UK Renewable Energy Pricing

Analysis

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Glossary

DECC	Department of Energy and Climate Change
TWh	1 Terawatt hour = sustained power of approximately 114MW for a period of one year
MWh	Megawatt hour of electricity
GW	1 Gigawatt = 1,000MW
MW	1 Megawatt = 100 Kilowatts
ROC	Renewable Obligation Certificate
RBF Premium	Recycled buyout fund premium
LEC	Levy exemption certificate
ROO	Renewables Obligation Order 2009, as amended by the Renewables Obligation (Amendment) Order 2010 which govern Green supplements
Brown electricity	Wholesale electricity
Green supplements	Additional revenue to renewable energy generators currently comprising ROCs, RBF premium and LECs

1. SUMMARY

Investment in UK on-shore wind projects provides:

- Stable, utility style, regular income through the ownership of an electricity generating station.
- Prospects of high returns as electricity prices move higher, driven by rising oil prices.
- A high degree of protection from inflation, as inflation would impact on oil and thus electricity prices and circa 45% of income is currently directly index linked through government legislation.

The highest risk-reward return is secured through acquiring fully consented on-shore sites and taking on the construction risk. It is anticipated that once operational and proven a constructed site could be sold to an entity seeking regular utility style income at a markedly lower yield than currently available, creating a significant return to an investor. Alternatively, the asset could be held to provide regular income for 25 years, being the expected lifespan of a wind farm.

Shortage of project finance and constraints on capital are being experienced at a time when rapid expansion of the industry is required, creating significant opportunity for equity investors, at a time when site values have declined and power prices have decreased from their peak of circa £100/MWh (MWh – Megawatt hour of electricity) in September 2008 to circa £50/MWh in early December 2010.

Investors are exposed to limited risks under the business model as fully consented sites are acquired with planning consent, grid connection offer and land leases in place to permit construction. There is no planning or development risk.

The UK Government is supportive of the renewable industry. The regulatory regime is stable and provides an attractive basis for investment. The UK Government has targeted 15% of total energy consumption to come from renewable sources, to comply with binding EU legislation by 2020. Renewable energy's share of consumption was 3.1% in 2009.

Expansion in renewable electricity generation will come from mature and proven technologies. On-shore wind is a proven technology, with a simple and standard method of construction with well capitalised and known counterparties.

The government has an aspiration of 14.9GW of on-shore capacity by 2020, compared to 3.9GW (GW – 1,000 Megawatts) currently in operation, which represents cumulative growth of circa 16% per annum.

This paper analyses renewable energy pricing.

2 RENEWABLE ENERGY PRICING ANALYSIS

2.1 Components of Renewable Energy Prices

The overall price paid for electricity from renewable sources is made up of four elements. The relative weighting of each source of revenue impacts on the risk profile of on-shore wind projects in the UK.

Fig 1: Indicative Renewable Energy Price

	Approximate Current Value		***Percentage***	
	£/MWh	**£/MWh**	***%***	***%***
Brown electricity 2010/11		41.00		*44.3*
Green supplements:				
ROCs (Fixed, index linked) for 2010/11	36.99		*39.9*	
RBF premium (variable) for 2010/11*	9.93	46.92	*10.7*	*50.7*
LECs (fixed, index linked) for 2010/11		4.70		*5.1*
Indicative Renewable Energy Price		**92.62**		***100.0***
** FIM estimate based on 2007/2008 value*				

Pricing arises from two largely inflation linked sources, (i) "brown" being wholesale electricity and (ii) "Green" supplements. As a result, UK renewable energy generators benefit from both:

- open market electricity prices;

  and

- legislated (under the Renewables Obligation Order 2009, as amended by the Renewables Obligation (Amendment) Order 2010 (together the "ROO")), largely index linked, renewable supplements, including Renewable Obligation Certificates ("ROCs") and the Recycle Buy-out Fund premium ("RBF premium").

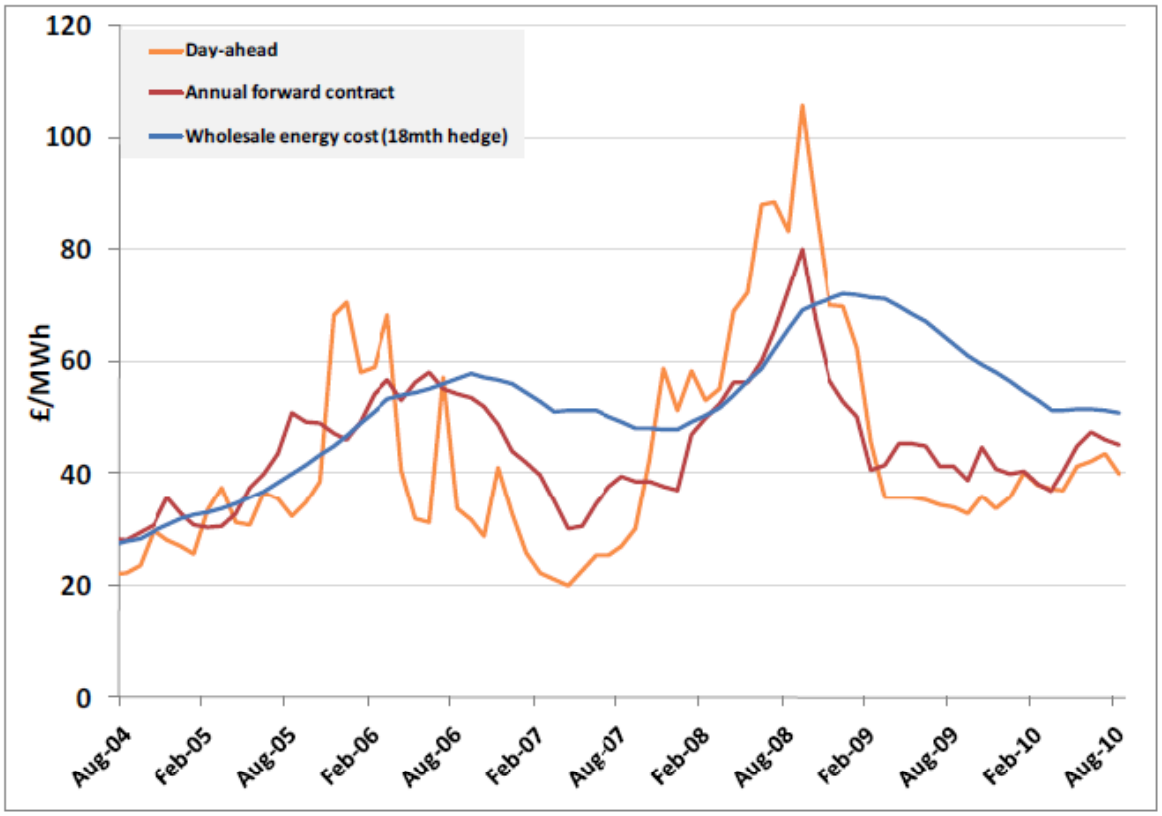
The combination results in a price for renewable energy in the UK which is high in comparison to many other jurisdictions, assisting in providing investors with competitive returns.

2.2 "Brown" Electricity (Wholesale) pricing: circa 44% of the overall value of the renewable energy price.

Day-ahead brown electricity prices have trended higher over the past six years in line with rising oil and gas prices, from circa £20/MWh in August 2004 to circa £50/MWh in December 2010. The year ahead price for the October 2011 contract is currently circa £48/MWh. Prices appear to be correlated to oil prices.

They are currently some 50% below the peak in September 2008 of circa £100/MWh. Demand destruction during the recession has seen electrcity sales decline from 327.9 TWh in Compliance Period 2005/06 to 305.8 TWh estimated by DECC for Compliance Period 2010/11, a decrease of 6.7%.

Fig 2: UK Brown Prices



Source - Ofgem Electricity & Gas Supply Market (Sept 2010)

Prices are expected to rise from current levels:

- As demand recovers in line with economic growth. DECC are forecasting demand of 310TWh in 2011/12 Compliance Period, an increase of 1.3% from 2010/11.
- As the oil price rises, Brown prices show a strong correlation to oil prices.
- As increasing pressure appears in the supply margin, as old generating capacity is forcibly decommissioned.
- To permit the construction of new main stream generating capacity including nuclear power which is likely to require higher prices of electricity and/or carbon emissions to make such developments economic.

Merrill Lynch has increased their oil price forecast to average $100/barrel (2010: $75/barrel) in 2011. OPEC member states have indicated that they are comfortable with $90/barrel.

UK brown prices are likely to have a floor at a level higher than current prices, due to the expected closure of generating stations, to comply with EU legislation in the case of coal fired plants and to age in the case of nuclear plants.

It is estimated that circa 20% of current generation capacity could be removed by 2020.

- EU – Large Combustion Plant Directive (LCPD) – should see 15% of older coal fired capacity removed by 2015, as this no longer will comply with emission requirements.
- A further 9% of ageing nuclear capacity is expected to be decommissioned by 2020.

Substantial investment is required in new conventional capacity. Under UK legislation, new coal fired stations must incorporate Carbon Capture and Storage (CCS), which will add significantly to cost.

New nuclear build has a long lead time both in planning and then in construction. Limited new capacity is likely before 2020. Expansion in the shorter term is likely to be restricted to gas fired stations, which are dependent on imported gas causing further volatility in UK electricity prices.

The expected decline in margin reserve, the difference between peak demand and total capacity, is forecast to become increasingly an issue by 2015. Should such a decline manifest itself, UK brown prices would rise, adding value to generators.

2.3 Green Supplements: circa 56% of overall value of renewable energy.

In addition to the value of brown electricity generated, UK renewable energy generators receive additional supplements, each governed by legislation. These supplements are not paid by the government and are thus not funded through the taxation system. In essence they are a direct cost to the consumer, being added to electricity bills. Supplements are:

- **ROCs:** providing a fixed, index-linked, payment under the ROO for circa 40% of overall value.

- **RBF premium:** providing an additional variable income dependent on the total production of renewable energy against set government targets under the ROO, currently circa 11% of overall value.

- Levy Exemption Certificates (LECs) providing an additional index-linked supplement (Climate Change Levy), currently circa 5% of overall value.

Some on-shore wind sites also benefit from a grid related TRIAD payment, which is of value in England and Wales but of limited value in Scotland. FIM have discounted this in the analysis.

2.4 Renewable Energy Price Forecasts

In modelling output prices for wind farm projects, Poyry Energy Consulting (Poyry) forecasts are widely accepted by both investors and banks. Banks typically model lending and covenants off Poyry Central prices as a conservative estimate of future pricing.

FIM model using the Mid price scenario, being the arithmetic mean between the Poyry High and Central forecasts, as a likely eventuality. FIM's view is that brown prices will move higher as global oil prices rise, and ROC values will remain high for the foreseeable future as renewable generation continues to fall short of government targets. The mid price scenario gives a total price of £113.13/MWh over the 25 year period of the forecast to 2035, comprising average prices of brown electricity £69.60/MWh, ROCs £41.37 and the LEC £2.16, all in April 2010 real money. This compares to current pricing for the October 2011 year ahead contract of £48/MWh and ROCs being sold forward for the current compliance period (CP 9 2010/11) at circa £45.

If output is sold under a long term power purchase agreement (PPA) with a registered supplier, the generator is likely to get circa 90% of the overall value of the three elements. As such it is reasonable to expect renewable energy prices to exceed £100/MWh (in April 2010 real money) over the 20 years that a project will benefit from ROCs. Prices for the final five years of the expected lifespan of the wind farm will exclude the benefit of ROCs.

The Low price scenario modelled by Poyry is at a level such that investment in new generating capacity is unlikely to be economic, and is as such discounted.

Fig 3: Poyry Renewable Energy Prices

	Total Renewable Energy Prices £/MWh April 2010 real money 2011-2035		
	High	**Mid**	**Central**
Brown	84.70	69.60	54.50
ROC	41.41	41.37	41.33
LEC	2.45	2.16	1.86
	128.56	**113.13**	**97.69**

Source: Poyry Prices July 2010

2.5 FIM's Observations

Renewable energy prices will be impacted by three factors, the two variable elements of the renewable energy price and inflation.

- Primarily through brown electricity prices rising, as this directly impacts on circa 44% of current price.
- Secondly, in the short to medium term, by additional value through the RBF premium as renewable generation is likely to continue to fall short of set government targets, although this only impacts on circa 10% of current price.

The pricing structure also provides a high degree of protection from inflation. Inflation would cause fuel, and thus oil prices to rise and brown prices (currently 44% of the total renewable energy price) would rise in line. Further, 45% of energy price is directly index-linked, being the ROC and the LEC, so the majority of income is effectively index linked.

Wind power has an additional attribute in being free at the point of use, and a wind farm's operating expenditure is only circa 20% of revenue, primarily due to the absence of any feedstock cost, so inflation should feed through to substantially higher returns for wind-powered generating stations.

Brown prices are totally exposed to market forces and are expected to rise. For Green supplements, as the ROC is set in legislation and index linked for 20 years, pricing risk is largely limited to the RBF premium element of the Green supplements.

3. ROC PRICING RISK ANALYSIS

The ROC comprises two elements, the ROC buy out price (fixed) and RBF premium (variable).

3.1 Renewable Obligation Certificates (ROC buy-out price) - circa 44% of overall value

This element of the renewable energy price is fixed by legislation and is index linked.

Generators of renewable electricity receive ROCs for each Megawatt hour (MWh) of production. ROCs are tradeable and had a set value, stated as the buy-out price, of £30/MWh in 2002 indexed to RPI. The value for 2010/11 is £36.99 per ROC.

In March 2010 the UK government extended the ROO and provided for renewable generating stations to receive ROCs for a fixed period of 20 years from the commencement of generation, thus reducing the risk profile associated with ROC payments on new projects. Banding was introduced in April 2009 such that different renewable energy generating technologies receive a set number of ROCs for each MWh of electricity generated. On-shore wind qualifies for 1 ROC per MWh of generation.

Any pricing risk within the value of the ROC is limited to the banding review mechanism. The next review is expected to be finalised in 2011 for implementation in April 2013. The previous review in 2010 "grandfathered" existing generating stations so that they received the same number of ROCs as applied prior to the review. It is expected that subsequent reviews will adopt the same principle.

3.1.1 Four yearly review of the ROC bands

Banding for different renewable technologies was first introduced in April 2009. On-shore wind currently receives 1 ROC for each MWh generated. Under a review it would be possible for the applicable band for a given technology to change, or the number of ROCs which apply to a technology to vary. Current bands are given in Appendix I.

The last banding review of the ROO, completed in April 2010, was the result of extended consultation, allowing generators time to adapt to the changes for any planned development. The ROO expressly included "grandfathering" for existing generators, so that existing generators commissioned before 1 April 2009 received at least the same number of ROCs as applied prior to the introduction of banding.

For the desired expansion of renewable technologies to be funded in the future, a similar arrangement would appear to be a pre-requisite of a review. Any change to the applicable number of ROCs at the time of commissioning would undermine confidence in the future of renewable technologies and make new schemes particularly difficult to fund.

The implication of the review provisions is that the value of ROCs for new capacity would decrease in the event that the set targets were achieved, subject to existing generators continuing to receive at least the same number of ROCs as applicable at the date of commissioning (further grandfathering).

A review could be implemented if the value of renewable energy output rises, or falls, significantly, for instance with movement in brown prices. Higher brown prices could see the value of ROCs reduced, so that renewable generators did not receive more than envisaged when the bands were devised.

However, renewable generators in this situation would continue to receive a similar total value, with the weightings between brown and green supplements varying in favour of the brown element. Conversely, in the event that targets are not met, the review process could see ROCs increased for given technologies. The next ROC Review is expected to be finalised by Autumn 2011 with implementation expected to occur in April 2013.

3.2 Recycle Buy-out Fund premium (RBF premium) - circa 11% of overall value

3.2.1 Legislative Provisions

This is the only variable element of the green supplements. At circa 11% of the current overall renewable energy price, any variation in value will only have a marginal impact on the total price.

Those electricity suppliers failing to meet the legislated targets for supplying renewable energy, either by generating sufficient ROCs themselves or by buying ROCs in the market, pay a sum (equal to the number of ROCs they should have supplied multiplied by the buy-out price) into the ROO buy-out fund. The buy-out fund is paid out to generators producing renewable electricity in proportion to the ROCs issued to them against all ROCs issued.

The greater the shortfall in ROCs issued below the legislated target, the greater the value of payments into the buy-out fund. Should the target number of ROCs be achieved there could be no payments into the buy-out fund. This eventuality has been avoided by the introduction of headroom provisions, currently set at 10%, so that the required number of ROCs under the ROO will be set annually by DECC to be 10% higher than their expected production of ROCs. As a result, the RBF premium is expected to provide renewable generators with additional but variable income.

3.2.2 Potential RBF Premium Value

It is expected that the recession will impact on the speed of development of renewables, with capacity continuing to fall short of government targets leading to a higher value in the RBF premium in the short term over the implied value of the RBF premium of £4.38 /MWh in the Poyry Mid price scenario (April 2010 real money). The RBF premium announced by OFGEM on 19 November 2010 was £15.17/MWh in Compliance Period 8 (2009/10). Based on the fixed value of a ROC of £36.99 for Compliance Period 9 (2010/11), several industry commentators have provided a view on the RBF premium:

- Poyry's mid point average value for the RBF premium for the next three years to 2014 is £5.60/MWh;
- Smartest Energy have considered that the RBF premium could reach as high as £11/MWh; and

Although the RBF premium is forecast to remain a benefit to renewable generators, enhancing cash flow, the major factors influencing returns will be the brown price and inflation.

Details of the production of ROCs is given in Appendix II.

3.3 Levy Exemption Certificates (LECs) – Circa 5% of overall value

LECs are indexed linked, and are governed by legislation. They arise under the Climate Change Levy introduced in April 2001. The levy is raised on the producers of CO_2 emissions. Renewable generation is exempt and qualifies for LECs. The 2010/11 value of a LEC is £4.70/MWh.

3.4 FIM Observations

An overproduction of ROCs could theoretically both remove the RBF premium and lead to a devaluation of the ROC value itself.

The ROO has moved to forestall this risk by setting the level of the obligation at the higher of;

- The fixed target of ROCs per MWh of electricity supplied as set out in the ROO; and
- The ROCs expected to be supplied in a compliance period as calculated by DECC uplifted for headroom, currently set at 10%.

Further value protection is provided through the ability of electricity suppliers to carry forward ROCs for up to one year, only 25% of a supplier's renewable obligation may be discharged with ROCs relating to a preceding compliance period.

As the value of a ROC is largely protected under the ROO, the main risk to renewable generators is in the value of the RBF premium. The RBF premium is forecast to be protected via the headroom mechanism with the potential for substantial upside in the event that UK renewable energy generators do not achieve the targets set out by DECC annually.

This is a mathematical calculation; the larger the underperformance against the RO targets the higher the value of the RBF premium. The variable RBF premium currently represents circa 11% of the total value of renewable electricity, restricting the risk on the total value received by renewable generators.

The Legislative Framework (Section 5) gives the background to UK renewable energy pricing legislation. As identified above the driver to pricing, both of the ROC itself and the RBF premium, is the production of ROCs against set, escalating targets.

The value of the RBF premium will be dictated by compliance with the set targets. A major impact will arise from how the UK government sets out to comply with EU legislation which requires 15% of total energy consumption to be supplied by renewables by 2020.

Electricity generation is the main focus, as it is more readily targeted than other facets of energy consumption such as transport fuel. This implies that renewable generation may be required far in excess of the 0.154 ROCS/MWh fixed target for 2015/16.

Some of the shortfall in renewable energy generation under the existing RO targets will be met by small scale renewable schemes under the government's Feed in Tarriff scheme which came into force in April 2010. The government have already stated a target of 20% by 2020, but many commentators expect the requirement to exceed 30% if EU targets are to be met, a view supported by the government's consultation process.

The value in the ROC will continue to be protected by the headroom mechanism, whilst the RBF premium is likely to remain at a significant level under current RO targets, and could potentially rise if these targets were raised/not achieved. Most forecasters believe the only current viable source of this new renewable generating capacity in the medium term (next five years) in any quantity is wind power.

4. UK ENERGY STRATEGY

4.1. UK Renewable Energy Strategy

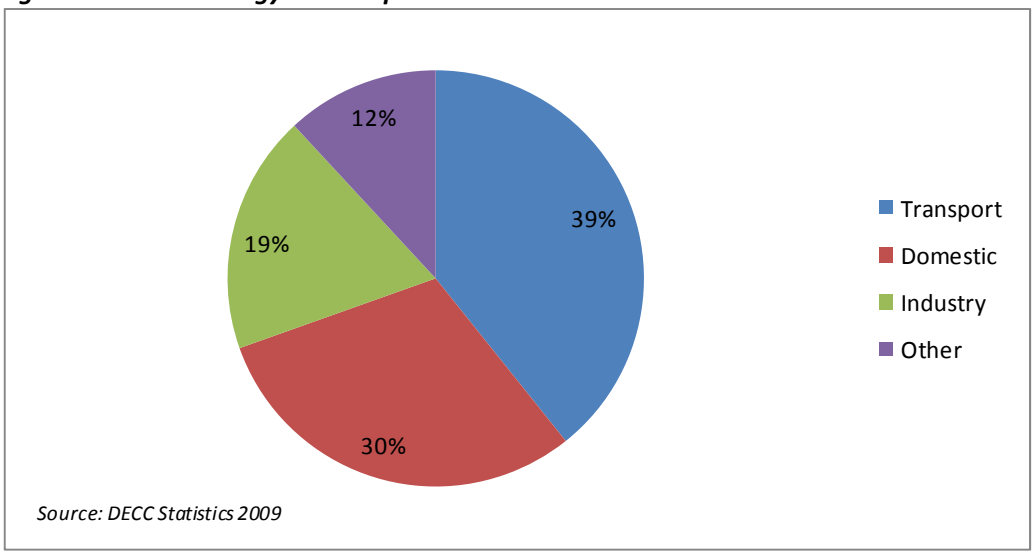
In 2009, the UK government published the UK Renewable Energy Strategy ("RES") paper to set out how the UK is to increase the percentage of renewable energy used in electricity, heat and transport. To meet the EU's legally binding target to ensure 15% of the UK's energy consumption comes from renewable sources by 2020; almost a seven-fold increase in 10 years.

The RES is designed to:

- Reduce the UK's emissions of CO_2 (in 2009, 481m tonnes) by circa 7% pa from 2009 to 2030;
- Reduce the UK's overall fossil fuel demand by circa 10% and gas imports by 20-30%; and
- Provide opportunities in the UK renewable energy sector resulting from circa £100 billion of new investment

The EU target applies to all energy consumption, but experts predict that there is limited scope for renewable technology to have a significant impact in the domestic and transport energy sectors in the short term. UK energy consumption in 2009 was 144 million tonnes of oil equivalent (decrease from 155 million tonnes equivalent in 2007).

Fig 4: Overall UK Energy Consumption 2009



Transport has a set target under EU legislation of 10% renewable fuel by 2020. With constraints on supply and requirements for improved technology, it is not expected that this target will be achieved.

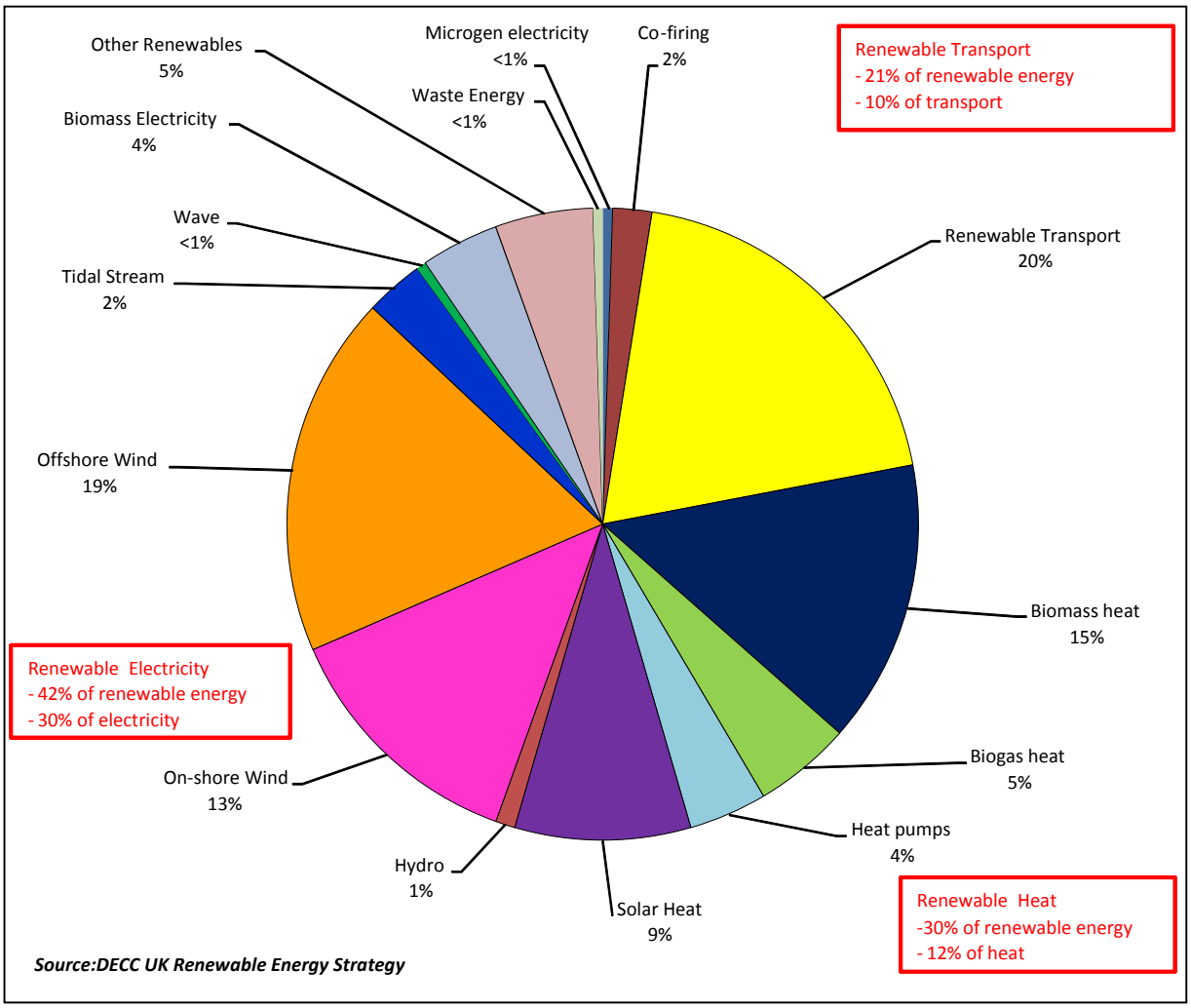
New buildings can be designed to achieve energy savings, but to have any impact in existing buildings a significant change in users' habits will be required, and this is forecast only to happen over a long period of time.

In the absence of a major shift in other sectors, UK compliance with EU targets can, in the foreseeable future, only be met by focussing on the electricity generation industry.

RES's lead scenario suggests that by 2020 the UK could see:

- More than 30% of the UK's electricity generated from renewable sources (up from about 5.5% in 2009);
- Circa 12% of the UK's heat generated from renewable sources (up from very low levels in 2009); and
- Circa 10% of transport energy from renewable sources (up from 2.6% in 2009).

Fig 5: DECC's Expectation of the Renewable Energy Map by 2020



According to DECC's National Renewable Energy Action Plan ("NREAP") published and submitted to the European Commission on 1 July 2010, the UK can meet its 15% renewable energy target for 2020. By the end of 2020, renewable technologies are estimated to have the following installed capacity :

Fig 6: Future Installed Capacity MW (year end December)

	2009	2010	2015	2020	CAGR %
Hydro	1,645	1,710	1,920	2,130	**2.2%**
Solar PV	27	50	1,070	2,680	**48.9%**
Wave and tidal	3	3	3	1,300	**83.5%**
On-shore wind	3,483	4,040	8,710	14,890	**13.9%**
Off-shore wind	941	1,390	5,500	12,990	**25.0%**
Biomass	1,932	1,920	2,530	4,240	**8.2%**
	8,031	9,113	19,733	38,230	**15.4%**

Source: DECC's National Renewable Energy Action Plan

FIM expect, based on current installed capacity and the immediate economic outlook, that installed capacity will fall substantially below these figures, particularly for wind. The current target is unlikely to be met under current energy policy. There will need to be a quantum shift in support for renewables to achieve the EU requirement. Renewable generators may benefit from an improved policy background in the future.

5. LEGISLATIVE FRAMEWORK

UK legislation is in response to EU legislation. In March 2007 the EU's leaders endorsed an integrated approach to climate and energy policy that aims to combat climate change and increase the EU's energy security while strengthening its competitiveness. They committed Europe to transforming itself into a highly energy-efficient, low carbon economy. The EU Heads of State and Government set a series of demanding climate and energy targets to be met by 2020, known as the "20-20-20" targets, which are:

- A reduction in EU greenhouse gas emissions of at least 20% below 1990 levels
- 20% of EU energy consumption to come from renewable resources
- 20% reduction in primary energy use compared with projected levels, to be achieved by improving energy efficiency.

5.1 EU legislation

The Council of the European Union's latest directive on the use of energy from renewable sources (3736/08, 8037/09 ADDI) was adopted on 6 April 2009 (the Directive).

The aim of the Directive is to achieve by 2020 a 20% share of energy from renewable sources in the EU's overall final consumption of energy. This includes a 10% share of energy from renewable sources in each individual member state's transport energy consumption.

To achieve these objectives, the Directive for the first time set a mandatory national target for each member state for the overall share of energy from renewable sources in gross final consumption of energy, taking account of each country's different starting points. The main purpose of mandatory national targets is to provide certainty for investors and to encourage technological development allowing for energy production from all sources of renewable sources. To ensure that the mandatory national targets are achieved, member states have to follow an indicative trajectory towards the achievement of their target.

Each EU country is to adopt a national renewable energy action plan setting out its national targets for the share of energy from renewable sources consumed in transport, electricity, heating and cooling to 2020 to be notified to the Commission by June 2010. The UK has complied with this requirement.

To reach the mandatory targets, member states will apply support schemes or measures of cooperation between different member states and with third party countries.

The 10% target for the transport sector is set at the same level for each member state in order to ensure consistency in transport fuel specifications and availability.

Member states are required to transpose the Directive into national law within 18 months after its publication in the Official Journal of the EU, which took place on 5 June 2009. The UK's set target under the Directive for the share of energy from renewable sources in gross final consumption of energy in 2020 is 15%.

5.2 UK legislation

5.2.1 Structure

The Renewables Obligation Order 2009 ("ROO 2009") came into force on 1 April 2009. It extends to England and Wales only. Similar orders exist for Scotland, and for Northern Ireland. The Orders revoke and replace earlier Orders which were first enacted in 2002.

The Renewables Obligation (Amendment) Order 2010 ("ROAO 2010") came into force on 1 April 2010 and reflects amendments to the ROO 2009 (together the "ROO").

This is the legislative framework for the support schemes which will lead to the UK complying with the EU legislation to achieve a 15% share of energy from renewable sources in gross final consumption of energy by 2020.

The main points of significance to renewable generators are:

- Extension of the Renewables Obligation end date by an extra 10 years to 2037;
- Allocation of ROCs to a generating station for a fixed period of 20 years. and
- Increasing the headroom to 10% in CP 11 (2011/12).

These changes continue to de-risk renewable investments. ROCs will in effect be guaranteed to a project for 20 years, and there will be the potential for higher value in the RBF premium.

5.2.2 Summary of ROO 2009

ROO 2009 (as amended by the ROAO 2010) was operative from 1 April 2009 and:

- Changed the methodology of calculating compliance with the set targets of electricity to be supplied by licensed electricity suppliers and increased headroom from 8% (for CP9, 2010/11) to 10% (for CP10, 2011/12) of the forecast generation of ROCs.

- Introduced banding, giving defined technologies a set number of ROCs per MWh of electricity generated, subject to four yearly reviews, and "Grandfathered" existing generating stations such that they received the same number of ROCs per MWh of electricity produced as they did prior to the introduction of banding.

- Extended the Obligation Period to 2037 and provided that each renewable generating station would receive ROCs for a set period of 20 years from accreditation.

The RO is administered by the Office of Gas and Electricity Markets ("OFGEM") who issue renewable obligation certificates (ROCs) to renewable electricity generators on their renewable output. These certificates are sold to electricity suppliers with or without the associated renewable electricity.

Alternatively, instead of producing the required number of certificates in respect of all or part of their renewables obligation, a supplier is permitted to make a payment equivalent to the value of a ROC to

OFGEM (the buy-out price). Where suppliers discharge their renewables obligation (in whole or in part) by making payments to the OFGEM, the payments are held in the buy-out fund.

5.2.3 Renewables Obligation Supply Requirement and Headroom

The ROO imposes an obligation ("the renewables obligation") on all electricity suppliers, licensed under the Electricity Act 1989, which supply electricity to produce a specified number of renewable obligation certificates (ROCs) in respect of each megawatt hour (MWh) of electricity that each supplies to customers during a specified annual period known as an "Obligation Period" (year to 31 March).

As from April 2009, the RO target is the greater of the set target of supply or DECC's estimate of generation against forecast supply from licensed electricity supplies plus 10%, designed to ensure that there is value in both the ROC and the RBF premium.

The basis of compliance was altered, to be calculated as a given fraction, equal to the set target under the RO, of electricity supplied. The position is much as before – newer technologies receive more than 1 ROC/MWh, some such as co-firing receive less than 1 ROC/MWh.

The ROAO 2010 includes provisions as to the calculation of the Renewable Obligation to be provided by suppliers, which in essence is a percentage of overall supply, rising to 15.4% of supply in 2015/16:

Fig 7: Calculation of the ROC Obligation

Obligation period ending 31 March	ROCs per MWh of electricity supplied in Eng, Scot and Wales	ROCs per MWh of electricity supplied in N. Ireland
2010	0.097	0.035
2011	0.104	0.040
2012	0.114	0.050
2013	0.124	0.063
2014	0.134	0.063
2015	0.144	0.063
2016	0.154	0.063
until 2037	0.154	0.063

The quantum of the Obligation is set annually by 1 October for the succeeding Obligation period, i.e. at 1 October 2010 for the 2011/12 Obligation period. Appendix III shows how the quantum of the Obligation is calculated.

5.2.4 Banding of Different Technologies

Different renewable technologies that are used to generate electricity from renewable sources are banded, such that the number of ROCs issued to each generator depends on the technology employed (Appendix I).

There is to be a review of the banding provisions at four yearly intervals, with the first review commencing in October 2010, with implementation by April 2013 to coincide with the EU ETS cycle.

Previously, prior to banding, the set supply under the RO was in MWh and each renewable generator received 1ROC for each MWh of electricity sold.

The legislation in effect sets out to manage the value in the RBF premium. It predicts three variables:

- Quantum of electricity supplied by licensed electricity suppliers.
- The build out of renewable generating capacity.
- Production of electricity from operational renewable generating stations.

5.2.5 Climate Change Levy (CCL)

On 1 April 2001, the Government introduced the Climate Change Levy (CCL) under the Finance Act 2000. It is a charge on non-domestic supply of electricity in the United Kingdom. This is the industrial and commercial supply of taxable commodities for lighting, heating and power by consumers in industry, commerce, agriculture, public administration and other services.

The Climate Change Levy (General) Regulations 2001 provide for an exemption from CCL for renewable electricity. Renewables Levy Exemption Certificates (LECs) are issued monthly to accredited generating stations for each MWh of renewable source electricity generated. LECs identify renewable source electricity produced by accredited renewable generating stations.

Renewables LECs are part of the evidence required by HM Revenue & Customs to demonstrate the amount of renewable source electricity supplied to non-domestic customers in the United Kingdom. They are used by electricity suppliers to claim the CCL Exemption on non-domestic supply. Suppliers allocate Renewables LECs to a supply pursuant to a renewable source contract.

Electricity in 2010/11 is currently subject to the Levy at a rate of £4.70/MWh (subject to certain exclusions, exemptions, reduced rate and half-rate supplies). The CCL was index-linked as from 1 April 2008.

5.2.6 Electricity Market Reform

In December 2010, the UK Government announced a consultation for Electricity Market Reform, proposing to replace the Renewables Obligation in 2017 with a feed-in-tariff scheme. It will publish a White Paper in late spring 2011 on the back of the consultation and looks to get the reform into the statute books by 2012.

The proposal is that a feed-in-tariff with a contract for difference (“FIT CfD”) is based on guaranteeing a price for the production of non-fossil fuel electricity through variable payments on top of average market prices. Should wholesale prices for electricity increase above the promised rate of the FiT then generators will be required to return money to customers. Grandfathering will ensure that projects built while the RO is still in place to 2017 will remain under the mechanism.

Appendix I

Amount of electricity to be stated in ROCs generally

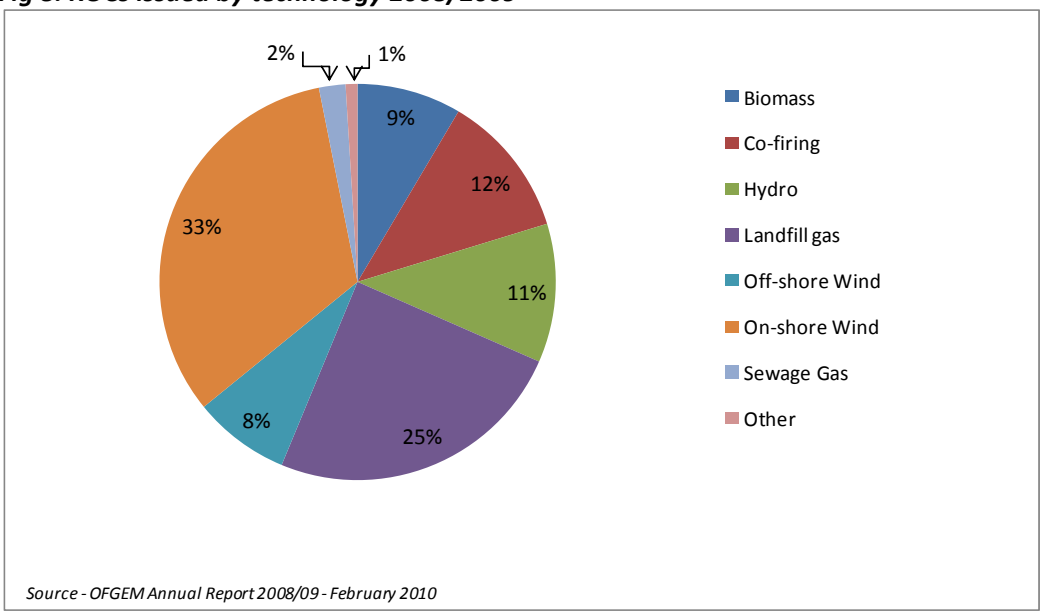
Generation type	Amount of electricity to be stated in a renewables obligation certificate	Equivalent ROCs/MWh
Electricity generated from landfill gas	4 megawatt hours	0.25
Electricity generated from sewage gas Co-firing of biomass	2 megawatt hours	0.50
On-shore Wind Hydro-electric Co-firing of energy crops Energy from waste with CHP Geopressure Co-firing of biomass with CHP Standard gasification Standard pyrolysis	1 megawatt hour	1.00
Dedicated biomass Co-firing of energy crops with CHP	⅔ megawatt hour	1.50
Off-shore Wind Wave Tidal-stream Advanced gasification Advanced pyrolysis AD Dedicated energy crops Dedicated biomass with CHP Solar photovoltaic Geothermal Tidal impoundment – tidal barrage Tidal impoundment – tidal lagoon	½ megawatt hour	2.00

Appendix II

Production of ROCs

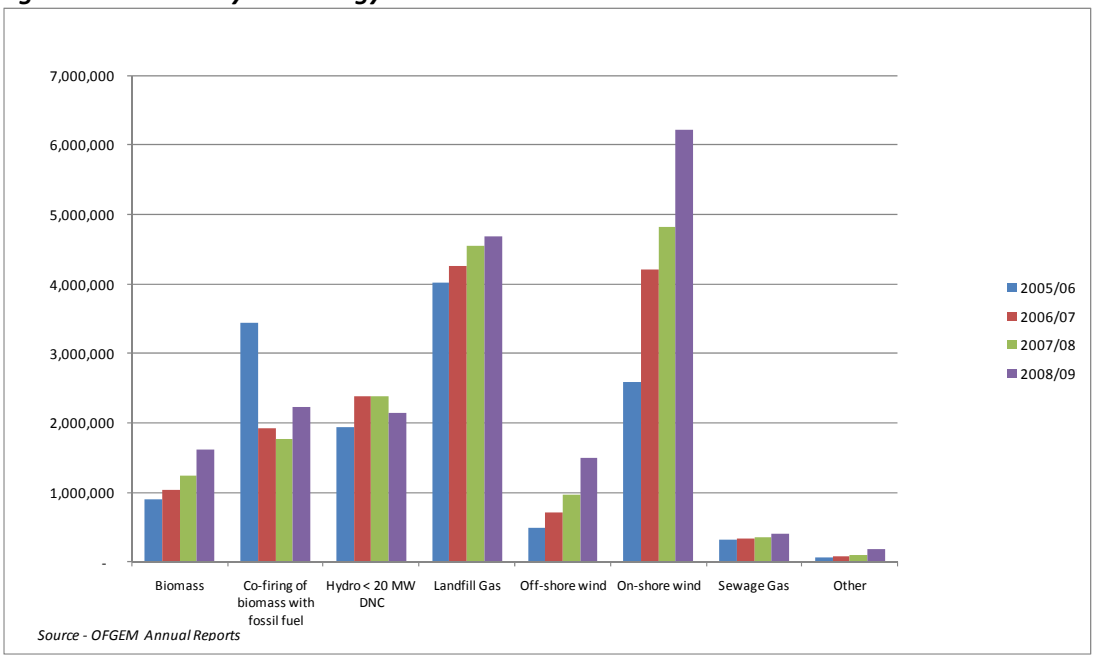
In OFGEM's Annual Report 2008/09 (CP7) reports that 18.9m ROCs were presented. The RO fixed target for 2015/16 is 0.154 ROCs per MWh of supply, and assuming a total electricity supply from Licensed Suppliers of say, 322TWh in 2015/16 (310TWh in 2011/12), in order for the UK to comply with this target 49.6 million ROCs need to be produced. This represents a 162% increase over current levels.

Fig 8: ROCs issued by technology 2008/2009



Source - OFGEM Annual Report 2008/09 - February 2010

Fig 9: ROCs issued by technology

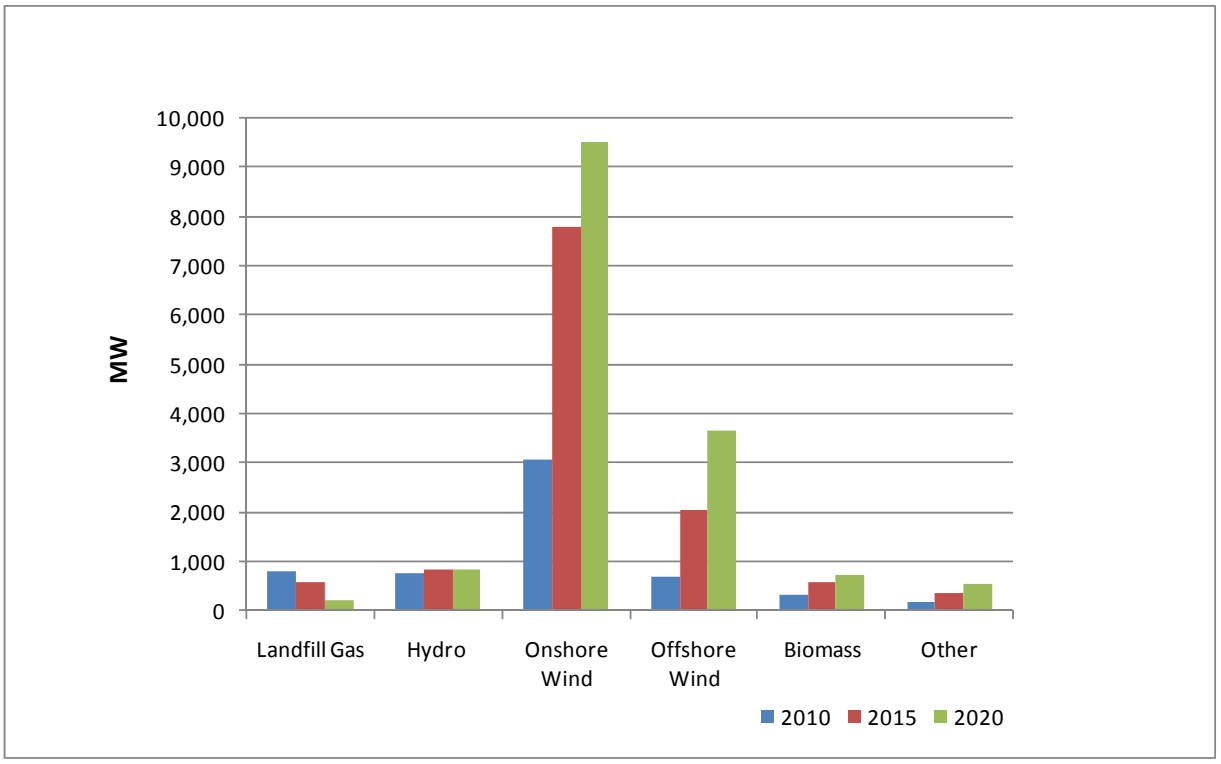


Source - OFGEM Annual Reports

Under the RO, banding has been introduced to encourage new technologies. Technologies which require limited capital investment or development have been awarded fewer ROCs.

The expectation is that despite the new bands, the majority of the expansion in the foreseeable future will come from wind, both on-shore and, increasingly, off-shore. In the current financial climate only proven technologies are likely to be developed in any capacity.

Fig 10: Forecast Capacity equivalence for the High ROC Price scenario



Meeting current targets is considered very challenging. UK Renewable Energy Strategy will focus further on renewable electricity, causing the set target for the production of renewable energy to rise substantially, under some forecasts doubling to over 30%. This would require continued and probably increased value in support for renewable generators.

FIM's Observations

On-shore wind (33% of 2008/09 ROCs)

Each 1,000MW of new capacity could be expected to add 2.63 million ROCs per annum (based on a 30% capacity factor). As at November 2010, RenewableUK estimate the following in respect of the on-shore generating capacity in the UK:

Fig 11: UK On-shore Wind Farms	Schemes	MW
Operational	269	3,853
Under Construction	28	1,124
Approved, not built	201	3,731
In planning	263	7,054
	761	15,762

Source: RenewableUK December 2010

Planning continues to be restrictive and is a major delay in projects coming forward. Secondly, many suitable large scale sites, particularly in the Highlands and Islands of Scotland and the Welsh mountains, are constrained by a severe lack of capacity on the grid, such that major new schemes could only be brought on line with a substantial investment in the national grid network.

Although part of this is planned (the Beauly-Denny upgrade) it is likely to take five or more years to implement. Many on-shore sites may be grid locked until 2020. If only 50% of the capacity "approved, not built" and "in planning" is constructed this would only add 5.4GW, giving a total installed capacity of 10.4GW, which is over 30% below the UK Government's stated target of 14.9W by 2020.

Off-shore Wind (8% of 2008/09 ROCs)

Each 1,000MW of new capacity could be expected to add 6.6 million ROCs per annum (based on a 37.5% capacity factor and 2 ROCs/MWh). As at November 2010, RenewableUK estimate the following in respect of the off-shore generating capacity in the UK:

Fig 12: UK Off-shore Wind Farms	Schemes	MW
Operational	13	1,341
Under Construction	4	1,154
Approved, not built	7	2,592
In planning	5	2,260
	29	7,347

Source: RenewableUK December 2010

The scale and economics of off-shore wind currently make significant expansion in the near term uncertain. Expansion will require a substantial sum of balance sheet finance in the present capital constrained environment.

Grid issues, rising costs of construction and planning delays will also all impact on short and medium term development of capacity. If only 50% of the capacity "approved, not built" and "in planning" is constructed this would only add 2.4GW, giving a total installed capacity of 4.9GW.

To have a significant impact on RO targets, approximately 5.0GW would need to be constructed – circa 27 turbines per month for five years. Engineering resources are not currently available to achieve this rate of build out.

Off-shore wind currently benefits from 2 ROCs/MWh for stations accredited between April 2010 and March 2014.

Biomass - Co-firing (12% of 2008/09 ROCs)

The ROO imposed a new cap on co-firing and a right to review the banding provisions in the event of over production:

Article 13(3): No more than 12.5% of a supplier's renewables obligation may be satisfied by ROCs from generating stations utilising partly fossil fuel and partly biomass – i.e. co-firing.

Article 33 (3)(f): Allows for a review if the banding provisions for co-firing are leading to over production of co-firing ROCs against the target limit of 12.5%.

Current production from co-firing is 12% (2008/09), indicating that co-firing can only grow in line with the rise in the RO target. The revised banding is for new capacity in co-firing to only receive 0.5 ROCs/MWh, which may lead to curtailment of expansion in co-firing in favour of dedicated biomass.

Dedicated Biomass (9% of 2008/09 ROCs)

Dedicated biomass is reliant on feed stock. UK availability is largely limited to recycled wood. Otherwise schemes will have to rely on imported feed stock with significant cost implications as wood is expected to rise in value and transport costs are likely to increase.

Hydro ≤20MW (11% of 2008/09 ROCs)

Production is forecast to have reached a plateau. Expansion will largely be limited to small scale, run of river developments, which will have very little impact on the overall supply of ROCs.

Landfill gas (25% of 2008/09 ROCS)

With the decline in new landfill as a result of the annual escalating landfill tax currently £48/tonne and rising £8 per annum to £72/tonne by April 2013 and the rapid recent development of this renewable source, production is likely to decline over time as the resource is utilised.

Energy crops

There is likely to be limited expansion as there are few purpose grown energy crops in the UK, a situation which is likely to continue due to high agricultural land values. Energy crops need to be grown on reasonably productive land to achieve a respectable yield.

New technologies

Energy from Waste (EfW) (advanced gasification, pyrolysis) will be the first to be developed commercially and may have an impact over a five to ten year horizon. Other technologies, such as wave and tidal power will follow behind.

Appendix III – Renewable Obligation Calculations

Compliance Period 10 (CP10) - 2011/2012

In order to calculate the size of the Obligation that renewable energy generators are encouraged to achieve; DECC makes two calculations.

Calculation A – Fixed Target

The number of Renewable Obligation Certificates (ROCs) that would be needed for suppliers to meet a fixed target of 0.114 ROCs per MWh from eligible renewable sources in England, Scotland and Wales and 0.05 ROCs per MWh in Northern Ireland for CP10

Using DECC's forward electricity demand figures for CP10, the total number is 34.85 million ROCs.

For DECC's 2011/12 UEP predictions of 310.03TWh of electricity which will be supplied by Licensed Supplier Electricity and applying 0.114 ROCs per MWh for England and Wales and Scotland; and 0.05 ROCs per MWh for Northern Ireland the total number is 34.85 million ROCs.

Calculation B – Headroom

The amount of renewable electricity DECC expect to be generated in 2011/12 is presented in the table below and based on this amount, the number of ROCs that we expect will be issued is uplifted by 10%.

	Amount
Potential ROCs from existing stations	27.22
Potential ROCs from new build	5.82
Co-firing assumed	1.50
Sub Total	34.54
Total (with 10% headroom)	**37.99**

The Obligation level is set in legislation as one of these calculations, determined by:

- Fixed Targets: If Calculation A is greater than Calculation B
- Headroom – If Calculation B is greater than Calculation A

According to legislation, Calculation B – Headroom sets the Obligation.

Appendix IV – Further Reading

EU Directive http://register.consilium.europa.eu/pdf/en/08/st03/st03736.en08.pdf
Renewables Obligation Order 2009 http://www.opsi.gov.uk/si/si2009/pdf/uksi_20090785_en.pdf
Renewables Obligation Order Scotland http://www.opsi.gov.uk/legislation/scotland/ssi2009/draft/sdsi_9780111003268_en_1
Renewables Obligation Order Northern Ireland http://www.legislation.gov.uk/sr/sr2009/pdf/nisr_20090154_en.pdf
CC http://www.defra.gov.uk/environment/climatechange/uk/business/cca/index.htm
OFGEM Annual Report 2007/08 http://www.ofgem.gov.uk/Pages/MoreInformation.aspx?docid=9&refer=About%20us/annlrprt
Department of Energy & Climate Change http://www.decc.gov.uk/en/content/cms/publications/lc_trans_plan/lc_trans_plan.aspx