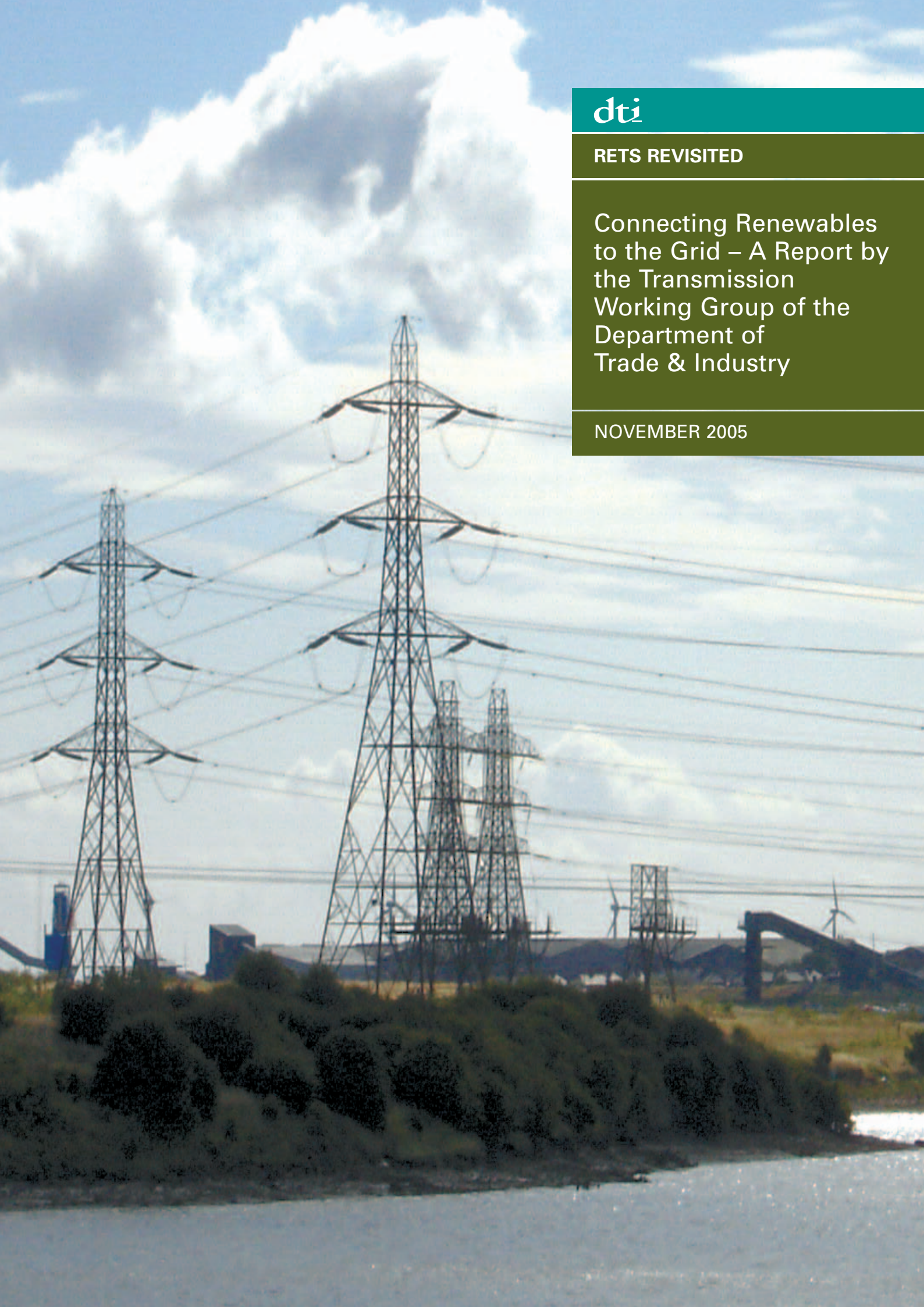

dti

RETS REVISITED

Connecting Renewables to the Grid – A Report by the Transmission Working Group of the Department of Trade & Industry

NOVEMBER 2005

dti

The DTI drives our ambition of 'prosperity for all' by working to create the best environment for business success in the UK. We help people and companies become more productive by promoting enterprise, innovation and creativity.

We champion UK business at home and abroad. We invest heavily in world-class science and technology. We protect the rights of working people and consumers. And we stand up for fair and open markets in the UK, Europe and the world.

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Glossary

BETTA	British Electrical Trading and Transmission Arrangements
DTI	Department of Trade & Industry
FSL	Final Sums Liability
NG	National Grid
Ofgem	The Office of Gas and Electricity Markets
RETS	Renewable Energy Transmission Study
SHETL	Scottish Hydro Electric Transmission Limited
SPT	Scottish Power Transmission Limited
SYS	Seven Year Statement
TIRG	Transmission Investment for Renewable Generation
TO	Transmission Owner (equivalent to Transmission Licencee)
TNUoS	Transmission Network Use of System

1 Summary

The aim of RETS Revisited is to review the progress that has occurred since the original RETS Report in June 2003. Given the large amount of wind generation planned, and the fact that much of it does not yet have planning consent or firm grid connection offers, it was felt that it would be helpful to take a further strategic look forward, rather than simply relying on the existing system to react to individual connection applications as and when required. RETS Revisited therefore:

- considers the current likely volumes of new renewable generation, the timescales for this generation to be ready for connection to the transmission system and transmission issues impacting on the delivery of projects.
- considers the effects on costs to the consumer of the rate of development of the transmission system in accommodating renewable energy to meet Government targets.
- makes recommendations for action in order to connect sufficient renewables to meet the 2010 target and the aspirations beyond to 2020.

Government policy is clear on the requirement for more renewable energy, and there is a market instrument, the Renewables Obligation, in place until 2027 which is driving the development of renewable projects. The Energy White Paper in 2003 recognised the need for the remodelling of the transmission grid to accept generation in new locations.

Wind will be the technology capable of delivering significant capacity by 2010 and beyond. By its very nature the technology has limited ability to respond to locational price signals. In order for new generation projects to be connected, there needs to be a parallel development of transmission infrastructure.

Transmission upgrades of over £560m were approved by Ofgem in December 2004[1]. These will assist the flows of electricity from Scotland. There is a need to ensure that these projects are not unduly delayed in construction. A review of the need for the linkage between upgrades to the Scotland-England interconnectors and Beauly-Denny line should be carried out now.

1 http://www.ofgem.gov.uk/temp/ofgem/cache/cmsattach/9631_28804.pdf

Levels of active consenting work for projects in Scotland and offshore have increased substantially, and will inevitably lead to increased demands on the transmission network. In addition to the review of the timing of the interconnector upgrade project referred to above, an urgent review should be undertaken to assess the case of whether upgrades to the Heysham and North East rings are now required. Current information indicates that conditions may have changed since the previous review was undertaken and that these works should be approved now to ensure timely connection of renewable generation throughout GB.

A lack of planned infrastructure upgrades will have serious implications for Government targets and aspirations out to 2020. Development of new infrastructure is a lengthy business, and decision delays will have serious implications on the ability to connect renewable energy projects.

The development of offshore wind farms requires a coordinated development of grid upgrades to ensure that capacity is available to coincide with the projected delivery of Round 2 projects. Existing proposals for new CCGT generation in similar locations to Round 2 projects, and to a similar time scale, also argues for a more coordinated approach. NG should be allowed to start work now on the planning of these projects to ensure timely implementation.

There is potential that new projects in Scotland and (to a lesser extent) England that obtain planning consent will not be able to proceed for many years because of the creation of the "BETTA queue". It is important that the rules surrounding this issue are reviewed so that differentiation between "real" projects which can be constructed immediately and less prospective projects can be achieved It is very difficult to establish who is sufficiently informed in order to make this distinction, and indeed on what basis they should do it. NG is not best placed to decide what projects are real or not, and indeed neither are Ofgem or the DTI. This would enable projects which can contribute to Government targets to progress more rapidly. It would be counter productive if projects were subjected to more onerous Final Sum Liabilities, and if projects that have obtained their consents are unduly delayed by the system.

2 Government Policy and Tartgets

The drivers for the renewable energy development take the form of Government targets, mechanisms to support the targets and aspirations beyond the targets. Demand for the connection of renewable energy sources to the transmission grid arise as a result of these drivers.
The Energy White Paper of 2003 set the framework for CO2 reductions of 60% by 2050. It noted, "We need to develop the existing transmission network to exploit our massive onshore and offshore wind resource." and "It is essential to create a network infrastructure capable of supporting and achieving our environmental objectives"[2]

UK 2010 target

The Government first stated a target for renewables to supply 10% of UK electricity demand by 2010 in 2000[3], and confirmed that target in the 2003 Energy White Paper[4]. The White Paper states "To hit the 10% target we will need to install approximately 10,000MW of renewables capacity by 2010..." The Government has put the Renewables Obligation in place to support the delivery of the UK 2010 10% target[5].

UK 2020 aspiration

The UK Government has an aspiration for renewables to generate 20% of UK electricity demand by 2020[6].

2 Our Energy Future – creating a low carbon economy – DTI, 2003, Section 4.25

3 Conclusions in response to the public consultation – New and Renewable Energy: Prospects for the 21st century (DTI, 2000). http://www.dti.gov.uk/renew/condoc/policy.pdf

4 Energy White Paper. Our energy future – creating a low carbon economy (DTI, 2003). http://www.dti.gov.uk/energy/whitepaper/ourenergyfuture.pdf

5 Renewables Obligation Order 2002; Renewables Obligation (Scotland) Order 2002; Renewables Obligation (Amendment) Order 2004; Renewables Obligation Order (Northern Ireland) 2005; Renewables Obligation (Scotland) Order 2005; Renewables Obligation Order 2005.

6 Energy White Paper, see footnote 2.

National targets

The Scottish Executive has set targets for renewables to generate 18% of Scotland's electricity demand by 2010[7], and 40% by 2020[8] (this equates to around 6 GW in 2020[9]). The Welsh Assembly has set a target of 4,000GWh to be produced from renewable energy sources by 2010, and a target of 7,000GWh from renewable energy sources by 2020. The Assembly Government has concluded that 800MW of additional installed capacity is required from onshore sources and a further 200MW from offshore wind and other renewable technologies in order to meet the 2010 target. A target for Northern Ireland has recently been set to generate 6.3% of electricity demand from renewables by 2012/13[10]

The Welsh Assembly has recently published Technical Advice Note (TAN) 8[11] to assist delivery of its renewable targets through the planning system. This identifies seven Strategic Search Areas (SSAs) each with indicative targets of installed capacity. The total indicative installed capacity for the seven areas is 1120MW. Substantial infrastructure will be required to support delivery of this level of generation.

There is a concern relating to the mid/North Wales areas where existing infrastructure is particularly sparse and the established regulatory mechanisms would not fund the required infrastructure. Discussions are progressing between the Welsh Assembly, Ofgem, NG and SP Manweb with a view to identifying a potential solution. These solutions might involve a TIRG style funding mechanism or existing DG incentives for the 132kV distribution infrastructure and any associated transmission infrastructure that is required. Given the lead times associated with such infrastructure projects it is crucial that these discussions are concluded as soon as possible to facilitate progress towards achievement of renewable targets.

7 Scottish Climate Change Programme (Scottish Executive, 2000). http://www.scotland.gov.uk/Resource/Doc/1050/0002275.pdf

8 Scottish Executive news release, 25/03/2003. http://www.scotland.gov.uk/News/Releases/2003/03/3412

9 Future Generation Group Report 2005: "Scotland's Renewable Energy Potential: Realising the 2020 Target" http://www.scotland.gov.uk/Publications/2005/06/17152613/26155

10 Renewables Obligation Order (Northern Ireland) 2005.

11 http://www.wales.gov.uk/subiplanning/content/tans/tan08/newtan8/tan8-e.htm

The Renewables Obligation mechanism to 2027

The Renewables Obligation mechanism requires electricity suppliers in the UK to source a percentage of their electricity demand from eligible sources of renewable energy. It provides a powerful and sustained incentive for developers to bring forward new renewable projects and so underpins the achievement of Government targets. There are three separate statutory instruments for England and Wales, Scotland and Northern Ireland. The percentage obligation for England, Wales and Scotland increases annually until 2015/16 and then remains constant at 15.4% until 2027. The percentage obligation for Northern Ireland increases annually until 2013 and then remains constant at 6.3% until 2027. Suppliers can meet this obligation by presenting Renewable Obligation Certificates (ROCs) to the regulatory authority, or by paying a buy-out fund contribution equivalent to £30/MWh (in 2002, rising annually with the Retail Price Index) or by a combination of the two.

The Renewables Obligation is currently under review, the first consultation period having closed in June 2005[12].

Implication for GB Wind Capacity

It is recognised that wind energy will be key to delivering the UK target[13,14]. In GB the most economic and accessible onshore wind resource is some distance from the main load centres of the southeast. New onshore wind generation will in general contribute to existing north-south transmission power flows. Therefore the interaction of wind and transmission issues in GB is key to the delivery of the UK 2010 target and 2020 aspiration.

The Energy White Paper set a target of 10% of the UK's electricity supply from renewable energy sources by 2010. As wind energy is the most economically competitive form of renewable technology with scope for expansion, it is likely that most new renewable capacity between now and 2010 will be wind generation (both onshore and offshore).

12 Renewable Energy – 2005/6 Review of the Renewables Obligation Preliminary Consultation (DTI, 2005). http://www.dti.gov.uk/renewables/renew_2.2.5.htm

13 2005-6 Review of the Renewables Obligation: Preliminary Consultation Document (DTI, 2005). http://www.dti.gov.uk/renewables/policy_pdfs/renewobligarevreport.pdf

14 Wind Power in the UK: A guide to the key issues surrounding onshore wind power development in the UK (Sustainable Development Commission, 2005).

3 Progress To Targets

Installed renewable capacity, and installed wind capacity, for the UK is shown in Appendix 2. This section is specifically about wind in GB.

At the end of July 2005, the installed capacity of wind generation in GB was 1000 MW (124 MW offshore)[15]. Annual build rates for wind in GB are shown in Appendix 2. 663 MW (180 MW offshore) is currently under construction. A further 1179 MW onshore (see Appendix 3) and 903 MW offshore are awaiting construction.

More that 6GW of onshore projects have currently made applications for consent approval by the relevant authorities in Scotland. In England and Wales it is expected that over 6 GW of offshore Round 2 projects will be submitted to the consents process by June 2006 in addition to onshore project consent applications. At the same time, NG stated[16] that there were 14GW of wind applications in Scotland. However Scottish Ministers have made clear their belief that many of these proposals are either speculative or will not meet the high standards of planning guidelines. Their target is 6 GW installed renewables capacity by 2020, although they have said that this figure is not to be regarded as a cap.

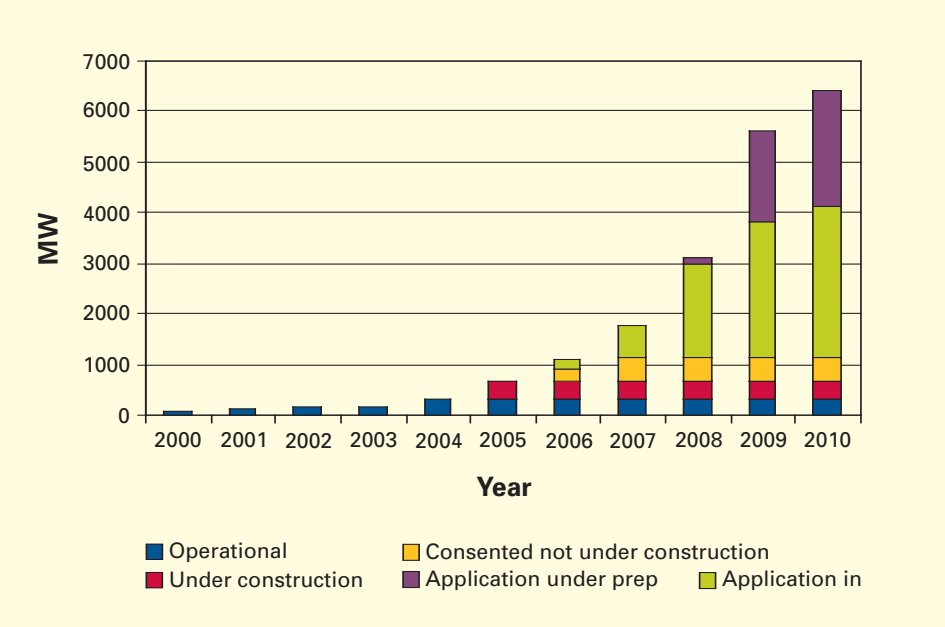
With the current rate of success with renewable projects in the consenting process, and with network infrastructure projects approved by Ofgem in the TIRG report constructed on time, progress towards achieving the 10% 2010 target is encouraging. Continued progress will be required to move towards the 20% aspiration for 2020.

However it must be stressed that this progress is dependant on access to grid being available at the appropriate time.

15 Figures derived from Digest of UK Energy Statistics 2003 (DTI, 2003) and British Wind Energy Association data. http://www.bwea.com/statistics/

16 NG presentation to Renewables Advisory Board Offshore Wind Group June2005

Figure 1. Cumulative total installed capacity in Scotland, onshore



4 Grid Development

Normally grid reinforcements are proposed and reviewed during the price control process. This normally happens every 4 to 5 years, and applications are made to Ofgem by the transmission companies. The next review is scheduled to be completed by April 2007.

The rate of development of wind energy has meant that Ofgem conducted a specific review for works proposed by the Transmission Companies and in December 2004 they published their conclusions in the Transmission Investment for Renewable Generation (TIRG). This approved projects with over £560m of baseline capital expenditure.

The key developments were the Beauly-Denny line upgrade and interconnector upgrades between Scotland and England. Crucial in the conclusions was the linkage between the 2 projects. This linkage could, if there are planning delays for the Beauly-Denny project, delay the construction of the interconnector upgrade thereby increasing the constraints costs borne by customers.

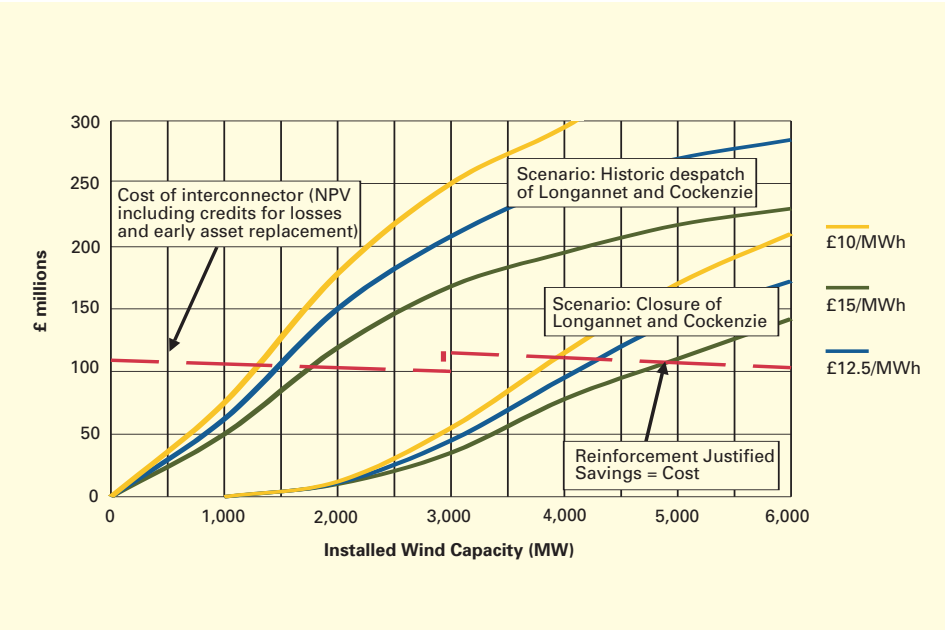
TIRG[17] concluded that interconnector reinforcements are economically efficient if 4-5 GW of wind in Scotland is connected in 2010.

In making the assessment of the 4-5 GW economic threshold, the TIRG assumed that Longannet and Cockenzie would close or be displaced in the market and that constraint costs would be 10-15 £/MWh (based on the data provided in the SKM report[18]), as shown in Figure 2. The high volume of constraints based on the operating regimes of Scottish Generators post BETTA indicate that the economic threshold for reinforcement may be closer to 1-2GW rather than 4-5GW. There is over 450MW of wind currently operational in Scotland, in excess of a further 450MW under construction, and over 700MW with planning consent. Achieving a figure of 1-2GW of wind before 2010 therefore has a high degree of certainty, regardless of Beauly-Denny.

17 Transmission investment for renewable generation. Final proposals 288/04. (OFGEM, 2004)

18 Technical evaluation of transmission network reinforcement expenditure proposals by licensees in Great Britain. (Sinclair Knight Merz, 2004)

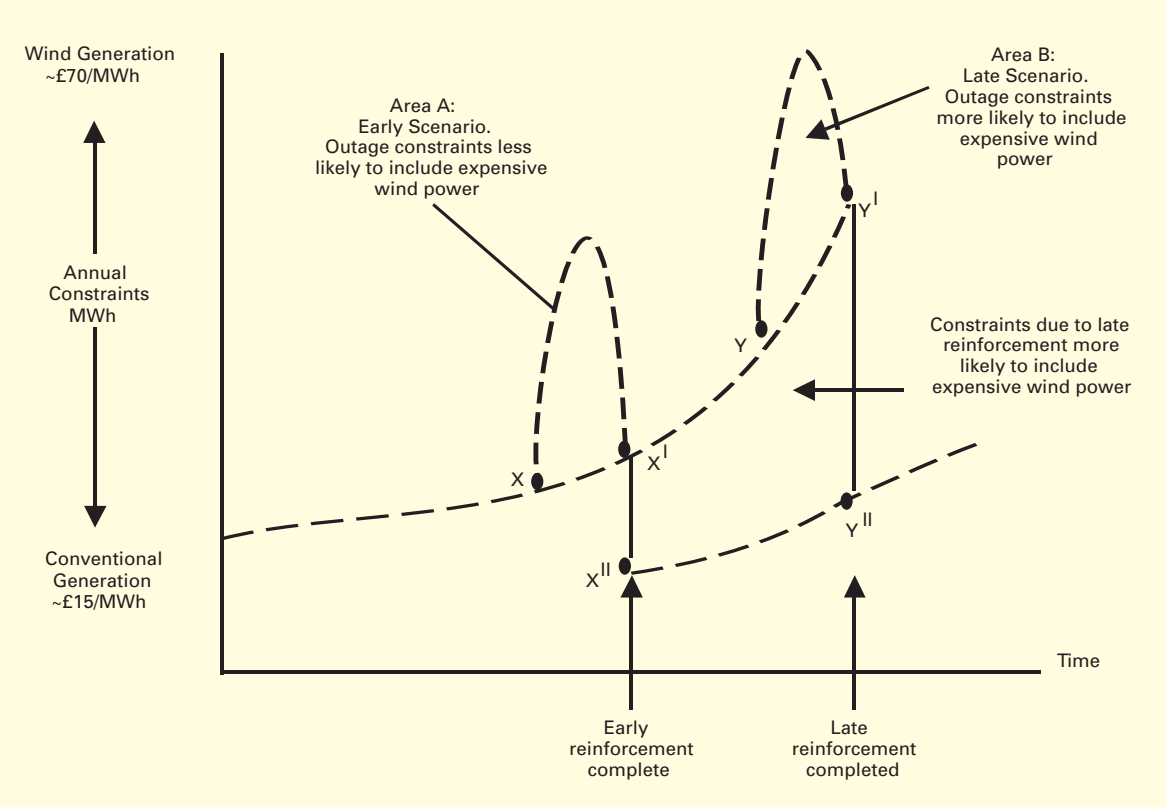
Figure 2. TIRG figure 5: Comparison of capitalized saving in constraint and investment costs for the interconnector project.



If the interconnector upgrades are made later than the economically optimum time, there are significant additional costs to the consumer due to the following issues.

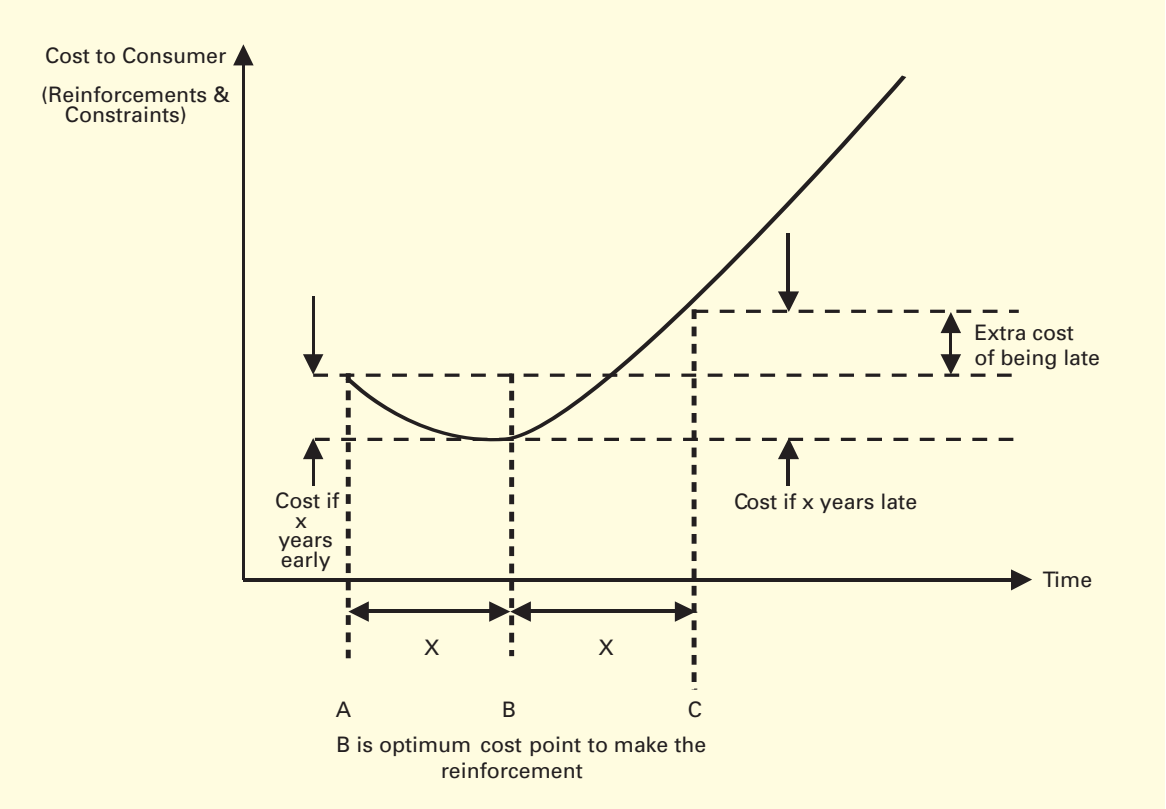
1. Annual constraint costs increase over time (the two dashed lines in Figure 3). Reinforcement during the period X – X′ (constraint levels then falling to X″) takes place during a period of lower overall constraint levels. Reinforcement during the period Y – Y′ (constraint levels then falling to Y″) takes place during a period of higher overall constraint level.
2. Upgrades require outages, which will result in additional constraints. These constraints are shown in Figure 3 as areas A and B. As upgrades are delayed, associated outages will require constraint of increasing levels of connected wind energy.
3. Assuming wind energy penetration increases over time, more wind energy will be constrained during outage periods for later reinforcement work. Therefore, later upgrades not only result in additional constraint costs due to the increase in annual constraint cost, but they are more likely to require constraint of wind energy, until the reinforcements can be completed.
4. Wind energy has much higher constraint costs compared to conventional plant (estimated in the TIRG at ~70 £/MWh, compared to 10-15 £/MWh for conventional plant). Therefore, whilst the amount of outage constraint during reinforcement work will be similar for the early (area A) and late (area B) reinforcement, the cost of that constraint will be much higher.

Figure 3. Two Scenarios Early & Late Reinforcements



Although the economic optimum capacity to complete each reinforcement can be determined, the optimum time to complete the reinforcement cannot be accurately determined in advance due to uncertainties. In this case these are the uncertain development rate of wind energy and the uncertain behaviour of existing generators. If the reinforcement is undertaken too early, consumers will bear the costs of capital on that investment until the optimum date is reached. If the reinforcements are too late, consumers will bear the additional costs of constraints (as outlined above). The costs of being too late or too early are not symmetrical, as shown in Figure 4, so for example being X years too early in reinforcement is less costly to the consumer than being X years too late. Therefore the comparative risks of being late or early should be assessed.

Figure 4. Effect of mistiming reinforcement on cost to the consumer.



When the interconnector upgrade is determined as economic and started it should be completed in four years, moving the critical North-South boundary from the interconnector circuits to the North East and Heysham ring circuits.

NG has indicated that the concurrent completion of the interconnector, North East and Heysham ring reinforcements would take seven years to complete simultaneously, and thirteen years to complete sequentially, due to the outage program required.

NG have stated[19] that an extra 2.5 to 3.5 GW of wind in Scotland will trigger the Heysham ring reinforcement. NG expect this wind capacity will be achieved in seven years (regardless of Beauly-Denny). Under this scenario, the Heysham and North East ring reinforcement may be economically efficient.

Recommendation

Current information available should be reviewed now to determine whether an immediate start on reinforcements of the interconnector, North East and Heysham rings is now justified, taking into account the timescales for reinforcements plus the uncertainties in the rates of wind farm development and in existing generator behaviour. This all has to take place in the context that early investment can lead to inappropriate assets being constructed, and that too late investment will delay efficient use of new generation assets.

19 NG presentation to Renewables Advisory Board MOWW group June 2005

5 Offshore Wind Develpment: Round 2

Fifteen round two offshore projects totalling 7169MW are currently in development, of these twelve projects totalling 5469MW are sited off the east coast of England, and hence due to be connect to the eastern side of the GB transmission network in the Humber, Greater Wash and Thames areas. Assuming all these projects obtain consents, they are predicted to commission as in the table below.

Year	MW Commissioned (Predicted)
2008	300
2009	1415
2010	1100
2011+	2464
Total	**5469**

In addition, NG has indicated that there is renewed interest in developing combined cycle gas turbine (CCGT) generation on the eastern side of the country (close to the landfall of the major gas pipelines). Indeed three large CCGT projects close to those areas of the East Coast identified for offshore wind have already been granted Section 36 consent, as shown below.

CCGT project	MW Capacity
Immingham CHP stage 2	475
Isle of Grain	1200
Keadby 2	710
Total	**2385**

19 NG presentation to Renewables Advisory Board MOWW group June 2005

The connection of such large amounts of generation is likely to require significant transmission upgrades or reinforcement and hence involve an extensive outage programme to accommodate the works. The delivery of this outage programme is likely to be exacerbated by increased north – south flows due to the connection of new generation capacity in Scotland, northern England and North Wales. Should the reinforcements required for both the Round Two offshore wind and the proposed CCGT developments not be identified in advance, allowing a co-ordinated reinforcement outage programme to be planned and executed, then unnecessary constraint costs could be incurred. In addition, undue delays may be imposed on the commissioning of the round two offshore and CCGT projects, which may threaten delivery of the Renewables Obligation targets beyond 2010.

An increase in constraint costs and a significant and sustained shortfall under the Renewables Obligation could both result in additional costs to the consumer for each MWh of electricity generated.

Recommendation

It is recommended that NG be given regulatory approval to commit sufficient funds to undertake an assessment of the transmission network reinforcements, outages and costs necessary to connect the Round Two offshore projects off the east coast and the proposed CCGT developments in the most cost efficient manner and commence relevant planning work. A possible route for further consideration is whether a comfort letter on expenditure could be issued to allow efficient investment to go ahead, akin to those issued during the RETS planning stage.

6 The Connection Queue

Following the creation of the GB wide transmission network, generators require a new connection agreement with the GBSO (National Grid). Transmission applications are assessed against the GB generation and demand background and interconnector flows are not contractually limited; however there is limited capacity on the GB Transmission System. For this reason applications are assessed in strict order and a GB Queue (the BETTA queue) has been established to formalise the order in which connection agreements will be offered and transmission applications processed.

The BETTA queue contains four categories:

1. Existing Users of the system prior to 1st September 2004
2. Existing Users of the system post 1st September 2004
3. Existing Applicants prior to 1st January 2005
4. Existing and new Applicants post 1st January 2005

Existing Users of the system (Category 1 and 2) will have already received their GBSO offers. The intention now is that Category 3 applicants will receive their GBSO offers by April 2006. However Category 4 applicants may have to wait a considerable time to receive their GBSO offers.

There are concerns about how this could delay the commissioning of projects. Category 3 projects with planning consents may be delayed until April 2006 for connection offers. There will then be a further delay while transmission grid connections are constructed. There is then the possibility that Category 4 applicants who receive planning consent and are ready to construct again are unable to connect to the transmission system due to their place in the BETTA queue. These projects will be delayed potentially until 2012 or beyond whilst waiting for GB reinforcements to be undertaken. There is currently a review of GB SQSS which may alleviate some of these problems.

NG has consulted on the issue and published their conclusions in July 2005. Key is that liabilities will be shared across users, that Final Sums Liability periods will be extended from 6 months to 12 months, and that, if projects drop out, they will be offered to projects in the queue.

The proposals for moving applicants up the queue if capacity becomes available take no account of consent status. Capacity earmarked for Category 3 applicants who later withdraw from the queue (e.g. due to failure to obtain consent) could be made available to Category 4 applicants who have a consent, thereby enabling connection and effectively delivering renewables capacity.

Due to licence conditions introduced by Ofgem on NG, these proposals are unable to prioritise projects that have achieved their project consents, and there appears to be an increase in the potential liabilities under Final Sum Liability calculations.

There is a risk that the consumer will be paying for the Renewables Obligation whist the connection queue is preventing developers completing projects that would deliver the obligation and Government targets.

Recommendation

That urgent discussions continue between NG, Ofgem and DTI to ensure that efficient generation is connected as soon as possible,

Appendix 1
Renewables Obligation targets

Table A1.1. Amount of the Renewables Obligation, England, Wales and Scotland.

Obligation period	Percentage of total supplies
1st April 2002 to 31st March 2003	3.0
1st April 2003 to 31st March 2004	4.3
1st April 2004 to 31st March 2005	4.9
1st April 2005 to 31st March 2006	5.5
1st April 2006 to 31st March 2007	6.7
1st April 2007 to 31st March 2008	7.9
1st April 2008 to 31st March 2009	9.1
1st April 2009 to 31st March 2010	9.7
1st April 2010 to 31st March 2011	10.4
1st April 2011 to 31st March 2012	11.4
1st April 2012 to 31st March 2013	12.4
1st April 2013 to 31st March 2014	13.4
1st April 2014 to 31st March 2015	14.4
1st April 2015 to 31st March 2016	15.4
Each subsequent period of twelve months ending with the period of twelve months ending on 31st March 2027	15.4

Table A1.2. Amount of the Renewables Obligation, Northern Ireland

Obligation period	Percentage of total supplies
1st April 2005 to 31st March 2006	2.5
1st April 2006 to 31st March 2007	2.6
1st April 2007 to 31st March 2008	2.8
1st April 2008 to 31st March 2009	3.0
1st April 2009 to 31st March 2010	3.5
1st April 2010 to 31st March 2011	4.0
1st April 2011 to 31st March 2012	5.0
1st April 2012 to 31st March 2013	6.3
Each subsequent period of twelve months ending with the period of twelve months ending on 31st March 2027	6.3

Appendix 2
Installed renewable capacity

Figure A2.1. Installed capacity of all renewables sources[20].

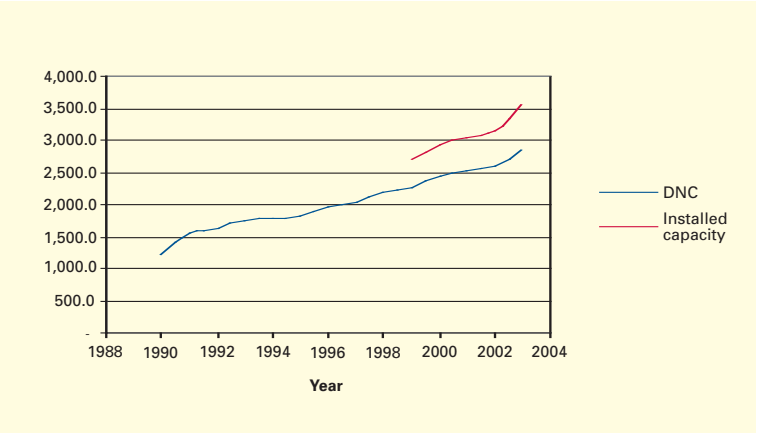


Figure A2.2. Installed wind capacity[21].

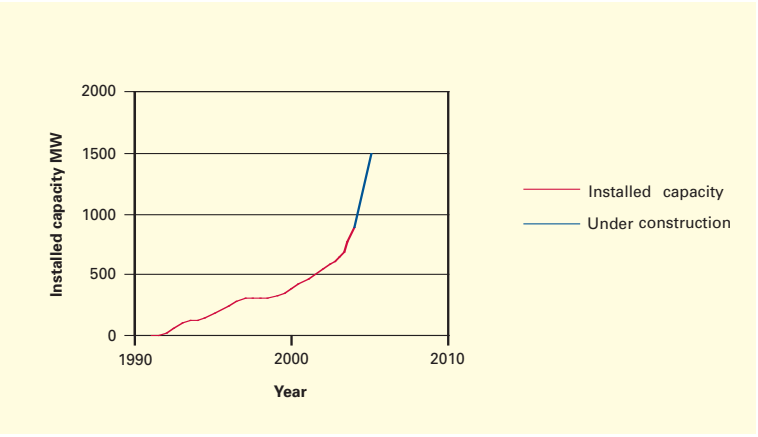
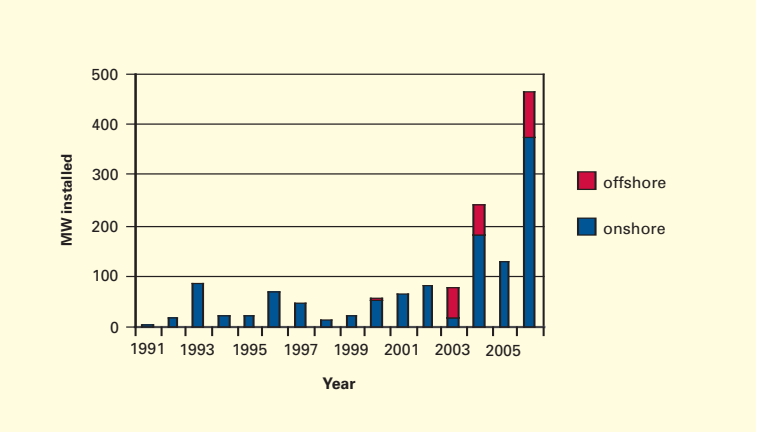


Figure A2.3. Annual build rates for wind in GB.



20 Digest of United Kingdom Energy Statistics (DTI, 2004). http://www.dti.gov.uk/energy/inform/dukes/dukes2004/index.shtml

21 British Wind Energy Association 2005. http://www.bwea.com/map/list.html and http://www.bwea.com/map/2005.html

Appendix 3
Renewable energy projects currently in the planning system

Technology	Operational
Biomass	64.79
Co-firing	
RO Hydro	680.50
Landfill gas	685.03
Off-shore wind	66.50
On-shore wind	703.88
Sewage gas	110.18
Wave and Tide	0.50
Photovoltaics	6.00
Existing large hydro	909.00
Waste	397.88

Installed Capacity (MW) currently in consenting system

Post consent			Pre consent
Under Construction	Awaiting Construction	Application being considered	Application being prepared
	69.80	30.00	63.25
11.88	12.15	117.67	18.12
48.81	100.02	24.81	38.76
524.6	743.18	6,545.47	2,561.24
	0.55		
	4.55		0.91
	7.29	0.15	
46.35	57.60	33.90	100.57

Notes

1a) Operational data has been obtained from the DTI's RESTATS database, maintained by FES (http://www.restats.org.uk/).

1b) The above operational data is from 2003. Data for 2004 is due for publication in June 2005. Results from a 6-month review will be available shortly afterwards (but the latter will be for DTI eyes only).

1c) RESTATS data includes all operational schemes, including those resulting from Section 36 consents. The planning data excludes S36 schemes, however, it is intended that this information will be included in the future.

2) All other data is obtained from the DTI's RE Planning Monitoring database maintained by Land Use Consultants (under contract to DTI).

3) 'Declared Net Capacities' (DNCs) are recorded in the 'Planning' database. Published DTI conversion factors have been used to derive 'Installed Capacity' for each scheme.

4) 'Planning data' is updated on a monthly basis, and all local planning authorities in the UK are contacted once every three months, along with a minimum of 50 renewable energy developers.

Appendix 4
Assumptions used in developing onshore wind penetration scenario

Figure 1 shows a wind penetration scenario for onshore wind in Scotland. This makes use of the following data sources.

- BWEA data for existing wind installations in Scotland
- BWEA data for wind installations under construction in 2005
- Section 36 data for projects with consent which are not yet under construction
- Section 36 data for projects which have applied for, but not yet received, planning consent
- Section 36 data for projects for which a scoping opinion has been prepared, is underway or for which an application is awaited

The scenario therefore only relates to large developments of greater than 50MW.

The year in which a project is assumed to be built, for the scenario, is based on the following assumptions.

- 75% of applications receive consent
- The annual build rate never more than doubles
- Projects larger than 200MW are built in phases of no more than 150MW per year
- It takes three years from consent to construction
- It takes one year from consent application to receipt of consent
- It takes one year from a scooping opinion to submission of an application

Appendix 5
Transmission Reinforcements

Transmission Price Control Review

The Transmission Price Control review is intended to allow the Transmission Owners (TOs) to finance certain costs attributable to, and efficiently incurred in the operation of their transmission businesses, including an appropriate return on their regulatory asset base.

The objectives of the price control review process are: -

I. To ensure the TOs can finance their licensed activities

II. To enable quality of service to be maintained; or approved appropriate new investment to be financed

III. To ensure that the prices charged to the TOs' customers (by the system operator) are no higher than necessary to fulfil (I) and (II)

IV. To provide incentives to ensure that the TOs maintain an appropriate balance between the quality of it's services, efficient capital investment, efficient operating expenditure and efficient financial management.

The price control allows the recovery of allowed revenues that are agreed with Ofgem at the periodic reviews. As part of the review process, the TOs submit their assessments of future operating expenditure requirements and capital expenditure forecasts for the review period. The revenues that the TOs are allowed to recover during the price control period are then determined by Ofgem after an independent evaluation of these forecasts.

Unless the have been deemed economically efficient in advance, TOs investments will be considered retrospectively by Ofgem. If Ofgem considers investments made by TOs are not efficient the TO will have to bear the cost of the investment and not be able to recover these costs. This situation makes the TO wary of committing to "unapproved" transmission investments.

Reinforcement timescales

Where reinforcements involve reconductoring of lines and changing equipment in existing substations, these works can be carried out without seeking planning permission. The limits on timescales are therefore related to the time taken for the works and securing outages on the network at appropriate times of the year to limit additional constraint costs and risks to the security of the network.

Substation reinforcements may require extensions to the substations with land acquisition and planning and therefore extended timescales.

Where new lines are constructed (as the North Yorkshire line) or reconstructed at higher voltages (as Beauly Denny) timescales are much longer due to the extensive planning, consultation and probably public enquiry stage. The former line took 15 years from announcement to completion.

These timescales must be taken into account in meeting the government's renewable energy aspirations and moving to a low carbon economy.

The RETS report

The RETS report of June 2003 by the three transmission licensees (SHETL, SPT, NG) assessed the connection of 2GW, 4GW and 6GW of additional renewables in Scotland and the recommended the staged reinforcements required to accommodate this.

Overview of transmission reinforcement requirements

The table below provides an overview of the potential transmission reinforcements required to support renewables. This includes those projects that were assessed under Ofgem's TIRG project but also lists others that might be required depending on the locations where generation actually connects

Reinforcement	TIRG Category	Forecast Completion Date	Status/Comments
1 Beauly-Denny	Baseline	2008	SHETL/SPT area
2 Sloy	Baseline	2008	SHETL/SPT area
3 South West Scotland	Baseline	2009	SPT area
4 Scotland-England Interconnector	Baseline	2010	SPT/NG area
5 Beauly-Blackhillock	-	2010	SHETL area
6 Penwortham QBs	-	2010	NG area
7 Beauly-Keith	Additional	2012	SHETL area
8 North East Ring	Incremental	2012	NG area
9 Heysham Ring	Additional	2012	NG area
10 SHETL 400kV Ring	-	2014	SHETL/SPT area
11 Kincardine – Denny – Strathaven	-	2014	SPT area

Note: "-" indicates that the identified reinforcement was not assessed under TIRG.

Appendix 6
Membership of Transmission Issues Working Group / Transmission Working Group

(as at 1 July 2005)

National Grid
Jon Carlton
Andrew Hiorns
Lewis Dale

Scottish Hydro Electric Transmission Limited
Mike Barlow
David Densley

Scottish Power Transmission Limited
Jim Sutherland
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David Gray
Andrew Walker

Welsh Assembly Government
Ron Loveland

Scottish Executive
Neil Stewart

DTI
Kristian Armstrong
Richard Mellish
John Overton
Philip Baker
David Gray
David Still