ONSHORE TRANSMISSION ASSETS AND RISKS ASSOCIATED WITH RENEWABLE PROJECTS WITH POTENTIALLY LIMITED LIVES

INTRODUCTION

CEPA and SKM have been requested by Ofgem to prepare a short note considering issues linked to asset lives for dedicated assets where the connected asset has an economic life less than the technical life of the dedicated transmission asset.[1]

This note is structured as follows:

- a clear statement of the issue is provided;
- discussion of the key factors that influence the choice of appropriate asset life for the dedicated transmission asset is then provided;
- a simple model of the impact of different asset lives is used to assess the impact if a shorter asset life was used; and
- a summary of the analysis and then a recommendation as to how Ofgem should address this issue.

A series of technical annexes support this short note.

THE ISSUE

The growth of potentially short-lived renewable generation may create an issue for the economic life of onshore transmission assets that are dedicated to the export of the power. For example, the initial expected life of off-shore wind generation is 20 years but the life of the dedicated onshore transmission line and associated assets is expected to be in excess of 50 years.[2] Should those dedicated assets have a 20 year life and consequently reduce the overall average economic life of transmission?

In answering this general question there seem to be three specific questions that need to be addressed:

1. What assets are required for the dedicated transmission links and how important are they in relation to the MEA or RAB of the sector? (It should be noted that the importance is likely to be different for each of the three transmission companies in Great Britain.)
2. What proportion of those assets are funded through customer contributions? Further, of the non customer funded assets do any have alternative uses or re-sale values? And

[1] This note has been commissioned by Ofgem. However, the views expressed are those of the consortium alone. The consortium members accept no liability for use of this report or any information contained therein by any third party.

[2] With an even longer technical life of over 70 years.

3. Is the service being provided by the dedicated transmission assets likely to be required beyond the life of the initial asset for which they were built?[3]

This paper addresses these questions with the third question being addressed within the framework of the scenarios prepared for the previous main economic lives project.

We will also utilize some simple modelling to test the implications of a lower asset life. Given the possible divergence between the three transmission companies consideration is given to the different positions they may face and utilize SSE's recent consultation document as a basis for some short-term assessment alongside our original longer term modelling.

There is also a linked question that is touched upon. There are existing examples of "stranded" dedicated assets (this was the case for Pembroke) which have been treated as part of the network and recovered over their regulatory life even though the economic life had ended. Consequently a change for these new dedicated assets needs to be put into the context of the existing approach.

DISCUSSION

The long-term network development scenarios discussed in the CEPA Economic Asset Lives Report[4] based on the Ofgem LENS scenarios indicate that in the future electrical demand is expected to grow substantially in order to meet the UK environmental aspirations. This growth in demand will require a considerable increase in investment in network reinforcement and new generation. In this context most assets currently installed and due to be installed in the short and medium term can be expected to be needed well beyond the end of their technical lives. In other words, for most network assets their economic lives will match their technical lives.

However the expected increased use of electricity in the future does not imply that all network assets will be needed or that there is no risk of network assets becoming stranded. The economic lives of certain generation assets can be much shorter than that of the network assets that connect them to the network. Typically generation assets lives are shorter than the technical lives of network assets, for example around 30 years for a thermal power plant or around 20 years for a wind project compared to 45-55 years for most transmission assets. When the generation project using the connection is decommissioned most of the connecting assets with longer technical lives could then become stranded. Is it then appropriate to consider shorter economic asset lives for these directly generation-linked network assets? (i.e. generation spurs)

Furthermore, many reinforcements of the transmission networks in the UK are required not because of one or a few generation projects but because of the increased amount of power flows from multiple renewable sources, for example from Scotland into England and from offshore locations towards the main demand centers in the onshore networks. The need-case for these assets rests on cumulative connections from renewable generation projects. In the case of SSE for example, over £3bn of their planned investments for the next 10 years (in a company with a

[3] It should be noted that the answer to this may raise questions about the 20 year life assumed for the offshore transmission assets, but the implications of this are beyond the scope of this project.

[4] http://www.ofgem.gov.uk/Networks/Trans/PriceControls/RIIO-T1/ConRes/Documents1/CEPA%20Econ%20Lives.pdf

RAB value of circa £400 million) are justified on the basis of cumulative renewable connections. Is it then also appropriate to extend the concept above and consider also shorter economic lives for these "renewable generation" driven network assets not necessarily connected to any specific network project? (e.g. Scotland-England bootstraps)

In considering the two questions above we have first looked at the policy developments in the recent past and also to published long term scenarios for the electricity sector. The full analysis is shown in Appendix A - Low Renewable Scenarios beyond 2020 (are there any?).

It is concluded that, not only has there been a continuous policy drive to increase the contribution of renewables in the energy mix during the recent past, but also that no published scenarios appear to anticipate a fall in the contribution of renewable generation beyond 2020 in GB. We conclude therefore that most renewable projects can be expected to be re-powered and redeveloped beyond the time when they reach the end of their economic lives, or replaced with other renewable projects, and that the risk of the network investments required to connect that generation into the network and transfer its power through the network is negligible. One of the factors that is likely to influence this ongoing use of existing sites (apart from the 50 year licences granted to the developers) is the fact that the offshore transmission associated with existing projects will have already been fully depreciated. If demand for new renewable projects exist, other unconnected sites would need significantly greater financial returns to overcome the benefit of the fully depreciated (but operational) off shore transmission links at the existing sites.

Although from the above it is possible to conclude that it seems unlikely that those network assets that are justified on the basis of multiple projects will become stranded, it cannot be totally discarded however that there could be a very small number of projects with dedicated connection assets that may become stranded (i.e. spur generation). This has already happened in GB in the case of some network investments made to connect thermal power plants. For example, the 2000 MW Pembroke Power Station in Wales was connected via two 400kV double circuit lines in 1968. This plant was mothballed less than 30 years later in 1996, and (at least) one of the double circuit lines has been mothballed since (although a new gas-fired power station, Pembroke B, is currently under construction and expected to be commissioned by 2012).

The proportion of the total investment depending on a few renewable generation projects is relatively small. In the case of SSE, the company with largest renewable driven network investment in the UK relative to its RAB, out of £3-4bn of renewable investment between £2bn and £2.5bn is related to specific projects as highlighted in Appendix B: Relative Importance of Assets. The possible impact on average asset lives is considered in the following section.

The real risk to the transmission companies, however, is not that the asset becomes stranded per se, or the resale value after dismantling is insufficient to cover the remaining un-depreciated cost (if dismantling could ever be justified in the case of difficult to consent overhead line corridors). The financial risk to the companies is that the investment in a stranded asset that is subsequently required to be dismantled is then wiped out of the RAB. Given that the business-case for the asset should have been well established and Ofgem's funding approval granted, it seems unreasonable that the companies would be penalized for something completely outside their control. Writing such assets out of the RAB has not been the standard approach in UK regulation generally or energy regulation specifically. One solution could simply be to allow the companies to carry those costs in their RAB until fully depreciated, the solution used for Pembroke, but other solutions are also possible. Ofgem could provide reassurance to investors that they will not be disadvantaged if and when such situation occurs.

MODELLING THE IMPACT ON THE AVERAGE ASSET LIFE

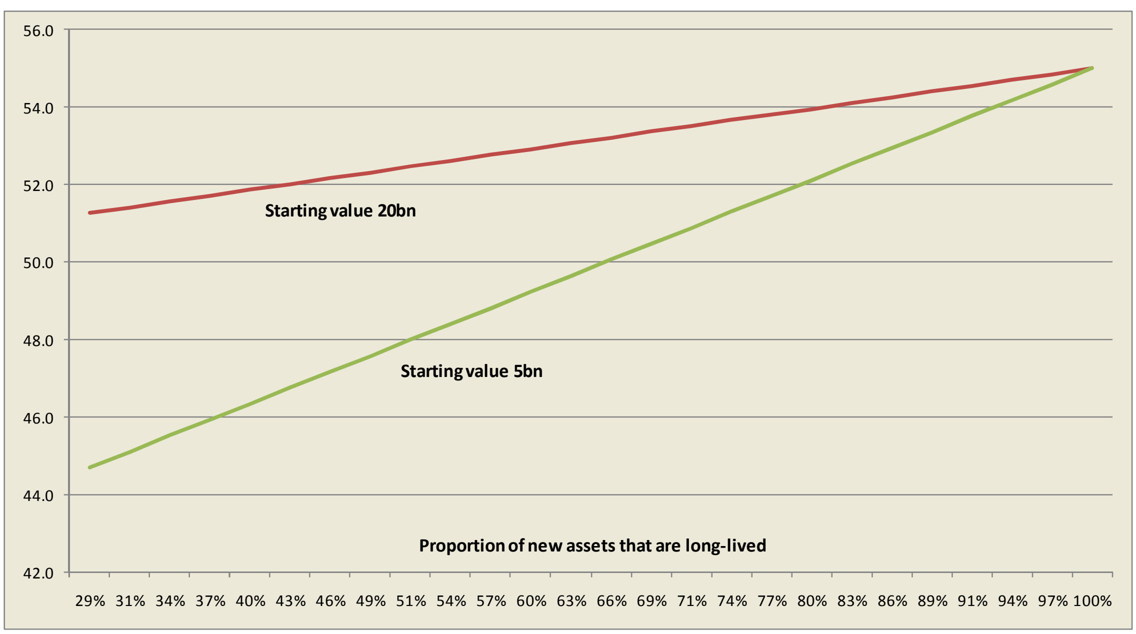
SHETL provides the potentially most extreme case of exposure to the risks discussed in this note and is the company about which we have the best information. As such, we have undertaken some stylised modelling of what would happen to average asset lives if dedicated assets with a risk of "stranding" were allowed a shorter asset life.

Our analysis of the information recently published by SHETL, discussed in Annex B, shows that of the £3 billion to £4 billion of investment possibly £2 billion to £2.5 billion might face some level of "stranding" risk.

Using a simple model, explained in Annex D, we find average asset lives as provided in figure 1 are possible, depending on:

- the size of the starting asset value;
- the initial asset life and the short-asset life (in this example we have used 55 years as the former and 20 years as the latter – the first is low compared to the technical life but in line with our recommendation for economic life set out in our earlier report for Ofgem); and
- the proportion of new assets that have a low risk of stranding.

Figure 1: Average asset lives under different scenarios



In the diagram, as one moves from left to right the proportion of new assets at risk of stranding is falling and consequently the average asset life increases.

In this stylised modelling, depending on the starting value, the average asset life is somewhere between 44 years and 52 years. So, still significantly above the existing 20 years that is used, but also below the upper end of 55 years being used for non-risky assets. Clearly the decision about the amount of assets actually at risk is key to determining where the average asset life if risky assets are allowed a shorter economic life.

CONCLUSIONS

A review of potential scenarios up to 2050 supports the view that renewables will continue to be an important part of future energy sources. It is also clear that locations of renewable energy sources will remain onshore wind in Scotland, offshore wind predominantly in Scotland and Northern England and marine generation also likely to be predominantly in Scotland. Therefore it is likely that without a dramatic change in energy policy the currently required and planned reinforcements will largely still be required as long as there is a need for wind and marine renewable energy sources.

Clearly if a new source of renewable energy was found, in a different location to that currently being exploited, of whatever type, then the economics of developing this resource, including the costs associated with transmission would have to be taken into account in any feasibility study.

Considering all the above we therefore conclude that it is not appropriate to allow shorter economic lives for onshore network assets required for generation connections in general, and renewable generation with lower technical lives in particular. We expect those network assets to be needed well into the future with their economic lives matching technical lives. Doing otherwise would result in an unfair benefit for future consumers at the expense of current consumers by virtue of a faster depreciation of the value of the network assets.

Nevertheless individual renewable projects may be curtailed or limited to a 20 year initial license period due to changing economic, technical or environmental factors. In such a case there is a chance that assets which are linked to a specific renewable project may become "stranded" dependent on decisions taken a particular project.

Whilst overall only a small percentage of the total RAB is at risk of being stranded, this does vary significantly between the TO's.

- Small proportion for NGET.
- Larger proportion for SPT. And
- Very large proportion for SHETL.

Of course stranding of transmission assets has happened before e.g. Pembroke, so can happen again.

One solution to this risk is to allow a shorter economic life for the asset, which could reduce the average asset life significantly in the case of SHETL if a significant proportion of assets were at risk. However, this requires us to take a strong view about the likelihood of stranding which is difficult, especially given our general belief explained above about the long term role for renewable generation in the Great Britain portfolio. In our stylised model about 70% of the new investment would need to be at significant risk of stranding for the average asset life to be below

45 years (assuming the true asset life is 55 years). It is difficult to imagine such a scenario. Further, the fact that Ofgem is proposing to use an average economic life of 45 years (as per the March 18th announcement) would suggest that a significant buffer has been built into the estimate and is consequently able to handle a realistic level of "stranding risk".

It is also clear that there are other solutions. If project specific stranding occurs then a mechanism can be designed to deal with the consequences. If there is a massive policy change then this will have to be addressed as well.

Based on the low risk of stranding and the recognized technical life of the assets it is not appropriate to limit asset life of assets associated with renewable projects.

APPENDIX A - LOW RENEWABLE SCENARIOS BEYOND 2020 (ARE THERE ANY?)

Below we outlined the progression of renewable targets and scenarios over the last five years – showing how policy and policy tools have developed to accommodate ever increasing renewable targets for the period to 2020.

We then assess scenarios developed over the period to 2050.

A.1 Policy Background

The UK Government introduced legislation in 2002 under the Renewables Obligation Order 2002 (Renewable Order or RO) to encourage the use of renewable energy in order to help reduce carbon emissions and diversify sources of supply. The impact of the RO is to provide a fixed sum, index linked, for renewable power generated in the form of a Renewables Obligation Certificate (ROC) and to impose a penalty on those electricity suppliers who fail to meet the targets set by the legislation.

At the time of the legislation the target was to supply 10.4 per cent of the UK's electricity from renewables by 2010/2011. In 2004 this target was increased to 15.4 per cent by 2015/2016.

The central objective of the Renewables Obligation is to comply with the UK's commitment under the Kyoto Protocol to reduce greenhouse gas emissions by 12.5 per cent below 1990 levels by 2008 to 2012. While the existing Kyoto Agreement expires in 2012 work continues on a new agreement following the meeting in Copenhagen in December with next opportunity for progress being at meeting in Bangkok in April.

Most recently the UK government has adopted more stringent CO_2 reduction targets in the Climate Change Act (CCA). The Climate Change Bill was introduced into Parliament on 14 November 2007 and became law, in the form of the Climate Change Act, on 26th November 2008. The CCA introduces a legally binding framework to set 5 year carbon budgets with legally binding CO_2 reduction targets.

Europe is also is setting targets – the so called 20/20/20 targets – that aim to reduce CO_2 emissions by 20 per cent, provide 20 per cent of EU energy from renewables and improve energy efficiency by 20 per cent - all by 2020. The Renewable Energy Directive sets mandatory national targets for each Member State with the aim of achieving a 20 per cent share of renewable energy in Europe's final energy consumption by 2020. Each Member States must design long-term renewable energy measures and policies and develop detailed estimations on the contribution of renewable energy in final energy consumption – so called National Renewable Energy Action Plans. For the UK the EU renewables target translates into renewables providing 15 per cent of the UK's primary energy by 2020.

In July 2006 the UK government initiated a reform of the Renewable Obligation following the publication of its Energy Review in that year. The Energy Review noted that, if the UK was to significantly increase its contribution from renewable generation, then the RO would need to be strengthened and modified to 'provide longer-term certainty and create a greater incentive for investment into those technologies that are further from the market.' The result was to initiate consultation in October 2006 on how the RO might be reformed, including introducing the concept of differing 'bands' of support for different technologies. The rationale was simple; those technologies that 'are further from the market' would receive more support than the hitherto flat support structure of one ROC per MWh.

In May 2007 the Government published an Energy White Paper. This included a review of the Renewables Obligation and the ROC mechanism. Overall the White Paper the confirmed the Government's intentions to revise the Renewables Obligation by:

- Extending it to 20 per cent of supply.
- To retain the RPI/RO buyout price link, providing renewable generators with an index linked fixed element of income for the duration of the current legislation to 2027.
- To introduce expansion of the RO beyond 15.4 per cent of supply by 2015/16 to maintain 8 per cent headroom.
- To introduce banding for different technologies.

Following the 2007 White Paper and ongoing reform of the RO, in April 2009 the Renewable Obligation Order (ROO) 2009 was published. The ROO is a statutory instrument that outlined how the RO would be calculated in 2009/10 and included applying differing bands to differing technologies and the concept of 'guaranteed headroom'. Guaranteed headroom ensures that future increases in RO levels will be calculated on the basis of the number of ROCs expected to be in circulation. The RO will be the greater of the Obligation and the headroom, but subject to an overall cap, currently set at 20 per cent.

As part of the Government's Energy White Paper strategy outlined above it then produced a consultation on a Renewable Energy Strategy (RES) for the UK in June 2008 with the aim of meeting the EU target of providing 15% of the UK's energy from renewables by 2020. In July 2009 the decision document following on from this consultation, 'The UK Renewable Energy Strategy,' was finally published.

The RES confirmed the government's long term commitment to the Renewable Order by announcing the following intentions:

- The RO will continue to remain the UK's main support scheme for large scale renewable electricity projects;
- The RO will be extended beyond its current end date of 2027 until 2037 for new projects
- RO support per project will be limited to a period of 20 years – although all support will end in 2037
- The maximum obligation level of 20% will be removed – so no 'limit' is put on renewable generation. The government also suggests in the RES that, in order to meet the EU target, some 30% of electricity will need to be generated from renewables by 2020.

In December 2010 the government introduced its Electricity Market Reform consultation in which it reiterated support for renewable generation, but proposed moving away from the ROC support mechanism to a system of Feed in Tariffs for low carbon generation.

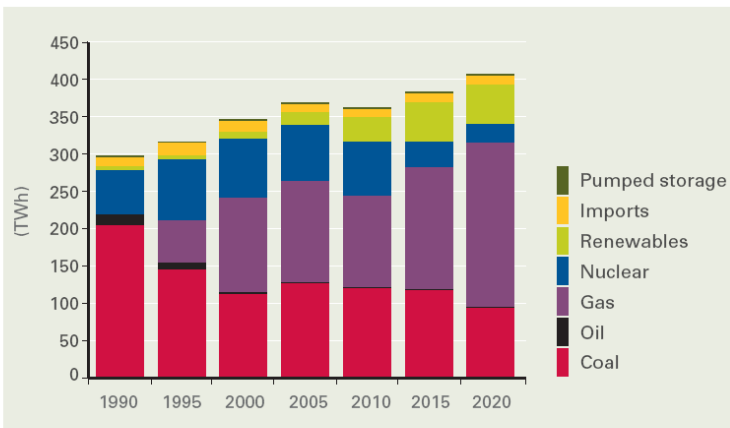
Overall – given the UK's legally binding commitment to reducing CO_2 emissions combined with the 20 year support mechanism under the existing RO and proposed move towards more revenue stabilising feed in tariffs, the regulatory background to the development of renewable generation in the UK is positive.

A.2 Scenarios to 2020

2006

The key document produced in 2006 relating to the electricity sector was the 2006 Energy Review. Chart 15 from that document showed the projected electricity mix in 2020 – a baseline scenario that was intended to show what would happen if little policy action was taken. The chart shows that, under that scenario dependency on gas was set to increase substantially. Renewables were projected to account for around 12% electricity supplied by 2020.

CHART 15. ELECTRICITY GENERATION MIX – PROJECTIONS TO 2020



Source: DTI, 2006

The document proposed a series of policies and initiatives to increase the proportion of low carbon generation. Regarding renewables it stated:

'The Government therefore proposes to strengthen the framework that supports the development and deployment of renewable technologies. With this strategy, the Government believes that we can achieve 20% of our electricity coming from renewable sources by 2020.'

2007

In March 2007, the European Council agreed a binding target of a 20% share of renewable energies in overall EU consumption by 2020. For the UK this was translated into 15% of primary energy to be supplied by renewables by 2020.

In the UK the key document of 2007 was the White Paper 'Meeting the Energy Challenge.' The paper outlined a key policy strategy to modify the Renewables Obligation – the RO was increased to 20% and 'banding' ROC support was introduced. As a result support levels could vary for differing renewable technologies – those that were more costly receiving greater support.

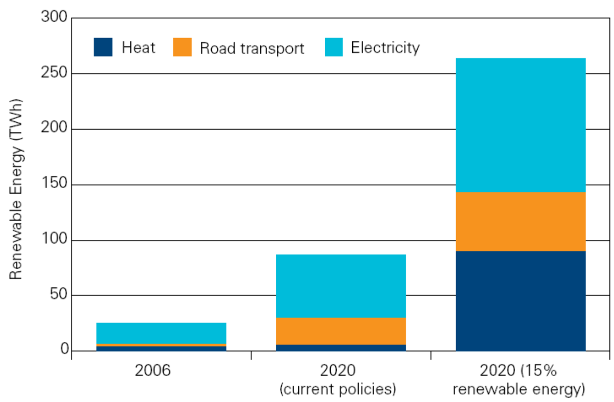
The resulting target for renewable contribution by 2020 was increased:

'Based on our central projections....we estimate that renewables would represent around 15% of the UK's electricity sales in 2020'

2008

In 2008 the Renewable Energy Strategy consultation was released, setting even higher targets for renewables following the European target to produce 15% of primary energy requirements from renewables. Figure 1 from the document shows that the target for renewables increased to over 100 TWh by 2020.

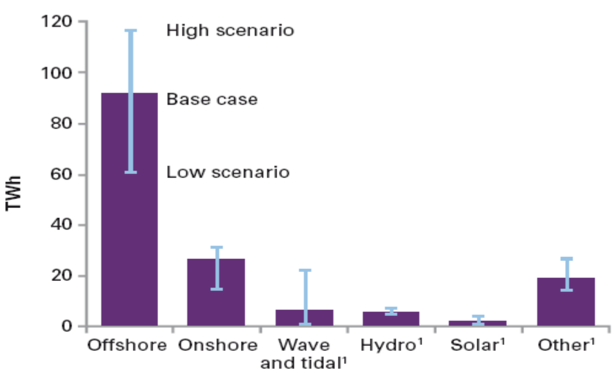
Figure 1: The size of the challenge – a potential scenario to reach 15% renewable energy by 2020



Source: BERR analysis

In the same year the Carbon Trust produced a report 'Big Challenge, Big Opportunity,' focusing on offshore wind. In it 'high,' 'medium' and 'low' scenarios of renewable generation were outlined, as shown in chart 1c below. Even in the 'low' scenario 42 GW of renewable generation was outlined by 2020.

***Chart 1c** Forecast UK electricity supply by technology in our central 40% renewable electricity scenario in 2020*



Implied capacity (GWs)

Minimum offshore wind power	19	13	7	2	1	n/a
Base case	29	11	2	2	1	n/a
Maximum offshore wind power	36	6	0	2	1	n/a

2009

2009 saw the release of the White Paper 'UK Renewable Energy Strategy'. Table 2.1 shows the resulting target for renewable generation arising in the White Paper – with over 30% of electricity to be generated from renewables by 2020.

Table 2.1:

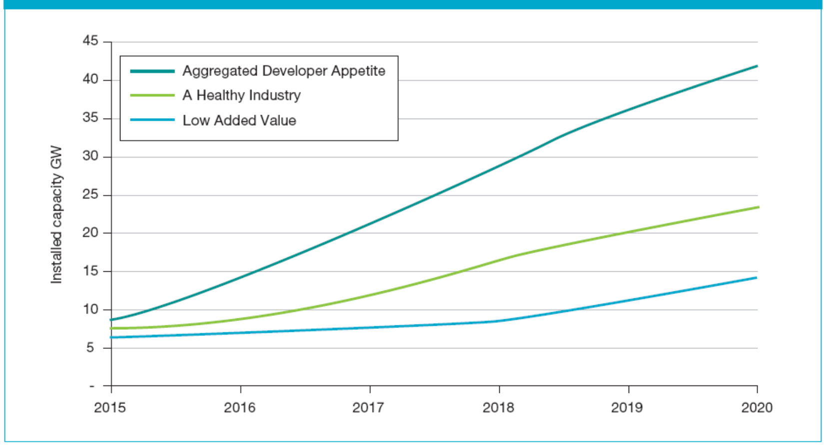
Final energy consumption in 2008 and projected for 2020

	2008		2020	
	All Energy (TWh)	Renewable Energy (TWh)	All Energy (TWh)	Renewable Energy for 'lead scenario' (TWh)
Electricity	387	22	386	117

2010

A report by Renewable UK 'UK Offshore Wind: Building an Industry' highlighted three scenarios of offshore wind development. The 'Low Added Value' scenario suggested over 14 GW of offshore wind might be developed by 2020 (Figure 3).

Figure 3: Cumulative Installed Capacity



Scotland

The table below shows a 'low' and 'high' renewable scenario for Scotland by 2020 taken from 'Driving the Low Carbon Economy' a paper by Scottish Renewables in 2010. The contribution of renewables in the Low scenario is expected to be over 12 GW by 2020

	DEMAND GROWTH		DEMAND REDUCTION	
CASE	Low Renewables ▼	High Renewables ▲	Low Renewables ▼	High Renewables ▲
Total generation capacity	20,830 MW	23,248 MW	20,830 MW	23,620 MW
Fossil, nuclear and pumped storage capacity	8,609 MW (41%)	8,109 MW (34%)	8,609 MW (41%)	8,109 MW (34%)
Renewables generation capacity	12,221 MW (59%)	15,511 MW (66%)	12,221 MW (59%)	15,511 MW (66%)
Total electricity production	74,910 GWh	82,203 GWh	74,910 GWh	83,203 GWh
Fossil, nuclear and pumped storage production	39,368 GWh (53%)	36,784 GWh (44%)	39,368 GWh (53%)	36,784 GWh (44%)
Renewables production	35,542 GWh (47 %)	46,419 GWh (56%)	35,542 GWh (47 %)	46,419 GWh (56%)
Gross consumption	43,815 GWh	43,815 GWh	37,876 GWh	37,876 GWh
Net export	31,095 GWh	39,388 GWh	37,034 GWh	45,327 GWh
Net export (% of total production)	42%	47%	49%	54%

A.3 Scenarios to 2050

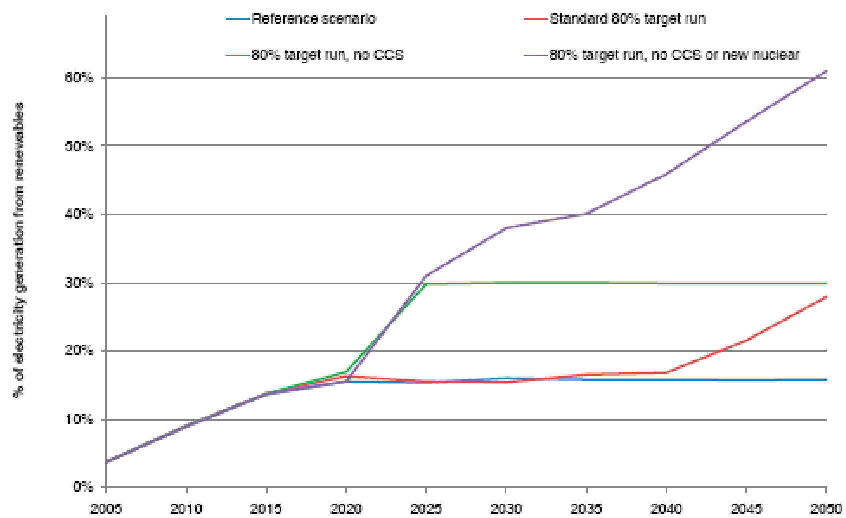
While renewable targets and aspirations are firmly in place for 2020, concern has been expressed over whether longer term aspirations will continue beyond 2020 to 2050. While legally binding targets do not exist to 2050, the former administration suggested the 2020 targets would put the UK 'on a path' to meeting an 80% carbon reduction by 2050 proposed by the Committee on Climate Change. The present administration appears to support the work of the CCC.

In terms of 2050 scenario projections, in 2003 the Tyndal Centre produced 'UK Electricity Scenarios for 2050.' In it four scenarios outlining the potential contribution of renewables in 2050 were outlined. All scenarios anticipate significant contributions from renewables by 2050. Total renewable capacity varies as electricity demand between the scenarios also varies.

	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Onshore wind	57	29	2	29
Offshore wind	100	100	100	50
Solar	88	44	4	4
Wave	33	33	33	33
Tidal Stream	2	2	2	2
Barrage	19	19	0	19
Hydro	10	10	10	9
Energy crops	41	41	7	7
Other	28	28	21	5
Renewables as % total electricity demand	40%	75%	42%	67%

In 2008 the Committee on Climate Change published 'Building a low-carbon economy – the UK's contribution to tackling climate change.' In the document the CCC outlined a number of paths the UK could take to meet its 2050 target of an 80% reduction in carbon emissions. In all paths increased electrification was considered necessary to decarbonise the UK economy. Figure 2.33 below shows the anticipated contribution of renewable energy in the CCC 2050 scenarios.

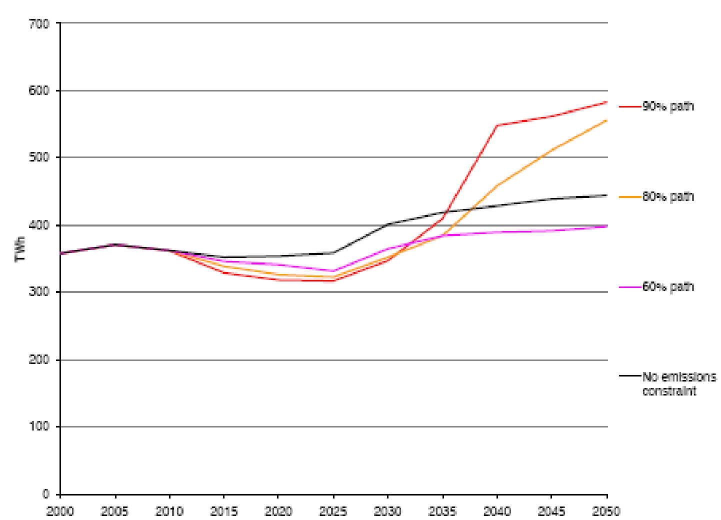
Figure 2.33 Proportion of electricity generation coming from renewable sources under different scenarios, 2005-2050 (MARKAL)



Source: MARKAL modelling based on CCC assumptions (2008).

Figure 5.7 shows how, if the UK is to achieve an 80% reduction in emissions by 2050, electricity demand will grow substantially to over 550 TWh as the economy electrifies. As a result, the 'Standard 80% target run' scenario outlined in figure 2.33 shows the contribution of renewable rising to some 28% of total electricity generated by 2050, amounting to around 155 TWh. Even in the reference scenario renewable generation in 2050 is projected to be some 88 TWh.

Figure 5.7 Long-term electricity generation, 2000–2050



In 2008 the EPRG published 'Electricity Network Scenarios for Great Britain in 2050.' The paper outlined a number of generation scenarios in 2050. Table 9 below compares the six scenarios with the 'current situation' at the time. In all scenarios the contribution of renewable generation grows – the lowest contribution from renewables is achieved in the 'Economic Downturn' scenario, where the economy contracts annually at 0.5%.

Scenario	Total Generation Capacity (GW)	Renewable generation (% of Total Capacity)	Renewable generation (% of Total Energy)	Central generation (% of Total Capacity)	Central generation (% of Total Energy)
Current Situation	74[1]	7%	4%[2]	84%	10%
Strong Optimism	145	60-70%	50%	10-20%	10-20%
Business as Usual	110	40-50%	30%	45%	50%
Economic Downturn	55	20-30%	10-20%	65%	75%
Green Plus	110	90%	80%	0%	0%
Technological Restriction	135	50-60%	40%	30%	40-50%
Central Direction	100	60%	50-60%	20-25%	25-30%

Table 9: Summary of electricity generation in each scenario

A.4 Summary

No published scenarios appear to anticipate a fall in the contribution of renewable generation beyond 2020. The current legislative background is supportive and the government continues to support a move towards decarbonising the UK economy. While realising the anticipated contribution of renewables will be challenging – policy support appears to be in place

APPENDIX B: RELATIVE IMPORTANCE OF ASSETS

Consideration is given here to assets which may be required by the TO to enable the connection of renewable generation irrespective of whether the generator life may be limited, either by license, technical lifetime or both.

For offshore transmission the assets which will be transferred to the OFTO are excluded for consideration, this includes the onshore (up to grid connection point) as well as the offshore assets. All of the assets which are transferred to an OFTO will be covered by the initial 20 year license.

Assets associated with renewable reinforcement which are owned by the TO's NGET, SPT and SHETL are included here. These assets will include:

- New transmission lines and cable circuits
- Uprated transmission lines and cable circuits
- New substations associated with these OHL lines and cable circuits
- Additional infrastructure (extensions and reinforcements) at existing substations
- New HVDC connections (onshore and offshore elements)

As the extreme example an overview of the projects for SHETL are shown in Table B1. Projects for NGET and SPT would show a reduced proportion of RAB.

For each project the capital cost is identified together with an assessment of the degree to which the project is justified on the basis of renewable generation based on the information provided by the TO's themselves. An assessment is then made as to the extent to which a specific investment is dependent on a single generation project and therefore subject to "project specific risk". This gives a subjective assessment of what proportion of the overall investments is at risk due to project specific factors. This proportion of the total investment for renewable can also be compared with the total RAB.

The relative breakdown for each project will of course vary between the elements of:

- OHL
- Substations
- Transformers
- C&P

What proportion is funded by customer contributions? It is our understanding that the maximum customer contribution is likely to be 33%.

Table B1: SHETL Projects[5], [6]

Project	Timescale	Location	Value	Renewables Justification	Project Specific Risk
Knocknagael Substation	2011	New 275/132kV s/s to provide capacity for additional renewable generation	£40.7m	Complete	Low
Beauly–Denny	2014/15	Rebuild of Beauly Denny at 400kV to support 1.5GW of renewable	£400m (estimated)	Complete	Low
Beauly–Blackhillock–Kintore	2014/15	Re-conductering to allow connection of 850MW	£32.3m	Complete	Low
Beauly–Dounreay	2012/13	Second circuit to allow connection of extra 400MW of renewable	£71.3m		
Beauly–Mossford	2014/15	Upgrade to allow connection of renewable in Strathconon and Strah Bran area	£50m		
Caithness strategy	2015/16 – 2017/18	Range of projects to open up region for renewable connections in environmentally acceptable way	£600m	Complete	Low
Kintyre–Hunterson	2016/17 – 2018/19	Allow for connection of 550MW of renewable generation in Argyll and Bute area.	£200m	Complete	Low

[5] Source "Keeping the lights on and supporting growth A consultation on our plans for the next decade" http://www.sse.com/SSEInternet/uploadedFiles/Media_Centre/Project_News/TPCR5_Green_Paper.pdf

[6] http://www.ofgem.gov.uk/Networks/Trans/ElecTransPolicy/TAR/Documents1/100118_TOincentives_final_proposals_FINAL.pdf

Project	Timescale	Location	Value	Renewables Justification	Project Specific Risk
East Coast 400kV upgrade	2016/17 – 2018/19	Required to support export of renewable energy to load centres in England	£350m	Complete	Low
East Coast HVDC subsea link	2018/19 – 2020/21	Will operate in parallel with East Coast mainland connection	£370m	Complete	Low
Western Isles link and associated onshore infrastructure on Lewis	2015/16	450MW connection required for anticipated generation on Lewis	£400m		
Shetland link	2015/16	600MW HVDC link to accommodate anticipated generation	£450m	Complete	medium
Orkney	2015/16	Initial 180MW link for marine developments followed by HVDC link	£500-£700m	Complete	High
Total SHETL			£3464.3 - £3664.2m	Complete	Low

APPENDIX C ASSET LIVES – DETAIL DISCUSSION

Regarding the assessment of transmission assets a key factor will be the concern as to what happens with an asset when an initial limited license period expires e.g. 20 years for offshore wind. A number of different factors need to be taken into account when considering this question, resulting in three separate cases:

Case A – Continued asset utilisation

Whilst lives of offshore and onshore wind generation equipment (and likely marine generation equipment) may be limited to 20/25 years the Licenses for renewable generation e.g. offshore wind leases up to 50 years, thus providing developers with the opportunity to renew / refurbish / retrofit generation equipment to extend operational lifetimes. In this scenario the transmission asset is likely to continue, in all likelihood until the technical life has been reached.

Case B - Partial asset utilization

A case may arise where part of a renewable generation source or a single project is shelved that the transmission asset is not fully utilized. This may give rise to the opportunity for a new connection to be made, if this can be justified. Alternatively the appropriate revenue adjustments could be made.

Case C - Completely stranded asset

Even if an asset is completely stranded then parts of the asset may be relocatable, particularly transformers but potentially switchgear if the value of the asset is significantly higher than the relocation cost. This can be particularly useful if assets are in demand and are on long supply lead times. An asset such as a cable or overhead line is not relocatable, however given the constraints in consenting the construction of such assets it is suggested that a very long term view would be required before any such asset was decommissioned.

To assess which of these cases may be more likely there are a number of unknowns:

- Life of onshore wind / offshore generation assets.
- Viability of offshore generation asset replacement/refurbishment/retrofit
- Life of offshore transmission assets

As well of course as the specific project details, thus it is not possible to determine in advance which projects may be limited and place any dedicated associated onshore assets at greater risk. Indeed if this were the case then initial project viability may be questioned at the outset.

APPENDIX D: MODELLING THE IMPACT ON AVERAGE ASSET LIVES

A simple model has been developed where the key inputs are:

- A starting asset value (two values are used for illustration: 5,000 and 20,000);
- A level of new investment (a value of 3500 is used);
- The proportion of new investment at risk (values starting at 2500/3500 and then reducing the numerator by 100 are considered);
- The average asset life for non-risky assets – 55 years; and
- The average asset life for risk assets – 20 years.

Calculations of the weighted average asset life are then made, with three elements being weighted by their asset value:

- Existing assets;
- Non-risky assets; and
- Risky assets.