REF
RENEWABLE ENERGY FOUNDATION

21 JOHN ADAM STREET, LONDON, LONDON, WC2N 6JG
TEL: 020 7930 3636. FAX: 020 7930 3637
WEB: http://www.ref.org.uk

UK Renewables Subsidies: A Simple Description and Commentary

ABOUT RENEWABLE ENERGY FOUNDATION

The Renewable Energy Foundation is a UK registered charity supported by private donation. It has no corporate sponsorship and no political affiliation. REF publishes extensive data on the performance of the UK renewables fleet, including monthly load factors for all 900 subsidised renewable generators. The Foundation has also sponsored prize-winning articles in peer-reviewed engineering journals, and has presented evidence in person to the House of Lords Select Committee on Economic Affairs.

ABOUT THE AUTHORS AND THE DOCUMENT

John Constable is Director of Policy and Research for the Foundation. Bob Barfoot is the Chairman of North Devon Campaign to Protect Rural England. This document began as work by John Constable, and has been circulated by REF in previous forms. The present version has been extensively revised, and brought up to date by Bob Barfoot. The authors have taken all reasonable steps to ensure that the information is correct, and would welcome corrections or comments.

DISCLAIMER

The Renewables Obligation, and Climate Change Levy

The Renewables Obligation (RO) and Climate Change Levy (CCL) system of indirect subsidy provide very substantial additions to the income stream for renewable generators. A grasp of how this system motivates proposals for renewable energy generation is important, because it is only then that we understand the process of technology selection which eventually manifests itself in the form of proposals put before the planning system.

The following analysis outlines the system, and notes that while the RO is complicated, it is in some ways very simple. The issuing and trading of certificates involves numerous stages and parties, but the end result is that, at present, it offers equal rewards to technologies

regardless of their intrinsic merits, where merit is understood in the context of the peculiar characteristics of the electricity supply industry. As a result, investors have tended to select technologies on the principle of "least capital cost first". Initially this resulted in a bias towards Landfill Gas generation, which was, quite incidentally, a high merit technology. Opportunities for LFG are now all but exhausted, and developers are currently concentrating on the next most attractive qualifying ticket to the subsidy stream. This happens to be onshore wind, which is a low merit generator, as will be explained later.

It is important to emphasise, therefore, that **those responsible for taking decisions within the planning system should not assume that incentivisation within the RO is an indicator of quality, or, though this may seem paradoxical, of the technology's suitability for the purpose of meeting the aims of the UK's renewable energy and climate change policy.**

On the contrary, in our view, it is the planning system which bears the full burden of responsibility for determining the quality of the proposal, its suitability to realise the aims of policy, and balancing this in relation to local impact.

THE RENEWABLES OBLIGATION

The electricity generated by renewable sources is *indirectly subsidised* through two market mechanisms:

> The Renewables Obligation, which is an artificial market administered by the government's Office of the Gas and Electricity Markets (Ofgem).
>
> The Climate Change Levy.

The workings of this market are complicated, but not hard to grasp. To simplify the explanation we will treat these two market instruments separately.

One thing must be understood at the outset: under the New Electricity Trading Arrangements and their successor the British Electricity Trading and Transmission Arrangements, there is an "open" market in electricity. Although this market is intricate, for our purposes we will think of it in terms of:

1. Generators. who sell their electricity to
2. "Suppliers", who sell it to
3. Customers.

In fact some "Generators" are also "Suppliers", and this is a point to which we will return.

THE RENEWABLES OBLIGATION: ELECTRICITY SUPPLIERS

All "Suppliers" selling electricity to "Customers" must now by law obtain a certain proportion of their total sales from accredited "renewable" electricity generating sources, such as biomass, wind-power, tidal energy, land-fill gas, or a number of other generation technologies. If they fail to do this they pay a fine.

In 2002/2003 the law required that 3% of supplied electricity was "renewable". In 2006/2007 the proportion was 6.7%, and it will gradually rise, until in 2015/2016 it will reach 15.4%. This is the "Renewables Obligation" (RO).[1]

[1] The Renewables Obligation Order 2006, Schedule 1. See http://www.berr.gov.uk/files/file34450.pdf

A supplier of electricity proves to Ofgem that they have met this obligation by producing "Renewables Obligation Certificates" at the end of the year, one certificate for every MegaWatt hour (MWh) sold.[2] For example, imagine a supplier which sold 1,000,000 MWh of electricity in 2006-2007. This company would have a Renewables Obligation of 67,000 MWh (6.7% of 1,000,000 MWh).

If a supplier fails to meet its obligation it must pay a so-called "buy-out" fine for every MWh it sold that was not "renewable". In 2006-2007 this fine was £33.24.[3]

So, if our imaginary company failed to supply any renewable electricity it would be fined 67,000 x £33.24 = £2,227,080. In real terms, even missing your RO by a small amount can be very expensive. For example, in 2006/2007 EDF Energy Customers PLC had a Renewables Obligation of 2,883,887MWh, and though it succeeded in meeting 98% of its Obligation through ROCs it was left with a 2% shortfall obliging it to pay £2,005,000 in a buy-out fine.[4]

These fines are paid to Ofgem, but not retained. At the end of the year the money is distributed to all electricity supply companies possessing ROCs, the amount received being in proportion to the number of ROCs held. In other words, if a supplier meets part or all of its RO, but other companies don't, the supplier who has ROCs is rewarded with a share of the fines.

In the period 2006/2007 for England and Wales the buy-out fines, plus interest, to be redistributed totalled £217,888,311, and the total number of ROCs submitted was 12,868,408 which meant that each supplier who correctly produced ROCs received £16.04 back per certificate.[5]

THE RENEWABLES OBLIGATION: GENERATORS

All companies generating power from accredited renewable sources are issued with Renewable Obligation Certificates by Ofgem. One MWh of electricity entitles the generator to one ROC.

When the renewable generator sells electricity to the supplier it is common, though not necessary, to sell the ROC too.

Because the ROC can save the supplier from having to pay a fine it adds to the price of the electricity.

The ROC is also worth something extra because it entitles the supplier to a share of the "buy-out" fines at the end of the year.

Thus, we can see that a renewable energy power station has two sources of income:

1. the price of the electricity they generate,
2. the price charged for the ROCs which they sell on to suppliers.

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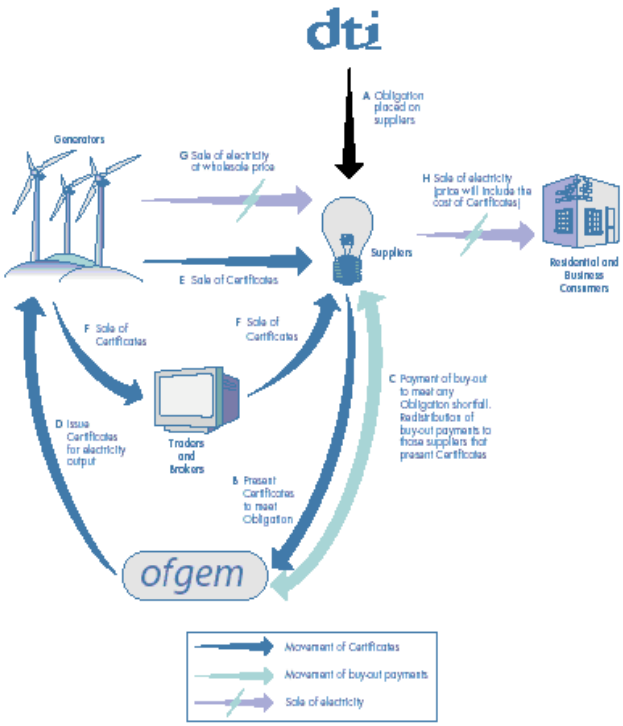
[2] One MWh is equal to 1,000 kilowatt hours (kWh). A representative average domestic household consumes somewhere around 4,700 kWh a year, which is 4.7 MWh.

[3] The fine, like the RO itself rises by stages. The figure of £33.24 was set in the Renewables Obligation Order 2006, Part 4, 11(2) See http://www.berr.gov.uk/files/file34450.pdf

[4] *The Renewables Obligation: Ofgem's Annual Report 2006-2007, p.* 46.

[5] *The Renewables Obligation: Ofgem's Annual Report 2006-2007*), p. 7.

The following chart, reproduced from the National Audit Office report on the Renewable Obligation represents the system in schematic form.[6]



The Price of Electricity

Due to the nature of the British Electricity Trading and Transmission Arrangements, wholesale electricity prices are very difficult to summarize in a single figure, because they vary so much according to the nature of the contract between buyer and seller. Market data is available from Elexon and UKPX.[7] Prices have risen greatly in the last few years. In 2003 the price was around £17 per MWh, but by October 2004 had reached about £30 per MWh.[8] At the time of writing (22 July 2008) wholesale electricity had been trading, on average, at between £50 and £70 per MWh.

The Price of Renewable Obligation Certificates

ROC prices are rather easier to determine than electricity, but there is still a significant difficulty in estimating the exact figure a company might expect, because both electricity and the certificates are sold on an open market and the price fluctuates according to demand. Furthermore, electricity and ROCs are not always sold together. Representative prices can, however, be gauged from the figures published by the Non-Fossil Purchasing Agency Ltd.[9]

Auction Date	*Average Price paid per ROC*
8 July 2008	£53.27/MWh

[6] National Audit Office, *Department Of Trade and Industry: Renewable Energy*, report by the Comptroller and Auditor General, Hc 210 Session 2004-2005, 11 February 2005, p. 15. Available from http://www.nao.org.uk/

[7] See http://www.elexon.co.uk/, and http://www.ukpx.co.uk/

[8] See for example http://www.ofgem.gov.uk/temp/ofgem/cache/cmsattach/2219_prices.pdf

[9] http://www.nfpa.co.uk

8 January 2008	£49.75/MWh
17 July 2007	£48.12/MWh
22 January 2007	£46.17/MWh
20 July 2006	£40.62/MWh
19 January 2006	£39.17/MWh
20 October 2005	£39.17/MWh
20 July 2005	£45.73/MWh
20 January 2005	£47.18/MWh
26 October 2004	£46.12/MWh
21 July 2004	£ 52.07/MWh
20 April 2004	£ 49.11/MWh
20 January 2004	£ 47.46/MWh

These may seem to be very high prices, but recall that the fine for not having ROCs is itself high, and that anyone possessing ROCs at the end of the year is entitled to a share of the fines paid by other companies, and you can see why the value goes up. In fact, because electricity and ROCs can, legally, be sold separately, ROCs are freely traded and there is a lively speculative market. For example, a speculator might buy ROCs and electricity early in the year, selling the electricity on separately, but keeping the ROCs in the hope that the overall supply of renewable electricity would be low in that year, and that there would be suppliers desperate to meet their RO and willing to pay high prices for ROCs.

That last statement may seem surprising. Surely, you might think, a supplier has to actually sell renewably generated electricity to meet its RO. The answer, oddly, is that this isn't necessary. All the power a supplier sells can come from a conventional generator, but provided that the supplier can buy sufficient ROCs on the open market the Renewables Obligation will have been met. This is perfectly legal, and exactly as the designers of the system expected it to be.

A Renewable Energy Station's Income

We are now in a position to see how much a renewable electricity generator might earn in a normal year. In the following calculations we will use £60 per MWh as an approximate wholesale electricity price, and a mean ROC price of £50.

Let us imagine a 16 turbine wind farm somewhere in England. Each turbine is of 2 MW. We can calculate the total likely output (generation figures are rounded the nearest 100 MWh:

> 32 MW (total capacity) x 8760 (hours in a year) x 0.241 (capacity factor)[10] = 67,600 MWh.

Thus we can calculate the likely income from the RO system:

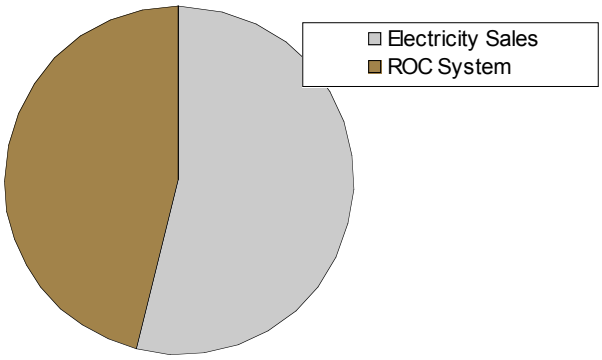
> Electricity income: 67,600 MWh x £60 per MWh = £4,056,000

[10] Capacity factor (sometimes referred to as Load Factor) is the proportion of theoretical maximum output that a power station can produce under normal working conditions. The output of conventional power stations is limited by the need for regular servicing, and by mechanical failure. Wind turbines are **additionally** limited by the fact that there may be no wind. Or, if there is wind it may not blow hard enough to generate maximum output at any particular time, or it may blow so hard that the turbines have to be shut down to prevent damage. In 2003 the UK's wind turbines achieved a Load Factor of 24.1% (Dti, *Digest of United Kingdom Energy Statistics 2004*), and in 2004 the Load Factor was 26.6% (Dti, *Digest of United Kingdom Energy Statistics 2005*).

Renewable Obligation Income: 67,600 MWh x £50 per ROC = £3,380,00

Total Income: £7,436,000

Thus, we can see that electricity sales constitute approximately 54% of a renewable station's income. The remaining 46% comes from indirect subsidy. In the first years of the Renewables Obligation the proportion was much higher, due to relatively low electricity prices.



Clearly, somebody has to pay for the RO system, and in fact it is the electricity consumer. The electricity suppliers are businesses trying to stay in the black, and since they have had to pay more for their electricity from the generators, because of the ROC premium, or have had to pay fines to Ofgem, they charge the customer more for their electricity. As the National Audit Office report on the electricity industry stated in 2003:

> *Suppliers have passed on to customers new environmental costs arising from the Renewables Obligation and Energy Efficiency Commitment. These have been equivalent to an additional 2 per cent on domestic bills.*[11]

The BERR Renewable Energy Strategy Consultation [2008] states that current climate change policies have added an additional 14% of domestic electricity bills and 21% to industrial electricity bills, much of this from the RO and the CCL.[12]

THE CLIMATE CHANGE LEVY

The Climate Change Levy (CCL) is a tax on energy used by businesses. It was announced in the March 1999 budget, and implemented on the 1st of April 2001.[13] In relation to electricity the CCL requires suppliers to charge commercial customers (i.e. business not domestic, governmental or charitable customers) an extra 0.43p per kWh (i.e £4.30 per MWh), which monies are then remitted to the government, where they are used to fund a national insurance contribution break and energy saving programmes. In the 2006 budget the CCL was index-linked.

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[11] Quoted from the National Audit Office document, *The New Electricity Trading Arrangements in England and Wales*, Report By The Comptroller And Auditor General, HC 624 Session 2002-2003: 9 May 2003. Available on http://www.nao.gov.uk/pn/02-03/0203624.htm

[12] BERR Renewable Energy Strategy Consultation para 10.5.3, p 231.

[13] For further details see: http://www.defra.gov.uk/environment/climatechange/uk/business/ccl/index.htm

Electricity produced from designated renewable sources is exempt from CCL, and is issued with exemption certificates that can be bundled with the power when sold to a supplier. Thus, the presence of a certificate allows the renewable generator to charge a premium price for renewable power. The reason for this is straightforward. If the electricity is exempt from CCL the supplier can either reduce the price of its power, thus passing the saving on to the customer and increasing its own competitiveness in the electricity market. Or, it can charge the customer full CCL and add the difference to its own operational margin. In either case, the presence of a CCL Exemption Certificate is worth something to the supplier, and the generator can therefore charge more for a MWh from a renewable source. The market seems to expect that this value will be split by the generator and the supplier, though the exact proportion of this cut depends on the deal struck by generator and supplier. C. K. D. Galbraith, one of Scotland's leading property consultants, in a document advising its clients on the profitability of renewable energy projects, remarks that:

> *The levy exemption certificate (LEC) is the climate change levy imposed on commercial sales of electricity. Renewable energy is exempt from this charge and the renewable generators can negotiate a proportion of this value for each unit produced, at approximately £2.30 per megawatt hour.*[14]

Clearly, however, it could go up to a much larger proportion of the £4.30 per MWh. The Energy Saving Trust advice document to those considering Combined Heat and Power schemes says that it may normally be as much as 80% of the levy price.[15] Splitting the difference we might say that a renewable generator might manage to achieve somewhere around 67% of the value of the certificate, or £2.88 per MWh. This stream of subsidy revenue is small in comparison to that arising from the Renewables Obligation, but should be borne in mind.

VERTICALLY INTEGRATED GENERATOR SUPPLIERS

Because of the RO and CCL systems even stations generating small quantities of stochastically variable power can generate large incomes, and might be attractive to small companies. However, for substantial "vertically integrated" companies that act as both generators and suppliers they are essential as a means of avoiding buy-out fines, and acquiring a share of the fines paid by others. As Ofgem states in their *Annual Report 2006-2007*:

> *When combined with the buy-out price that suppliers effectively avoid paying, a ROC produced against the RO was "worth" £49.28 to suppliers in 2006-07.*[16]

In fact large-scale generator/suppliers will pay considerable sums just for uncompleted renewable energy projects so that they can add them to their renewable portfolio. In January 2004, for example Scottish and Southern Energy Ltd bought an uncompleted wind power station of four turbines on Orkney for £8.3m.[17] It seems likely that much of the activity we

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[14] http://www.ckdgalbraith.co.uk/newsletter/may_2004.html

[15] Community Energy (Carbon Trust & Energy Saving Trust), *Getting Best Value for Electricity Generated in Community Heating* (Not dated), p. 8. and p. 18.

[16] Ofgem, *Annual Report on the Renewables Obligation2006-2007*, p. 7.

[17] See the report dated 16 Jan. 2004 in *The Scotsman*, http://business.scotsman.com/latest.cfm?id=2537228

currently see in the wind-power area results from property developers trying to acquire planning permissions in order to sell them.

The market for renewable energy is an artificial one created and maintained by government legislation. Those who claim that the renewable energy sector is unsubsidized, and self-supporting, are indulging in sophistry. The fact that the ROC subsidy is *indirect* and does not pass through government hands does not make it any less of a subsidy. Without government legislation creating the Renewables Obligation and Climate Change Levy system this source of income would be unavailable.

The question is whether this consumer-derived money is well spent. It is becoming increasingly apparent that one very significant problem with the Renewables Obligation system is that it does not discriminate between "firm" and "non-firm" renewables, that is between high value and low value renewables. Consequently, many are now concluding that those renewables, such as biomass, which is fully dispatchable, and tidal-based generators which are capable of providing some degree of firm generation (and thus contribute more certainly towards security of supply and emissions reduction) deserve more encouragement than low quality, randomly variable generation technologies, such as wind (which have a knock-on effect on the rest of the grid, and are consequently costly as electricity generators and uncertainly effective as emissions abatement techniques).

It appears that the Government is now prepared to admit that wind generation is intermittent and needs to be backed up by conventional power stations. On 23 June 2008 a question was put by Lord Stoddart of Swindon:

> *Q. Lord Stoddart of Swindon:*
>
> *My Lords, have the Government had discussions with the national grid about their policy of building thousands of wind turbines? Is not the national grid concerned about the connection of these wind turbines and will it not require additional conventional capacity to be built to cover the time when the wind is not turning them?*
>
> *A. Baroness Vadera, (The Parliamentary Under-Secretary of State, Department for Business, Enterprise and Regulatory Reform):*
>
> *My Lords, my noble friend makes a valid point. In answer to the question that was asked earlier, wind generation is intermittent and therefore needs - may I use a technical term? – base-load capacity which means we need to build for coal and gas to back up the wind. That is why it is not the most effective source in terms of energy security of supply, but it is very effective for climate change.*[18]

Baroness Vadera's reply that wind generation is "very effective for climate change" may be questionable in the light of the cost of the emissions saving through wind energy, along with the overall system impact.

ARE THE SUBSIDIES WORTH IT?

There is growing concern amongst analysts that the Renewables Obligation is seriously defective and is failing to deliver value for money. In its response to the Government's proposed Reform of the Renewables Obligation, Ofgem reported in January 2007 that:

[18] http://www.publications.parliament.uk/pa/ld200708/ldhansrd/text/80623-0001.htm#80623-0001.htm_spnew68

> *We fully support the Government's aims of reducing carbon emissions and promoting renewable generation but we think there are cheaper and simpler ways of meeting these aims than the RO scheme which is forecast to cost business and domestic customers over £30bn. Rising wholesale prices and the start of the EU Emissions Trading Scheme have significantly improved the prospects for renewable generation. We think the Government should introduce a different form of support and have set out a possible replacement based on long term contracts offering renewable generators a fixed return where the cost to customers falls if the wholesale price rises. We think this would deliver more carbon savings at lower costs to customers.*
>
> *We administer the existing scheme and have major concerns about the practicalities and administrative costs of the proposed reforms. We do not think we should be involved in setting renewable bands as this would conflict with our role of making sure the energy market remains competitive.*[19]

In further response dated September 2007, Ofgem again made these points:

> *We support strongly the Government's efforts to reduce carbon dioxide emissions to tackle climate change. But we do not think that either the existing scheme or the Government's proposed changes are the best way to either promote renewable generation or to cut carbon dioxide emissions. We think that the current scheme costs customers more than it needs to and we do not think that the Government's proposed changes are a good idea. We explain why in this response and also develop our thinking on alternative support mechanisms that we think could meet the Government's renewable and carbon emissions targets at lower costs to electricity customers.*[20]

Similarly powerful criticisms are made in a report by the National Audit Office, and the consultants' reports on which it is in part based.[21] These documents not only summarise the system in admirably clear terms, but also provide trenchant criticism of the operation of the Obligation. From the present perspective, the most relevant conclusions are that:

1. Onshore wind is very significantly over subsidised.
2. The Renewables Obligation is a very expensive way to save CO_2.[22]
3. The RO is faulty in so far as it does not distinguish between technologies of varying merits.[23]

It is worth noting that the excessive subsidy offered to onshore wind development has drawn developers even to sites where the wind resource is very weak and the environmental impact

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[19] http://ofgem2.ulcc.ac.uk/temp/ofgem/cache/cmsattach/18363_ROrespJan.pdf?wtfrom=/ofgem/whats-new/archive.jsp

[20] Ofgem's Response to BERR consultation on reform of the Renewables Obligation. http://www.ofgem.gov.uk/Sustainability/Environmnt/Policy/Documents1/Ofgem%20response%20to%20Renewables%20Obligation%20consultation[1].pdf

[21] National Audit Office, *Department Of Trade and Industry: Renewable Energy*, report by the Comptroller and Auditor General, Hc 210 Session 2004-2005, 11 February 2005, p. 15. Available from http://www.nao.org.uk/

[22] NAO, *Renewable Energy*, p. 6.

[23] NAO, *Renewable Energy*, p. 41.

severe. At the moment renewable electricity projects of higher capital cost, but with higher intrinsic merit, are quite simply starved of investment.

It should be noted that revision along these lines seemed likely in 2006 as can be seem from an oral answer to a question in the House of Common the Energy Minister, by the Rt Hon Malcolm Wicks MP.

> *Q. Mr. Lancaster*
> *Increasing the use of renewable energy sources is the best way of increasing diversity in the UK's energy supply. But does the Minister agree that we need to reconsider the renewables obligation, which focuses on wind power to the detriment of other emerging technologies?*
>
> *A. Malcolm Wicks*
> *Yes, I agree that the renewables obligation, despite its strengths, which have brought forward much renewable energy, could appear to be a blunt instrument and certainly seems to be favouring one technology—the wind farm. Within the review, we are therefore considering the issue that the hon. Gentleman raises.*[24]

The concern raised by Mr Lancaster and confirmed by the Minister are now widespread within the renewable energy industry itself, and is reinforcing other criticisms. For example discussions internal to the Renewable Energy Association (formerly the Renewable Power Association) have produced an extremely interesting leaked document citing with deep concern the mounting criticism in the UK. One paragraph deserves citation here:

> *Many of those most closely connected with the DTI have received the message that it is politically unsustainable for the RO to continue in the form originally envisaged, with quotas continually rising to 2027 and with all technologies equally eligible for ROCs.*[25]

As the REA observe on the first page of this document, the fundamental ground of the criticism is that "some technologies get more support than they need", a view taken, the REA note, not only by the NAO, but also by the Committee for Public Accounts, and most significantly by the European Commission, whose major report "The support of electricity from renewable energy sources", was published in December 2005.[26] This document is of very considerable interest, both for its content and its origin. We can begin with the following quotation as an introduction for two of its most significant charts:

> *Figure 4 and figure 6 show the generation cost of wind energy and the level of the supported prices in each country. Support schemes for wind vary considerably throughout Europe with values ranging from €30/MWh in Slovakia to €110 per MWh in the UK. These differences – as seen in Figures 4 and 6 – are not justified*

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[24] House of Commons – Oral Answers Date published: 05 May 2006 Energy Supplies. http://www.publications.parliament.uk/pa/cm200506/cmhansrd/cm060504/debtext/60504-02.htm#60504-02_wqn2

[25] Renewable Energy Association, "Moving the debate forward: The future of the RO draft 2", p. 2.

[26] European Commission, "The support of electricity from renewable energy sources" Brussels, 7.12.2005 COM(2005) 627 final
http://ec.europa.eu/energy/res/biomass_action_plan/doc/2005_12_07_comm_biomass_electricity_en.pdf

by the differences in generation costs. Generation costs are shown in a range based – in the case of wind – on the different bands of wind potential.[27]

Figure 4. below represents for the EU-15 the relation between the minimum and average costs of onshore wind generation (a range indicated by blue bars) and compares this with the average to maximum support offered by subsidy or infeed tariff or tax credit (red dot and line). As will be noticed the UK offers the highest level of support, with very little difference between average and maximum levels, and, most importantly, the very largest distinction between cost and support levels. This latter interval is the margin enjoyed by the developer.

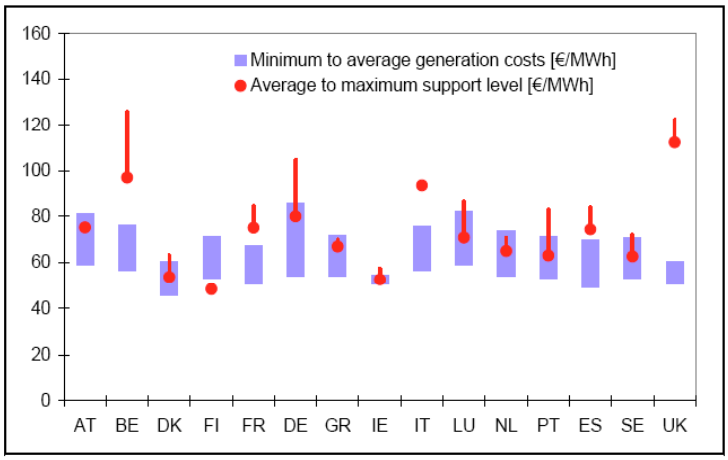

Figure 4:
Price ranges (average to maximum support) for direct support of wind onshore in EU-15 Member States (average tariffs are indicative) compared to the long-term marginal generation costs (minimum to average costs). Support schemes are normalised to 15 years.

The purpose of the EU report is to compare the impact of the various national support mechanisms on various technologies. For present purposes we will select only a single representative example, that of biomass electricity from forestry residues:

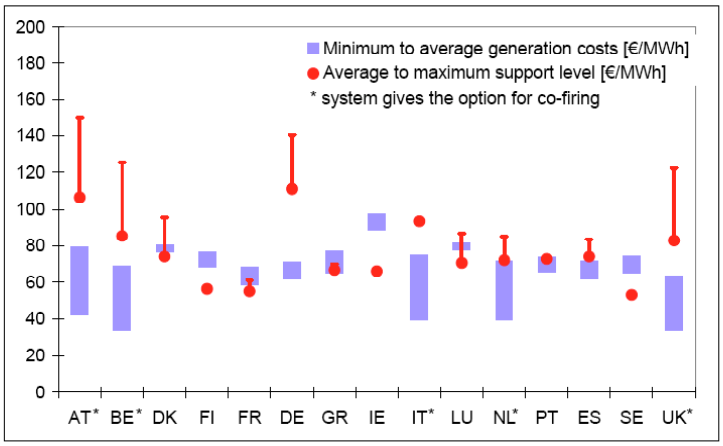

Figure 12:
Price ranges (average to maximum support) for supported biomass electricity production from forestry residues in EU-15 member states (average tariffs are indicative) compared to the long-term marginal generation costs (minimum to average costs).

As can immediately be seen, while the maximum support offered is comparable to that provided for onshore wind, the margin of average to maximum support over generation costs

[27] European Commission, "The support of electricity from renewable energy sources", 27.

for forestry residue biomass is very much smaller, and is therefore less attractive to investors. Yet biomass is capable of providing firm generation, and is therefore a technology of higher intrinsic merit from the point of view of the subsidising consumer.

The Energy White Paper 2007 proposed the banding of Renewable Obligation Certificates[28]

In January 2008 the Government published it's response to the BERR Renewables Obligation Consultation[29] and sets out proposals for the banding of the various technologies which includes an additional band at 0.5 ROCs:

> *As a result of the responses we propose the following amended banding regime, introducing an additional band at 0.5 ROCs to allow an intermediate step between the 0.25 ROCs and one ROC bands, with sewage gas and co-firing of non-energy (regular) biomass moving to the 0.5 ROCs band following reassessment of their costs:*[30]

Band	Technologies	Level of Support ROCs/MWh
Established 1	Landfill gas	0.25
Established 2	Sewage gas, co-firing on non-energy crop (regular) biomass	0.5
Reference	Onshore wind; hydro-electric; co-firing of energy Crops; EfW with combined heat and power; Geopressure; others not specified.	1.0
Post-Demonstration	Offshore wind; dedicated regular biomass.	1.5
Emerging	Wave; tidal stream; fuels created using an advanced conversion technology (anaerobic digestion; gasification and pyrolysis); dedicated biomass burning energy crops (with or without CHP); dedicated regular biomass with CHP; solar photovoltaic; geothermal; tidal impoundment (e.g. tidal lagoons and tidal barrages (<1GW); microgeneration.	2.0

At the time of writing the Energy Bill 2007-2008[31] before Parliament contains proposals to ratify these changes to the Renewables Obligation[32]:

[28] Energy White Paper: Meeting the Energy Challenge, 5.3.38.
See http://www.berr.gov.uk/energy/whitepaper/page39534.html
[29] http://www.berr.gov.uk/files/file43545.pdf
[30] BERR Renewables Obligation Consultation – Government Response, 2.7
[31] http://www.publications.parliament.uk/pa/ld200708/ldbills/052/2008052.pdf
[32] Energy Bill 2007-2008, Section 32D

(1) A renewables obligation order may specify the amount of electricity to be stated in each renewables obligation certificate, and different amounts may be specified in relation to different cases or circumstances.

(2) In particular, different amounts may be specified in relation to -

(a) electricity generated from different renewable sources;

(b) electricity generated by different descriptions of generating station;

(c) electricity generated in different ways.

(3) In this section "banding provision" means provision made in a renewables obligation order by virtue of subsection (1).

WILL THE RO SYSTEM ALLOW THE GOVERNMENT TARGETS TO BE MET?

As we discussed earlier, the value of each ROC depends upon the demand for certificates; the higher the demand the higher the value to the generators and the suppliers that need to purchase them. This demand depends on whether or not the companies have fulfilled their RO. It follows that if all of the energy generators and suppliers meet their RO in a given year then the value of ROCs would fall to zero. Thus the RO system may actually act as a cap on meeting the Government's targets.

The House of Lords Science & Technology Committee put this most clearly in 2004:

[…] The value of Renewables Obligation Certificates, and thus the subsidy received by renewable generators, is determined by the ratio of eligible renewable generation to the level of the RO at the time. Therefore the lower the amount of renewable output, the higher the subsidy per MWh generated. If, on the other hand, output from eligible renewables were actually to reach the RO level, the marginal value of ROCs—and arguably the value of all ROCs— would fall to zero. As Dr Anthony White told us, "if we were to meet the 10.4 percent target I think there would be a lot of unhappy investors"

Assuming that investors do not behave, in Dr White's words, "like lemmings", generating companies will scale back the introduction of new plant as capacity approaches the level of the RO. The RO will in reality thus act as a cap or upper limit on the renewables capacity, not a target. Given the uncertainty in annual output, we might expect to see this cap start to take effect at around 75 percent of the RO.

[…]The RO will in practice tend to act as a cap on renewable output, not a target. If the Government wish the RO to deliver its longstanding ten percent target for 2010, it should be set at a significantly higher level, although this would incur substantial extra costs for consumers.[33]

This discussion of the subsidy system sets out to explain why it is that wind energy projects are far and away the most frequent proposal set before the planning system. We have

[33] House of Lords Technology Committee: 4th Report of Session 2003-2004 - Renewable Energy: Practicalities. Section 5.6, 5.7, 5.8.
See http://www.publications.parliament.uk/pa/ld200304/ldselect/ldsctech/126/126.pdf

seen that this is not because of any intrinsic merit or economic superiority, but rather because of an imbalance in the Renewables Obligation.

New legislation may go some way towards addressing this imbalance, but it is likely that onshore wind will continue to be the preferred option of developers for many years to come.

It should be remembered that, in the main, renewable energy proposals are led by the need to obtain the best return for the investors and shareholders of the development companies. The proposed changes for banding the ROCs may provide incentives for the developers to invest in those technologies with higher merits than onshore wind, but that will depend on the commercial judgement of the development companies.

Again the House of Lords Science & Technology Committee made it clear that it is investors that will be responsible for the drive for renewable energy, and that proposals are primarily driven to provide a return for those investors:

> *Renewable electricity is not at present economic—none of the technologies we have been discussing can currently generate electricity as cheaply as, for instance, new combined cycle gas turbine (CCGT) plant. So if the Government are to persuade the private sector to finance renewable development they need to put in place adequate incentives. In practice that means providing attractive conditions for third party investors—those who are not otherwise wedded to the sector. As Mr Edmund Lazarus, of Englefield Capital, commented, such investors can "allocate capital to anywhere where [they] can get the best risk-weighted return". The challenge is not just to ensure that there is a return on investment in renewables, but that this return is competitive with that on other potential investments.*[34]

SUMMARY

In this discussion of the subsidy system we set out to explain why it is that wind energy projects are far and away the most frequent proposals set before the planning system. We have seen that this is not because of any intrinsic merit or economic superiority, but rather because of an imbalance in the Renewables Obligation.

We have examined the Government's plans to address this imbalance and discussed whether commercial interests will allow greater investment in the more meritorious renewable technologies.

We have discussed whether renewable technology proposals are driven by a desire to reduce emissions or whether they are driven by commercial interests.

Finally we need to turn to the words of the Energy White Paper 2003 which set out four aims;

> *As we address these three challenges, we will have four goals for our energy policy:*

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[34] House of Lords Technology Committee: 4th Report of Session 2003-2004 - Renewable Energy: Practicalities. Section 5.1
See http://www.publications.parliament.uk/pa/ld200304/ldselect/ldsctech/126/126.pdf

- *to put ourselves on a path to cut the UK's carbon dioxide emissions - the main contributor to global warming - by some 60% by about 2050, [….] with real progress by 2020;*
- *to maintain the reliability of energy supplies;*
- *to promote competitive markets in the UK and beyond, helping to raise the rate of sustainable economic growth and to improve our productivity; and*
- *to ensure that every home is adequately and affordably heated.*

This White Paper also set out the basis on which the Government's targets had been set:

> *In January 2000 we announced our aim for renewables to supply 10% of UK electricity in 2010,* ***subject to the costs being acceptable to the consumer.*** *We introduced the Renewables Obligation (which requires suppliers in England and Wales to obtain an increasing proportion of electricity from renewables year on year) in April last year. We also exempted renewable generation from the Climate Change Levy. By 2010 these measures will provide the renewables industry with support worth around £1 billion a year. [Emphasis supplied]*

We must now ask ourselves whether the RO system will allow the four aims of the Energy White Paper 2003 to be achieved, and whether we find the costs of the RO system acceptable to us as consumers.

It seems to the authors of this paper that the answer to these questions is that the Renewables Obligation is, as Ofgem and the National Audit Office have observed, both counterproductive and very poor value for money.

John Constable
Bob Barfoot 5 September 2008