SONI LTD

SEVEN YEAR GENERATION CAPACITY STATEMENT

2003/04 – 2009/10

December 2003

SONI Ltd

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For the years 2003/04 to 2009/10

The information used to compile this statement is derived from SONI's own data. Whilst all reasonable care has been taken in the preparation of this data, SONI is not responsible for any loss that may be attributed to the use of this information.

December 2003

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1. EXECUTIVE SUMMARY

This 2003 Seven Year Generation Capacity Statement has been produced by SONI Ltd at the request of the Northern Ireland Authority for Energy Regulation (NIAER). The last Statement was produced in 1999 by the NIE Power Procurement Business when they had responsibility to ensure that adequate generation capacity was available to meet the generation security standard.

The Statement reflects the generation capacity position in the autumn of 2003 and includes committed generation developments for the period to 2009/10. It takes into account a new Combined Cycle Gas Turbine (CCGT) at Coolkeeragh and recently installed CCGT plant and contractual changes at Ballylumford (a generating unit at Ballylumford contracted to provide capacity for RoI is not counted in NI capacity). The Statement provides two scenarios, one based on high generator availability that also allows a small credit to wind generation (about 18MW credit for the 83MW installed in 2003) and a second scenario based on lower generator availability.

The year 04/05 notes an increase in available transfer capacity to RoI from 300MW to 330MW by synchronous interconnection. Some trades from Scotland on the Moyle High Voltage Direct Current (HVDC) Interconnector pass through the NI transmission system to RoI, but the entire capacity of Moyle is treated as being useable in NI under plant shortfall conditions. This is consistent with the methodology adopted by ESB National Grid for the treatment of these trades. It is assumed that the facility to increase the capacity of the Moyle Interconnector to 450MW in emergency conditions is available. However, there is no guarantee that energy can be purchased during emergencies.

Co-operation between the TSO's in Scotland, NI and RoI needs to be at a high level to ensure optimised security of supply. TSO/TSO arrangements are important in securing inter-area rescue flows and efficiency. Market designs should be cognisant of the importance of these arrangements if security and efficiency are not to be compromised.

Operating at the generation security standard implies that load shedding may be anticipated to occur every 1.43 years. The ratio of generation unit sizes to peak demand is high and any degradation of availability will impact on security of supply.

The Statement concludes that the committed levels of generation capacity operating at high availability levels comply with the generation security standard adopted to meet forecast NI demand. Where availability levels decrease then the standard may not be met.

2. INTRODUCTION

This statement of future generation capacity requirements is made by SONI Ltd, the Northern Ireland Transmission System Operator at the request of the Northern Ireland Authority for Energy Regulation (NIAER).

It covers the next seven years from 2003/04 to 2009/10 and shows projections of demand and contracted generation capacity for those years. It discusses the generation security standard that previously applied and assesses the ability of the capacity to meet demand to that standard.

Previous Seven Year Generation Capacity Statements included a section setting out a centralised plan to address any capacity shortfalls. Under the Electricity (NI) Order 1992 as amended by the Energy (NI) Order 2003 the Derpartment of Enterprise, Trade and Investment (DETI) and the NIAER carry joint responsibility for security of supply. With the introduction of market liberalisation in July 1999 as a result of the IME Directive (96/92/EC) the market is expected to provide adequate generation capacity. However, the latest Electricity Directive (2003/54/EC), to be implemented by 1 July 2004, requires Member States to put in place arrangements to provide a new capacity, which could be activated in the event of the existing or proposed capacity being insufficient to ensure security of supply. These arrangements are to take the form of a tendering or equivalent procedure on the basis of published criteria. It is the intention that this Statement would identify and highlight risks to security of supply if the market fails to deliver adequate generation capacity.

Since market liberalisation in July 1999 NIE has continued to monitor the generation capacity situation and highlighted issues to the Northern Ireland Authority for Energy Regulation (NIAER) and their predecessor. With the Authority's approval NIE has put in place short term arrangements to cover known capacity shortfalls.

3. GENERATED PEAK DEMAND FORECAST

3.1 Forecast Demand Data

The Transmission & Distribution system maximum demand data is based on totalised data from power stations, interconnectors, renewable generation etc. The forecast does not include the demand that was suppressed by customer private generation. (An estimate of customer private generation is made for the year ahead to assist in generation maintenance outage planning.)

Temperature has been found to have the greatest effect on demand compared with other meteorological factors. Temperature correction in the form of average cold spell (ACS) analysis is necessary to remove the demand variation caused by temperature, thus enabling the underlying demand growth rate to be determined more accurately. Historic ACS corrected demands are subjected to statistical analysis to calculate correlated trend lines and growth rate predictions.

3.2 System Maximum Demand

The actual 2002/2003 Northern Ireland system peak demand was 1635MW and occurred on 7 January 2003 at 17:25 hours.

The sent out profiles (including centrally despatched generator output, interconnector energy flows and embedded generation that is exported onto the network) for 7 January 2003 and 13 July 2002 are shown in Figure. 1 below. The graphs give an indication of the profile and volume of demand for winter peak demand and summer trough. On the 7 January 2003 the network utilisation is at a maximum around 17:30 hours; this maximum demand is as a result of coincidental usage patterns, for example domestic cooking load, lighting load etc. The graph does not include the demand that was suppressed by customer private generation; this is estimated at 80-120MW. The graphs represent the equivalent power sent out onto the transmission system. They do not include the power station auxiliary equipment power consumption and therefore do not total 1635MW for the 7 January 2003.

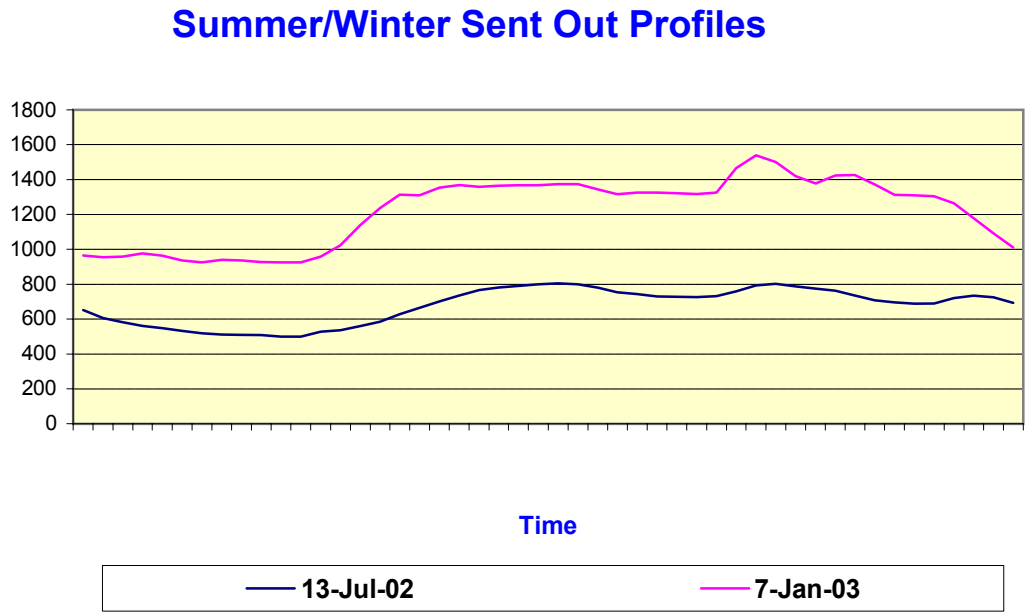

Figure 1

3.3 System Maximum Demand Forecast

The forecast (Figure 2) used in this statement is based on data up to and including the 2001/02 winter period and is corrected to ACS conditions.

	Generated Peak
2003/04	1669
2004/05	1699
2005/06	1731
2006/07	1763
2007/08	1796
2008/09	1829
	1863

Figure 2

Within the context of a global slow down the NI economy has performed reasonably well. Northern Ireland's relatively greater dependence on the public service sector and public expenditure has sheltered it to some degree from this global slowdown. Unemployment is now at low levels, however the Q1 2003 estimates for manufacturing show there was a fall of 1.4% from the previous quarter, and a decrease of 1.9% compared to the same period a year earlier.

The overall network energy growth (kWhr) predictions have reduced from growth rates in excess of 2% in the late nineties to a current prediction of 1.8%. NIE demand predictions take into consideration

exogenous factors such as the impact of Natural Gas and Energy Efficiency Initiatives. It should also be noted that the growth in peak demand has been consistently less than the growth in overall energy sales over the last ten years and the average annual growth in peak demand (MW) has been approximately 1% per annum. However, it is expected that this trend has exhausted the load factor improvements and both peak demand and overall energy sales will grow at similar rates in future.

4. CONTRACTED GENERATION CAPACITY

4.1 PPA Contracted Capacity

Plant contracted to NIE either under pre-vesting contracts or contracts negotiated thereafter totals to a maximum of 1658MW measured as output capacity at generator terminals. All of this capacity is assumed to remain committed for the duration of the period covered by this statement, with the exception of the two oil fired units at Coolkeeragh that have been assumed to cease operation in March 2005.

Generating Plant Capacities

Station	Fuel Used	Contracted Capacity MW (at peak)
Kilroot Unit 1	HFO/Coal	260/220
Unit 2	HFO/Coal	260/220
GT 1	Gas Oil	29
GT 2	Gas Oil	29
B'ford Unit 4 [1]	Gas/HFO	180[1]
Unit 5 [1]	Gas/HFO	0 [1]
Unit 6 [1]	Gas/HFO	[1]
GT 1	Gas Oil	58
GT 2	Gas Oil	58
CCGT A	Gas/Gas oil	250
CCGT B	Gas/Gas oil	250
CCGT D	Gas/Gas oil	106
C'Keer Unit 6	HFO	60
Unit 7	HFO	60
GT 8	Gas Oil	58
TOTAL		**1658**

The Kilroot units normally operate with coal firing however their capacity can be increased from 220MW to 260MW by oil firing. The gas turbines are gas oil fired with capacity reduced at non-peak times.[2] These capacity reductions are ignored for generation security purposes.

[1] During 2002/3, Units 4 5 and 6 at Ballylumford were replaced by new CCGT plant of similar total capacity. The NIE Power Procurement Business (PPB) subsequently swapped its contract for Unit 1 with Unit 4. Unit 4 now has a contracted capacity of 180MW. In addition, NIE PPB contracted with Unit 6 (also reduced to 180MW) for on-supply to ESB. This capacity is not counted in the calculation of capacity available for NI as it may be fully committed to RoI.

[2] For example Ballylumford GT1 has a capacity of 58MW but this is reduced to 53MW for operation at non-peak periods.

4.2 Renewable Generation

4.2.1 Non Fossil Fuel Obligation (NFFO) Capacity

Under the Non Fossil Fuel Obligation (NFFO), NIE signed contracts for approximately 15 MW DNC (Declared Net Capacity) of Non Fossil Fuel Plant on 1 April 1994 and 16 MW DNC on 4 September 1996. The commissioned schemes are shown in the table below and these contracts will start to expire on 31st March 2009. However, for the purposes of this statement, it is assumed all the plant will remain available until at least 2010.

Scheme Name	Technology		Capacity
NFFO1			
Rigged Hill	Wind	5000	2142
Corkey	Wind	5000	2142
Slieve Rushen	Wind	5000	2086
Elliott's Hill	Wind	5000	2142
Bessy Bell	Wind	5000	2098
Owenreagh	Wind	5000	2054
Harperstown	Hydro	250	250
Benburb	Hydro	75	75
Carrickness	Hydro	155	155
Park Mills	Hydro	30	30
Randalstown	Hydro	500	500
Blackwater	Hydro	100	100
Sion Mills	Hydro	780	780
Oakland's WTW	Hydro	49	49
Silent Valley	Hydro	435	435
Total NFFO1		32374	15038

NFFO2			
Lendrum's Bridge	Wind	5000	2141
Slievenahanaghan	Wind	1000	426
Blackwater Museum	Biomass	204	204
Brook Hall Estate	Biomass	100	100
Benburb Small Hydro	Hydro	75	75
Total NFFO2		6379	2946

4.2.2 Additional Renewable Generation

The following independent wind generation schemes have been connected to the NIE grid.

		Maximum Capacity (MW)	Date
Altahullion	Wind	26	April 2003
Lendrums Bridge	Wind	8.2	October 2002
Snugborough	Wind	13.5	October 2003
Total		**47.7**	

In 2003, the Department for Enterprise, Trade and Investment (DETI) announced its intention to place a renewable obligation on suppliers and to back this with a system of renewable certificates tradeable throughout the UK. The obligation equates to approximately 250MW of installed capacity by 2009/10. In the absence of better information the present installed capacity of 83MW has been increased in equal amounts each year. The incentives may deliver more than the obligation. The envisaged obligation is 6.3% by consumption by 2010. In addition a target of 12% by consumption has been set for 2012. This equates to installed capacity of approximately twice these figures.

4.3 The Effect of Contract Cancellation or Expiry on Contracted Capacity

In previous statements, the programme of plant available for meeting demand was considered under two scenarios, (i) assuming that on cancellation by the Director General that item of plant is taken out of service and (ii) by ignoring the possibility of cancellation by the Director General. Within the next seven years there is no difference between contract expiry and earliest cancellation dates, giving only one scenario.

Capacity Available to meet N. Ireland Demand

Year	Capacity Changes (MW)	Total Plant (MW)
03-04		2191
04-05	+ 28MW (renewables)	2219
05-06	-2×60 (C'K) [1] +400 (C'K)[1] + 28MW (renewables)	2527
06-07	+ 27.5MW (renewables)	2554.5
07-08	+ 27.5MW (renewables)	2582
08-09	+ 28MW (renewables)	2610
09-10	+ 28MW (renewables)	2638

[1] It is expected that a new CCGT plant will be commissioned at Coolkeeragh by early 2005, although this will not be subject to a Power Purchase Agreement with NIE. In the analysis presented in Section 4 we have assumed that the 2×60MW sets in Coolkeeragh will remain available until March 2005 by which time the CCGT is expected to be commissioned.

4.4 Interconnection

In 2002 a high voltage direct current (HVDC) link between Scotland and NI was commissioned. The installed capacity of the link is 500MW but the transfer capability is curtailed by certain network limitations on both sides. The available transfer capacity is therefore 400MW except in emergency conditions when it can be increased to 450MW. An Electricity Supply Agreement (ESA) for 125MW was agreed as part of the package to facilitate the construction of the link and this contract with NIE PPB lasts until late 2007. The remaining interconnector capacity is auctioned for up to three years ahead by the transmission system operator (TSO) in NI. While some of this capacity is purchased by market participants to facilitate transit energy flows to supply the RoI market, the capacity can, in emergency situations, be used to supply customers in NI. This is consistent with the methodology adopted by ESB National Grid for the treatment of market trades across the interconnector between NI and RoI.

The ESA with NIE PPB contains interruption rights, although energy can generally be obtained when required from the larger Scotland and GB system. It should also be noted that there have been occasions when energy has not been available during an interruption either for replacement or emergency assistance.

This assessment assumes the capacity of the Moyle as 450MW.

5. GENERATION SECURITY STANDARD

The generation security planning standard that applied until July 1999 was based on a disconnection rate of 70 days in 100 years and a voltage and frequency reduction rate of 140 days in 100 years at times of annual system peak demands. This statement uses this standard.

The method of calculation of the risk of failure for each year is a comparison of the probabilities of capacity being available with the probabilities of peak system demands, as follows: -

- The projected availabilities at peak periods of each item of plant are built into an available capacity probability distribution for each year.

- The top 50 days of the year when demand on the system is highest are considered to be the times of risk and a distribution of demands over those days is constructed, with the restricted ACS peak as the highest. No allowance is made for errors in demand forecasting.

- A failure occurs when demand is greater than available plant capacity. The probability of this occurring is the disconnection rate for that year.

- With increasing generating unit size the methodology adopted does not fully reflect the potential for capacity shortfalls at other periods outside the 50 peak demand periods.

5.1 Projected Availabilities at Peak Periods

Two projections of the availability of generating plant and interconnector capacity are considered.

- **A higher availability projection** - these figures are based on the average peak availability achieved by the generating units over the last 10 years and assumes this high level of availability continues to be achieved.

- **A lower availability projection** - these figures are given to show the effect on generation security of a fall back to a poorer standard of plant availability.

Projected plant availabilities and capacities during peak periods are shown for each year up to 2009/10 in Table 1.

Note that for the purposes of this analysis, the 60MW sets at Coolkeeragh are assumed to remain available until 31 March 2005 by which time the new CCGT is due to be commissioned.

Table 1
Projected Generator Availabilities & Capacities at Peak Periods

		Availability at peak periods		Generation Capacity						
				2003/4	2004/5	2005/6	2006/7	2007/8	2008/9	2009/10
Site	**Unit**	**High**	**Low**	**MW**	**MW**	**MW**	**MW**	**MW**	**MW**	**MW**
Ballylumford	G4	0.98	0.90	180	180	180	180	180	180	180
	GT1	0.97	0.95	58	58	58	58	58	58	58
	GT2	0.97	0.95	58	58	58	58	58	58	58
	CCGT A	0.98	0.95	250	250	250	250	250	250	250
	CCGT B	0.98	0.95	250	250	250	250	250	250	250
	CCGT D	0.98	0.95	106	106	106	106	106	106	106
Kilroot	G1	0.98	0.95	260	260	260	260	260	260	260
	G2	0.98	0.95	260	260	260	260	260	260	260
	GT1	0.97	0.95	29	29	29	29	29	29	29
	GT2	0.97	0.95	29	29	29	29	29	29	29
Coolkeeragh	G6	0.97	0.90	60	60					
	G7	0.97	0.90	60	60					
	GT8	0.97	0.95	58	58	58	58	58	58	58
	CCGT	0.98	0.95			400	400	400	400	400
Moyle	DC link	0.99	0.98	450	450	450	450	450	450	450
Renewables	*Note 1*	0.99	0.00	83	111	139	166.5	194	222	250
		Total Plant MW		**2191**	**2219**	**2527**	**2554.5**	**2582**	**2610**	**2638**

Notes

1. Renewable generation is assigned a capacity credit of 20% with 0.99 availability for the High Availability scenario and a zero capacity credit for the Low Availability scenario.
2. The availability figures for Ballylumford G4 take account of the presence of unit G5 which can be used as a replacement if required.

5.2 Peak Demand Which Can Be Met

The results of the assessment of particular plant totals against the generation security standard are shown in terms of peak demand which can be met by such plant capacity.

The peaks which can be met are calculated with results as follows.

Peak which can be Met (PWCBM) against Security Standard
Using **Higher** Availability Projection

Year	Total Plant MW	PWCBM MW
2003/4	2191	1868
2004/5	2219	1873
2005/6	2527	2115
2006/7	2555	2120
2007/8	2582	2126
2008/9	2610	2132
2009/10	2638	2138

Peak which can be Met (PWCBM) against Security Standard
Using **Lower** Availability Projection

Year	Total Plant MW	PWCBM MW
2003/4	2191	1671
2004/5	2219	1671
2005/6	2527	1884
2006/7	2555	1884
2007/8	2582	1884
2008/9	2610	1884
2009/10	2638	1884

6. NEW CAPACITY REQUIREMENTS

On the basis of projected demands and projected plant availabilities at peak periods, and assuming that any new arrangements for generation security are similar to the existing security standard, the over and under achievements of the security standard can be calculated.

Peak which can be Met (PWCBM) against Security Standard
Using **Higher** Availability Projection

Year	Total Plant MW	PWCBM MW	Projected Peak Demand MW	Generation Surplus/Deficit	Capacity Required MW
2003/4	2191	1868	1669	199	0
2004/5	2219	1873	1699	174	0
2005/6	2527	2115	1731	384	0
2006/7	2555	2120	1763	357	0
2007/8	2582	2126	1796	330	0
2008/9	2610	2132	1829	303	0
2009/10	2638	2138	1863	275	0

Peak which can be Met (PWCBM) against Security Standard
Using **Lower** Availability Projection

Year	Total Plant MW	PWCBM MW	Projected Peak Demand MW	Generation Surplus/Deficit	Capacity Required MW
2003/4	2191	1671	1669	2	0
2004/5	2219	1671	1699	-28	28
2005/6	2527	1884	1731	153	0
2006/7	2555	1884	1763	121	0
2007/8	2582	1884	1796	88	0
2008/9	2610	1884	1829	55	0
2009/10	2638	1884	1863	21	0

Notes

1. This analysis assumes a zero MW transfer to/from the ESB system.
   (ignoring exports from Ballylumford Unit 6 contracted for ESB).
   The interconnector has a N-S transfer capacity of 330MW
2. A possible future increase in the Moyle DC link capacity from 450MW to 500MW would yield an increase in PWCBM of 33-37MW.
3. Projected Peak Demand figures represent the Average Cold Spell (ACS)
4. Forecast generation does not include 118MW of demand suppressed by customer generation.

Under the high availability scenario the generation capacity standard is met in each year. There is a modest deficit in 2004/05 when the standard is based on the lower level of availability.

Operating at the generation security standard implies that load shedding can be anticipated to occur every 1.43 years. The ratio of generation unit sizes to peak demand is high and any degradation of availability will impact on security of supply.

7. CURRENT PLANS FOR NEW GENERATION

7.1 Coolkeeragh CCGT

A 400MW Combined Cycle Gas Turbine (CCGT) plant is expected to be commissioned at Coolkeeragh by early 2005. This plant is included in the calculation of PWCBM in the preceding sections of this document.

7.2 Interconnection with the Republic of Ireland.

The interconnection with the Republic of Ireland was re-commissioned in the spring of 1995. It has been used for short-term operational benefits and commercial trading.

The North-South available transfer capacity for the coming year has been increased from 300MW to 330MW plus a transmission reliability margin. NIE system stability limitations curtail transfer capacity.

The South-North transfer capacity for daytime commercial trading is 0MW and is constrained by the RoI transmission system. Trading in a South-North direction has been facilitated by the introduction of superposition.

At present the RoI has a shortfall in generation capacity and therefore there is limited trading in the South-North direction.

7.3 Opportunities for New Generation

<u>All-Ireland Perspective</u>

It is not sensible to deal with NI alone when discussing the opportunities for new generation. The reader should consider the plans for market evolution in both jurisdictions and refer to the RoI Generation Adequacy Statement produced by ESB National Grid (ESBNG).

<u>Interconnection</u>

Transmission system limitations constrain transfers into and out of NI despite interconnection between NI & RoI and between NI & Scotland. Studies part funded by EU are being undertaken between NIE and ESBNG to determine the most feasible alternative for increased interconnection capacity in the North-South and South-North directions. No schemes are at present being considered to increase

the tradable capacity of the Moyle DC link from 400MW to 500MW. In NI this would require an increase in capacity of transmission circuits operating at 275kV and some additional reactive support. By operating the Moyle at 500MW it would become the largest source feeding into the all-island system. To cover the contingency of the sudden loss of the Moyle link at 500MW would require the all-island system to carry additional spinning reserve.

Location of Generation in NI

NIE's 2003 Transmission Seven Year Statement deals with the issues of generation and demand location.