance with Part II F, Condition 19 of the NIE Transmission and Public Electricity Supply Licence that applied up to 1 November 2007. This report covers the 12 month period from 1 April 2007 to 31 March 2008.

The SONI Licence to Participate in Transmission of Electricity became effective from 1 November 2007.

One of the key measures of performance is availability, both of the overall Northern Ireland transmission system, and the interconnection to the system. System availability is calculated as the actual circuit hours available as a percentage of the total possible circuit hours available. Circuit outages that result from both planned and unplanned unavailability are taken into account.

The annual system availability was 97.10%, with an average winter availability of 98%, reflecting the fact that planned work on circuits is kept to a minimum over the winter months. The annual system availability is slightly lower than the 2006/07 figure of 97.48%, however, this is due to lengthy planned outages on the two 110kV interconnectors taken in March and April.

The performance of the interconnector and tie lines was above average, with Moyle HVDC interconnector having an annual availability of 99.76% and the North-South 275kV tie line 97.60%. In both these cases, planned maintenance work over the summer months was the main cause of unavailability. The two 110kV tie lines had an annual availability of 93%, however, this lower figure was again mainly due to planned maintenance work in March and April.

Another key measure of performance is system security, which reports on any incidents resulting in loss of supplies to customers. In the year of this report there were four such incidents, an increase on previous years. However, the total unsupplied energy of the incidents is much lower than in previous years, reflecting the reduced impact of the incidents compared to previous years.

Quality of service is also covered in this report, and is measured in terms of the number of voltage and frequency excursions outside statutory limits over the previous year. While there were no voltage excursions over the previous year, there were seven frequency excursions, an increase on recent years. None of these incidents, however, resulted in a loss of load in Northern Ireland.

1 INTRODUCTION

This Transmission System Performance Report has been prepared by the System Operator for Northern Ireland Ltd. (SONI). It has been prepared in accordance with the requirements of the NIE Transmission and Public Electricity Supply Licence which was effective to 31 October 2007. As a result of the changes made to facilitate the Single Electricity Market SONI were granted a separate "Licence to Participate in the Transmission of Electricity" effective from 1 November 2007. This report covers the financial year 2007/08, the period from 1 April 2007 to 31 March 2008 and is aligned with NIE's equivalent Distribution System Performance Report.

Future reports will be prepared in accordance with Part 11 of Condition 20 of the new Licence. A further Transmission System Performance Report will be published in December as a result of a change to the financial reporting arrangements and will cover the period from 1 November 2007 to 30 September 2008. Future reports will then be provided for the financial year which is the period 1 October to 30 September

SONI is responsible for the safe, secure and efficient operation of the Northern Ireland transmission network. The transmission network is operated at 275kV and 110kV. Its primary purpose is to transport power via overhead lines and cables from generators to distribution bulk supply points. The power is then transformed to lower voltages (33, 11 and 6.6kV) and distributed to customers.

This report provides information on system availability, interconnector availability, system security and quality of service on the 275/110kV transmission network.

Section 2 outlines both the month by month system availability and unavailability for 2007/08, and also provides a historic comparison of annual system availability.

Section 3 shows the historic availability and monthly unavailability for interconnection with both GB and RoI during 2007/08.

Section 4 provides details of incidents that resulted in the loss of supplies over the year 2007/08, and compares the number of incidents and unsupplied energy over a ten year period.

Section 5 highlights quality of service and measures this with reference to both system voltage and frequency, and records when either criteria exceeds its statutory limits.

Reporting is carried out in accordance with the definitions and principles of the National Fault and Interruption Reporting Scheme (NAFIRS),

(Engineering Recommendation G43/2). The effects of national / regional emergencies and disputes are excluded.

2 SYSTEM AVAILABILITY

2.1 CALCULATION METHODOLOGY

System Performance is monitored by reporting monthly variations in system availability, winter peak and average annual system availability, together with planned and unplanned system availability.

Availability is reduced whenever a circuit is taken out of operation, either for planned purposes for construction work to take place, or as the result of a fault, caused, for example, by lightning strikes, high winds, equipment failure etc.

SONI is required under its licence to operate the transmission system in accordance with the Transmission and Distribution System Security and Planning Standards, and the Grid Code.

Planned work is necessary to facilitate new user connections and network development, as well as the network maintenance necessary to maintain system security and reliability.

The outages of transmission circuits either planned outages or faults resulting in forced outages have the net effect of reducing system availability to less than 100%. System availability is defined by the formula:

$$\frac{\text{The sum of all circuit hours actually available} \times 100\%}{\text{(No. of circuits)} \times \text{(No. of hours in one year)}}$$

A circuit is defined as the overhead line, cable, transformer or any combination of these that connects two system busbars together or connects the system to a User's busbar. Network busbars are located in transmission substations; the busbars, circuits and network configuration is described in the current SONI Transmission Seven Year Statement.

There are approximately 150 transmission (275kV and 110kV) circuits in the Northern Ireland transmission system, covering a total length of circa 2130km in the form of overhead lines and cable circuits at 275kV and 110kV.

Planned unavailability is defined as maintenance outages taken that are required to maintain transmission network assets. These are planned in excess of seven days prior to the outage. This also includes outages to facilitate user connections (generators etc.) and also general network maintenance that benefits all users.

Unplanned unavailability is due to an outage which occurs as a result of breakdown, i.e. outages required and taken immediately upon request or planned at less than seven days notice.

2.2 RESULTS

2.2.1 ANNUAL SYSTEM AVAILABILITY

For 2007/08, the Average Annual Availability of the Northern Ireland Transmission System was 97.10%.

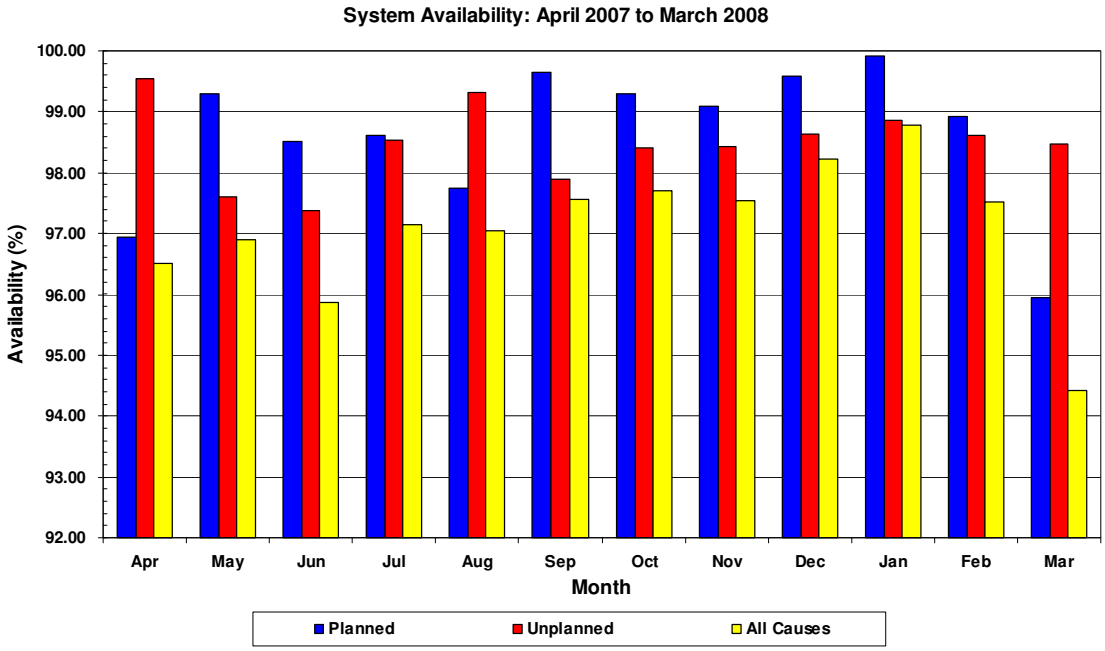
2.2.2 SUMMER AND WINTER AVAILABILITY

The Winter Peak System Availability (average system availability for the period of November 2007 to February 2008) was 98.01%.

The Summer System Availability (average system availability for the period of May 2007 to August 2007) was 96.74%.

2.2.3 MONTHLY VARIATION

The chart and table below show the month by month variation in system availability in respect of the transmission network in Northern Ireland. The chart also shows the contribution to the availability of both planned and unplanned unavailability.

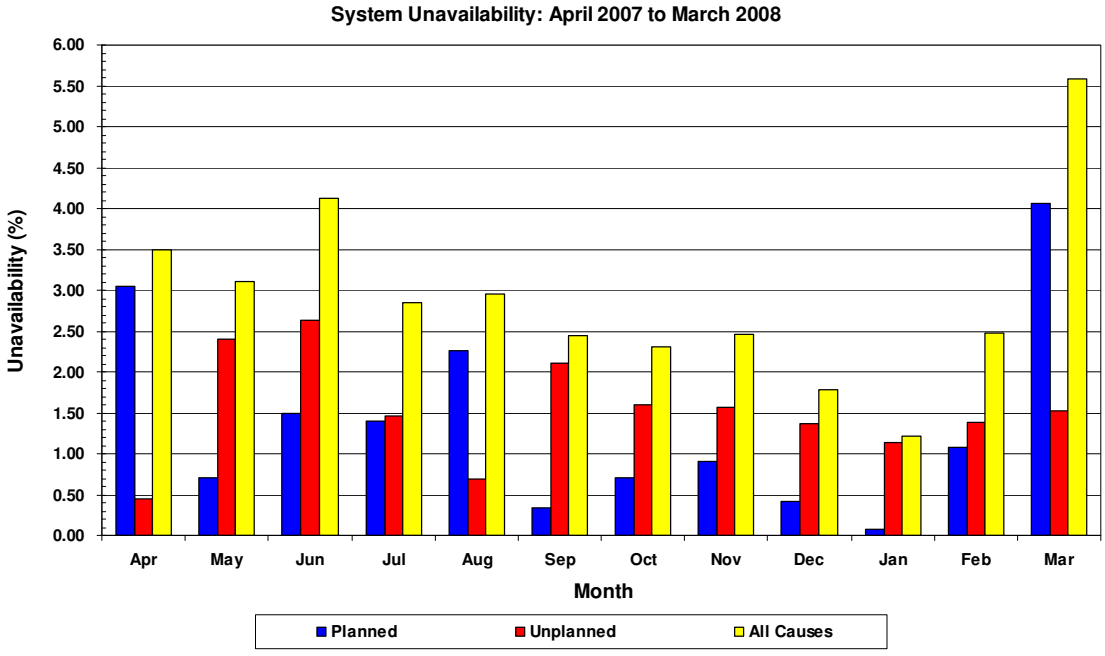


Review Period Month/Year	System Availability (%) Planned Outage	System Availability (%) Unplanned Outage	System Availability (%) All Causes
April 07	96.95	99.55	96.50
May 07	99.29	97.61	96.90
June 07	98.50	97.37	95.87
July 07	98.61	98.54	97.15
August 07	97.74	99.31	97.05
September 07	99.66	97.90	97.55
October 07	99.29	98.41	97.70
November 07	99.10	98.43	97.53
December 07	99.59	98.63	98.22
January 08	99.92	98.86	98.78
February 08	98.92	98.61	97.52
March 08	95.94	98.47	94.41

Overall, the availability of the system is high, particularly over the winter months (98%). The higher availability over the winter months is because planned outages are usually scheduled to take place over the summer months. This is reflected in the fact that from November to January, the availability is over 99%, and that there is a general reduction in the overall availability over the summer months.

2.2.4 SYSTEM UNAVAILABILITY

The chart and table below show the month by month variation in planned and unplanned system unavailability.

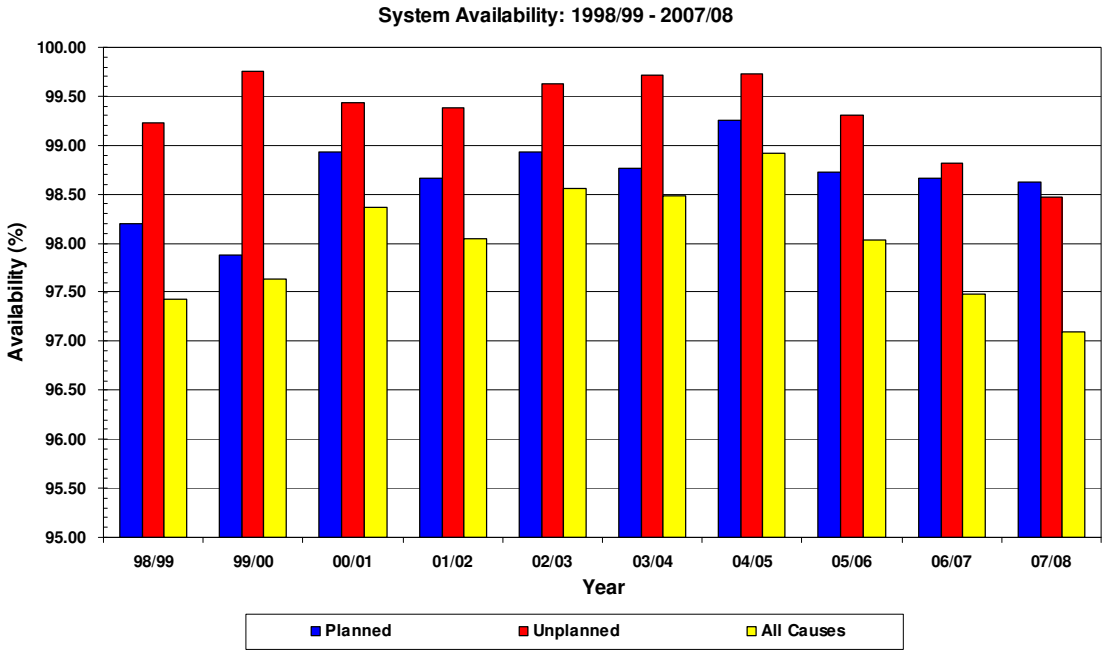


Review Period Month/Year	System Unavailability (%) Planned Outage	System Unavailability (%) Unplanned Outage	System Unavailability (%) All Causes
April 07	3.05	0.45	3.50
May 07	0.71	2.39	3.10
June 07	1.50	2.63	4.13
July 07	1.39	1.46	2.85
August 07	2.26	0.69	2.95
September 07	0.34	2.10	2.45
October 07	0.71	1.59	2.30
November 07	0.90	1.57	2.47
December 07	0.41	1.37	1.78
January 08	0.08	1.14	1.22
February 08	1.08	1.39	2.48
March 08	4.06	1.53	5.59

The transmission system has performed well over the year (2007/08), particularly during the winter months (November to February) when planned outages are kept to a minimum. Unplanned unavailability is distributed throughout the year, and not just confined to the winter period, with the highest occurrence of 2.63% in June.

2.2.5 HISTORIC AVAILABILITY PERFORMANCE

The chart and table below show the historic variation in system availability from 1998/99 to 2007/08 in respect of the transmission network in Northern Ireland.



Review Period Year	System Availability (%) Planned Outage	System Availability (%) Unplanned Outage	System Availability (%) All Causes
98/99	98.20	99.23	97.43
99/00	97.88	99.75	97.63
00/01	98.93	99.43	98.36
01/02	98.66	99.38	98.04
02/03	98.93	99.63	98.56
03/04	98.76	99.71	98.48
04/05	99.25	99.73	98.92
05/06	98.73	99.30	98.03
06/07	98.66	98.82	97.48
07/08	98.63	98.47	97.10

There has been a small reduction in availability from 2004/05 (98.92%) to 2007/08 (97.1%) of 1.82%. The main causal factor has been the increase in unplanned outages over the past four years.

3 INTERCONNECTION AVAILABILITY

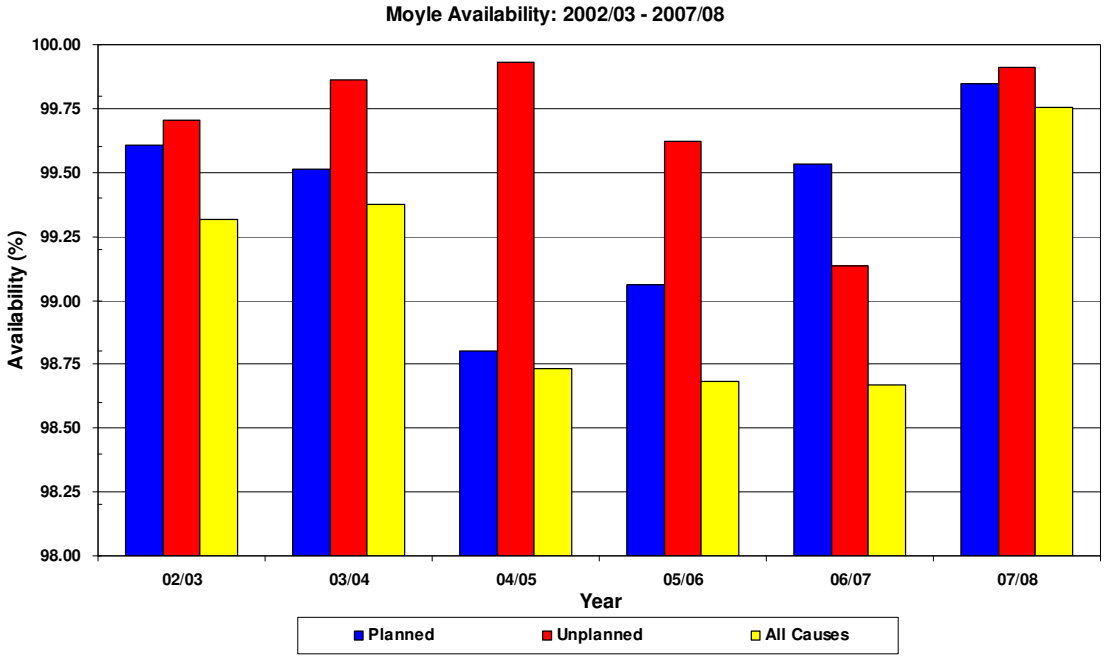
3.1 INTERCONNECTION WITH GB

The Moyle interconnector linking the NI transmission system to the GB transmission system commenced commercial operation in 2002 and is constructed as a dual monopole HVDC link with two coaxial undersea cables from Ballycronan More, Islandmagee to Auchencrosh, Ayrshire, Scotland. The interconnector is operated by SONI and forms part of the Northern Ireland transmission system, and therefore the performance of this link falls under the scope of this report.

3.1.1 ANNUAL AVAILABILITY

The Annual Availability of the Moyle Interconnector was 99.76%.

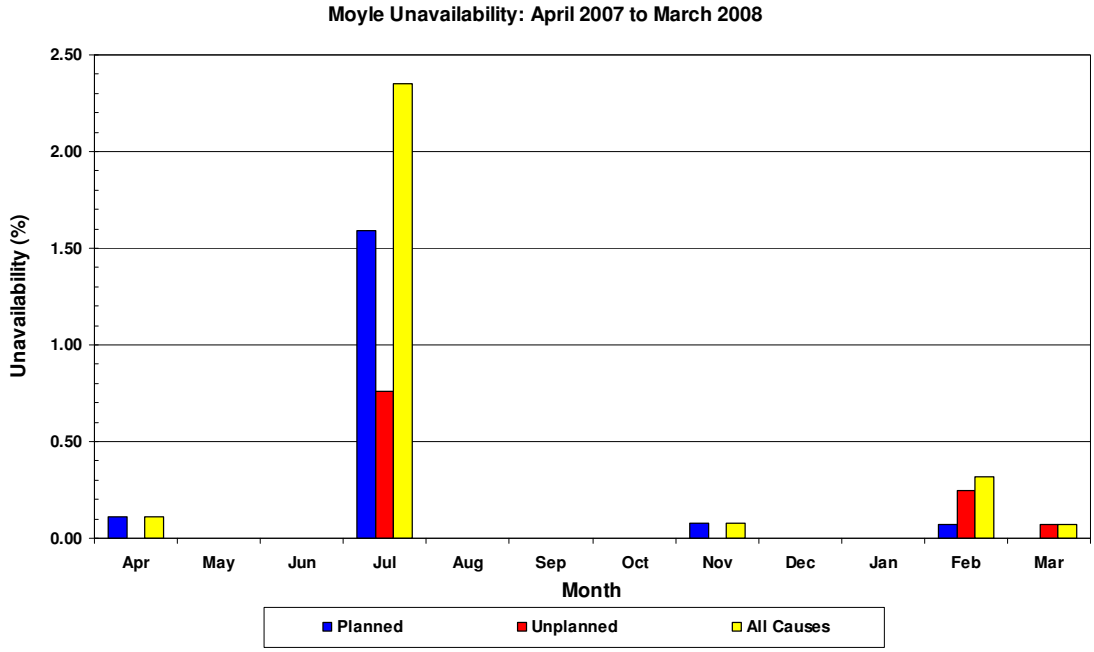
The chart below shows the annual variation in the Moyle Interconnector availability from 2003/03 to 2007/08.



Review Period Year	System Availability (%) Planned Outage	System Availability (%) Unplanned Outage	System Availability (%) All Causes
02/03	99.61	99.71	99.32
03/04	99.51	99.86	99.37
04/05	98.80	99.93	98.73
05/06	99.06	99.62	98.68
06/07	99.53	99.13	98.67
07/08	99.85	99.91	99.76

3.1.2 MONTHLY UNAVAILABILITY

The chart and table below show the month by month variation of unavailability of the interconnector during planned work undertaken by Moyle.



Review Period Month/Year	Moyle Unavailability (%) Planned Outage	Moyle Unavailability (%) Unplanned Outage	Moyle Unavailability (%) All Causes
April 07	0.11	0.00	0.11
May 07	0.00	0.00	0.00
June 07	0.00	0.00	0.00
July 07	1.59	0.76	2.35
August 07	0.00	0.00	0.00
September 07	0.00	0.00	0.00
October 07	0.00	0.00	0.00
November 07	0.08	0.00	0.08
December 07	0.00	0.00	0.00
January 08	0.00	0.00	0.00
February 08	0.07	0.25	0.32
March 08	0.00	0.07	0.07

The Moyle interconnector has maintained a high level of availability over the past six years since its introduction in 2002. In the year 2007/08 it has a high overall availability of 99.76%. The unavailability was mainly due to regular planned outages in July.

3.2 INTERCONNECTION WITH ROI

3.2.1 275kV TIE LINE

The Northern Ireland transmission system was reconnected with RoI in March 1995. The synchronous interconnection is via the double circuit 275kV North-South tie line between Tandragee and Louth. Since the introduction of the Single Electricity Market, the circuit is treated as a tie line.

Outages are coordinated between EirGrid and SONI to allow work to be undertaken in an efficient manner.

3.2.2 110kV TIE LINES

110kV interconnection with RoI is as follows:

- Strabane – Letterkenny 110kV circuit.
- Enniskillen – Corraclassy 110kV circuit

Until 2001, both circuits operated in a standby mode, but were then converted into permanent interconnections by the deployment of power flow controllers, rated at 125MW. The power flow controllers are normally adjusted to maintain a 0MW transfer, but can be set to any desired value to support either system during abnormal operating conditions. Since the introduction of SEM, the circuits are treated as tie lines.

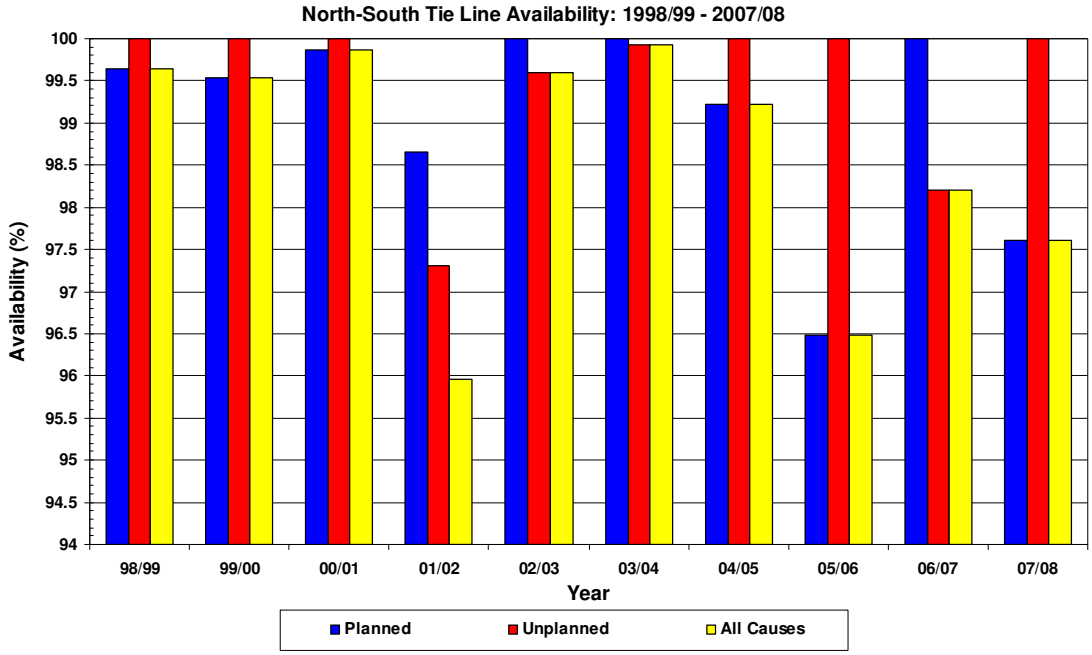
The two circuits are automatically taken out of service during the outage of both 275kV circuits on the North-South tie line. This is to ensure that the all island transmission network operates in a stable manner.

The power flows in the 110kV tie lines are normally adjusted to support either network when planned or unplanned outages occur in either NI or RoI.

3.2.3 275kV NORTH-SOUTH TIE LINE ANNUAL AVAILABILITY

The annual availability of the North-South tie line was 95.20%.

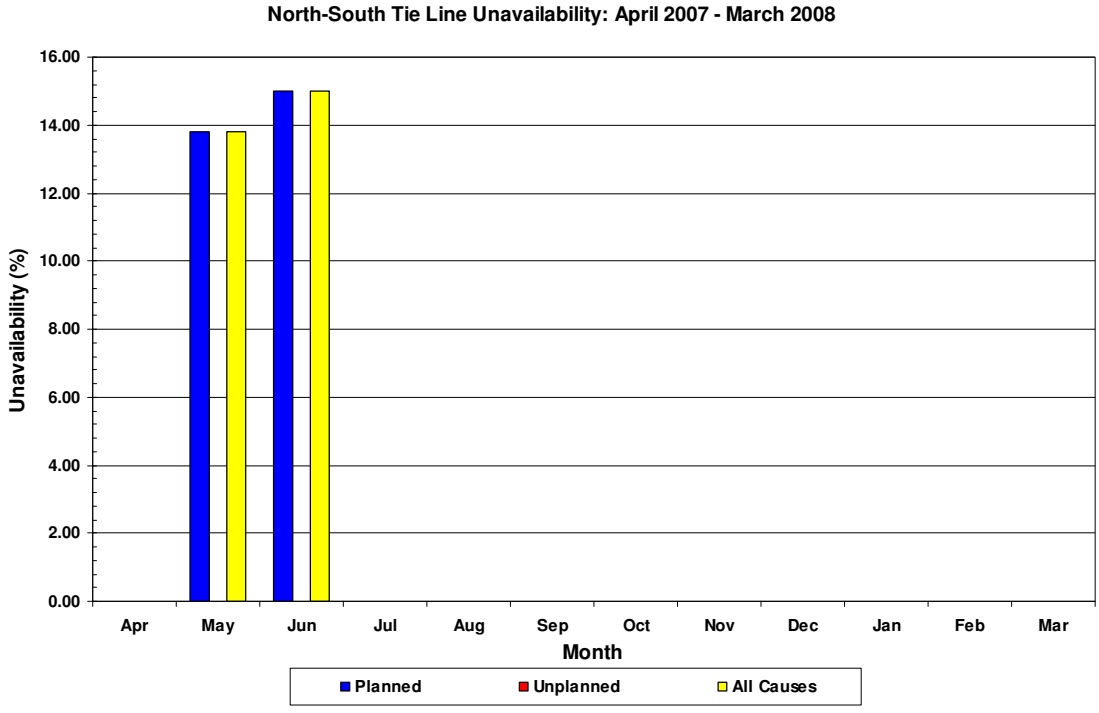
The chart and table below show the annual variation in the availability of the Tie Line from 1998/99 to 2007/08.



Review Period Year	System Availability (%) Planned Outage	System Availability (%) Unplanned Outage	System Availability (%) All Causes
98/99	99.65	100.00	99.65
99/00	99.54	100.00	99.54
00/01	99.87	100.00	99.87
01/02	98.65	97.31	95.96
02/03	100.00	99.59	99.59
03/04	100.00	99.92	99.92
04/05	99.22	100.00	99.22
05/06	96.49	100.00	96.49
06/07	100.00	98.21	98.21
07/08	97.60	100.00	97.60

3.2.4 275kV NORTH-SOUTH TIE LINE MONTHLY UNAVAILABILITY

The chart and table below show the month by month variation of unavailability of the North-South tie line.



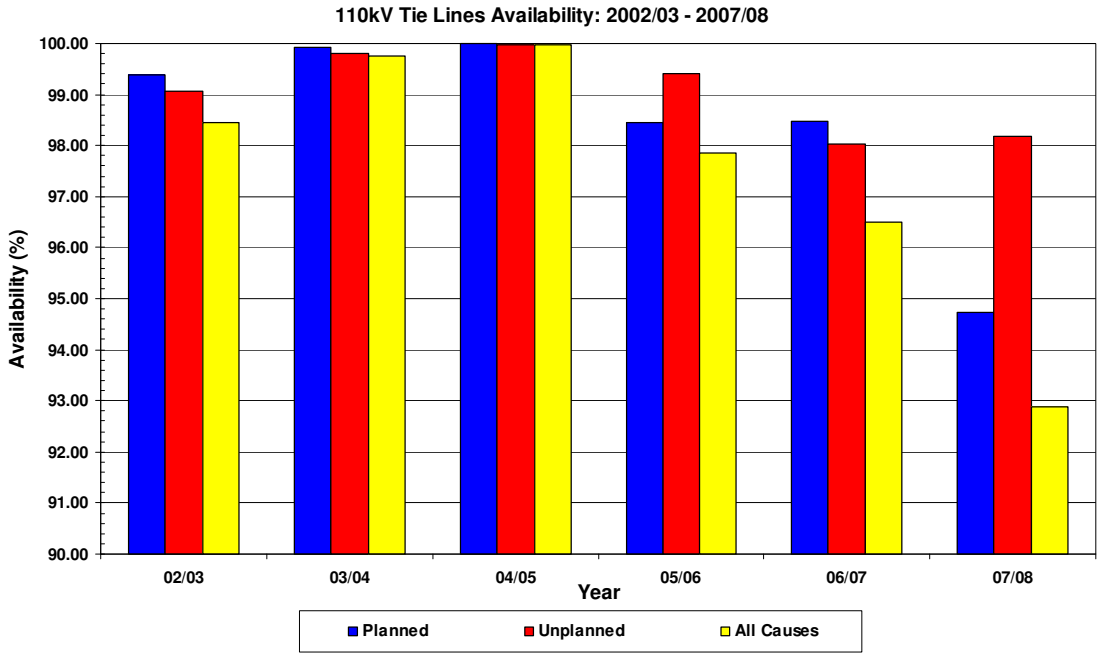
Review Period Month/Year	System Unavailability (%) Planned Outage	System Unavailability (%) Unplanned Outage	System Unavailability (%) All Causes
April 07	0.00	0.00	0.00
May 07	13.79	0.00	13.79
June 07	15.01	0.00	15.01
July 07	0.00	0.00	0.00
August 07	0.00	0.00	0.00
September 07	0.00	0.00	0.00
October 07	0.00	0.00	0.00
November 07	0.00	0.00	0.00
December 07	0.00	0.00	0.00
January 08	0.00	0.00	0.00
February 08	0.00	0.00	0.00
March 08	0.00	0.00	0.00

The results indicate that the unavailability is due completely to planned work undertaken in May and June 2007, and no unplanned outages occurred

3.2.5 110kV TIE LINES ANNUAL AVAILABILITY

The annual availability of the 110kV tie lines was 85.79%.

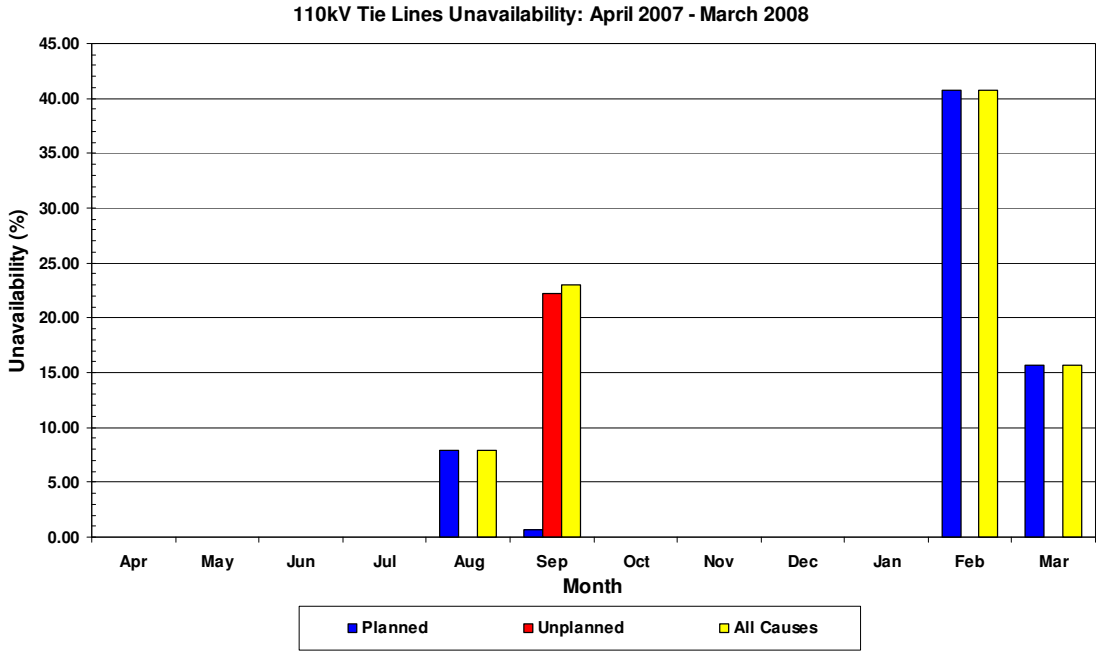
The chart and table below show the annual variation in the availability of the tie lines from 2002/03 to 2007/08.



Review Period Year	System Availability (%) Planned Outage	System Availability (%) Unplanned Outage	System Availability (%) All Causes
02/03	99.39	99.07	98.46
03/04	99.93	99.81	99.74
04/05	100.00	99.97	99.97
05/06	98.46	99.41	97.87
06/07	98.47	98.04	96.51
07/08	94.72	98.18	92.89

3.2.6 110kV TIE LINES MONTHLY UNAVAILABILITY

The chart and table below show the month by month variation of unavailability of the 110kV tie lines.



Review Period Month/Year	System Unavailability (%) Planned Outage	System Unavailability (%) Unplanned Outage	System Unavailability (%) All Causes
April 07	0.00	0.00	0.00
May 07	0.00	0.00	0.00
June 07	0.00	0.00	0.00
July 07	0.00	0.00	0.00
August 07	7.88	0.00	7.88
September 07	0.70	22.26	22.96
October 07	0.00	0.00	0.00
November 07	0.00	0.00	0.00
December 07	0.00	0.00	0.00
January 08	0.00	0.00	0.00
February 08	40.73	0.00	40.73
March 08	15.70	0.00	15.70

The availability of the 110kV tie lines dropped to 93% in 2007/08, due to the large amount of planned outages undertaken in February and March.

4 SYSTEM SECURITY

All transmission system related events that occurred in Northern Ireland that resulted in a loss of supplies are reported individually, giving information concerning the nature and cause of the incident and location, duration and an estimate of energy unsupplied.

An incident is defined as any system event that results in a single or multiple loss of supply.

4.1 NUMBER OF INCIDENTS AND ESTIMATED UNSUPPLIED ENERGY

Within the Northern Ireland transmission system there were four events that resulted in a loss of supplies.

The unsupplied energy from the Northern Ireland system in 2007/08 was estimated to be 41.58MWh.

4.2 INCIDENTS FOR 2007/08

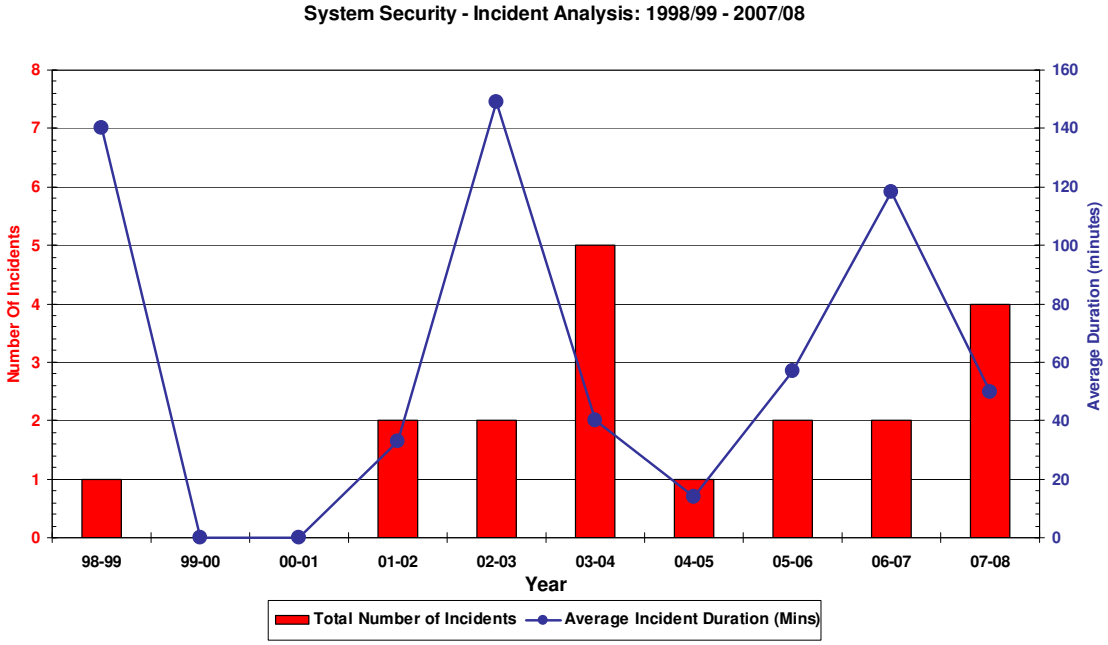
	Incident Date, Time and Location	MW Lost	Mins	MWh Unsupplied	Customer Supply Interruptions
1	**04/05/2007 05:21 at Loguestown Main** Coleraine - Loguestown 110kV circuits taken out of service due to a fire at an industrial park under the lines.	15.0	12	3.00	13,117
2	**15/05/2007 07:05 at Limavady Main** Fault in mechanism associated with a circuit breaker at Limavady Main- failed to trip for a line fault (transient)	10.0	59	9.83	12,818
		5.0	115	9.59	
3	**01/02/2008 04:18** Unplanned outage on the Ballyvallagh - Larne Main 110kV 'B' circuit.	10.0	92	15.33	12,000
4	**13/02/2008 16:26 at Cregagh Main** Unplanned outage of the Castlereagh - Cregagh 110kV circuirt due to 3rd party damage to cables.	10.0	23	3.83	5,000

[2. Unplanned outage at Limavady Main substation]

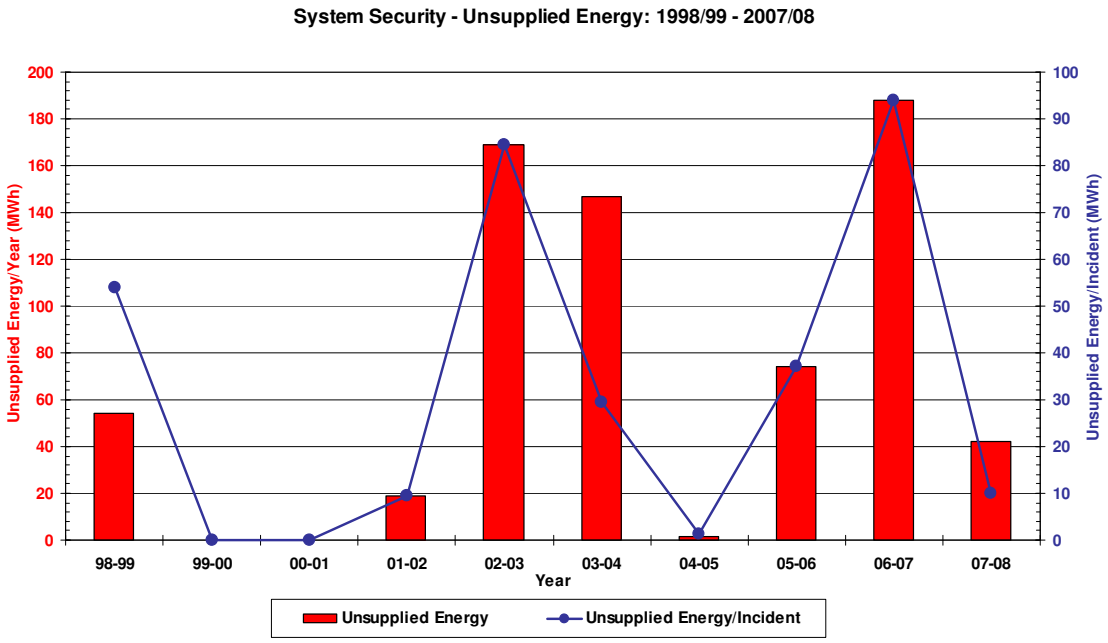
The criterion for reporting incidents is specified in Schedule 4, paragraph 35, of the Electricity Supply Regulations (Northern Ireland) 1991. An incident shall be reported if there has been:

- Any single interruption of supply to one or more consumers of 20MW or more for a period of one minute or longer; or
- Any single interruption of supply to one or more consumers of 5MW or more for a period of one hour or longer; or
- Any single interruption of supply to 5,000 or more consumers for a period of one hour or longer.

4.2.1 SYSTEM SECURITY - INCIDENT ANALYSIS



4.2.2 SYSTEM SECURITY - UNSUPPLIED ENERGY



The unplanned outages were minor in 2007/08- the largest loss of supply being 15MWhr.

5 QUALITY OF SERVICE

Quality of service is measured with reference to system voltage and frequency.

5.1 VOLTAGE

The Electricity Supply Regulations (Northern Ireland) 1991 permit variations of voltage not exceeding 6% for voltages of 110 kV.

Consumers may expect the voltage to remain within the limits, apart from under abnormal conditions e.g. a system fault.

5.2 VOLTAGE EXCURSIONS

During 2007/08, there were no voltage excursions exceeding the agreed reporting criteria.

There have been no voltage excursions during the period from 1998/99 to 2007/08.

5.3 FREQUENCY

The Electricity Supply Regulation (Northern Ireland) 1991 permit variations in frequency not exceeding 2.5% above and below 50Hz, a range of 48.75Hz to 51.25Hz.

The NIE Grid Code (CC5.3) reflects these limits and constricts this criterion further to within 1% of 50Hz, a range of 49.5Hz to 50.5Hz.

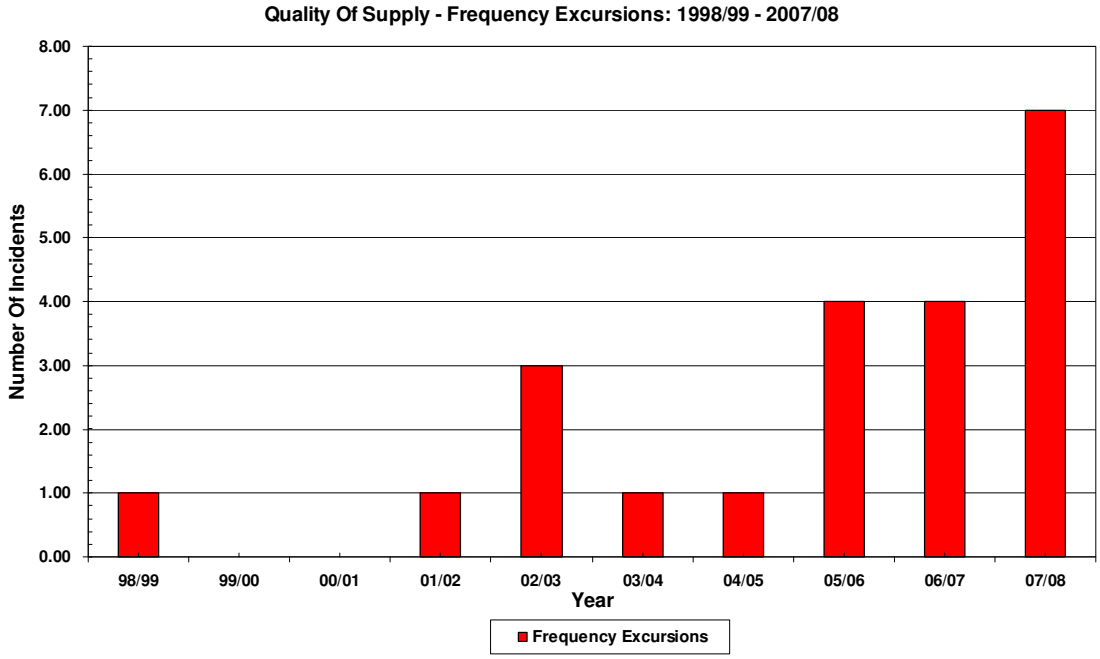
5.4 FREQUENCY EXCURSIONS

During 2007/08 there were seven reportable frequency excursions. The following table details these excursions.

Date	Time	Min/Max Frequency (Hz)	Duration outside reporting criteria <49.5: >50.5 Hz	Duration outside statutory limits <48.75: >51.25 Hz	Cause
01-Jul-07	10:41	49.388	00:02:44	-	Coolkeeragh C30 Trip
13-Jul-07	09:36	48.817	00:08:42	-	ESB Dublin Bay Trip
28-Dec-07	16:55	49.397	00:03:46	-	ESB Aghada U1 Trip
29-Jan-08	10:42	49.303	00:05:21	-	ESB Dublin Bay Trip
01-Feb-08	10:37	49.21	00:04:25	-	ESB Dublin Bay Trip
21-Mar-08	19:27	49.298	00:03:39	-	ESB Moneypoint Trip
30-Mar-08	15:15	49.29	00:01:12	-	Coolkeeragh C30 Trip

5.4.1 ANNUAL FREQUENCY EXCURSIONS

The following chart shows the number of frequency excursions for the last ten years.



The increase in frequency excursions is due to the increase in the number of incidents that resulted in the loss of a large generating unit. On all occasions, this did not result in the loss of any NI load.

In recent years, a number of large combined cycle gas turbine (CCGT) units have been commissioned on the Island. These units tend to be base load, higher efficiency plant, generating for a high proportion of the time. As the all-island generating plant portfolio tends towards a smaller number of larger units, then there is an increased possibility that frequency excursions will occur. It should be noted, however, that there were no incidents where the Electricity Supply Regulations (Northern Ireland) 1991 statutory limit of 2.5% was exceeded, and no customer disconnections occurred.