



# postnote

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## RENEWABLE ENERGY

Generating electricity from renewable energy sources is a key part of the Government's strategy to tackle climate change and to develop business opportunities. It has set a target for 10% of all electricity to be generated from renewable sources by 2010. A Renewables Obligation (RO) Order, requiring electricity supply companies to sell electricity from renewable sources, will shortly be introduced into Parliament<sup>1</sup>. Concerns have been expressed, however, that the target may not be met because of potential difficulties with the policy and its role in the wider electricity market.

This briefing outlines the main renewable energy sources, the barriers to uptake, and the policies to stimulate their deployment. It specifically aims to help Parliamentarians in their consideration of the RO Order 2001. Also, this briefing accompanies a separate briefing on electricity networks (POSTnote 163).

### Renewable sources of energy

Renewable sources of energy occur naturally and repeatedly in the environment and from some human activities (see box opposite). The Utilities Act 2000 defines them as 'sources of energy other than fossil fuel or nuclear fuel.'<sup>1</sup> In 2000, 2.8% of the total electricity generated in the UK was from renewable sources<sup>2</sup>. In total, four fifths of electricity from UK renewables was generated from large-scale hydroelectric power schemes, landfill gas combustion and municipal waste incineration.

### Policies to encourage renewable energy

Until 2000, the main plank of the Government's policy for renewable energy was to require electricity companies to secure specified amounts of electricity from renewable energy sources. This was known in England and Wales as the Non-Fossil Fuel Obligation (NFFO), in Northern Ireland as NI-NFFO and in Scotland as the Scottish Renewables Obligation (SRO). For brevity, these are all referred to in this briefing as NFFO.

### Renewable energy sources

Figures in brackets are electricity generated in 2000 expressed in terawatt hours (TWh)<sup>3</sup>

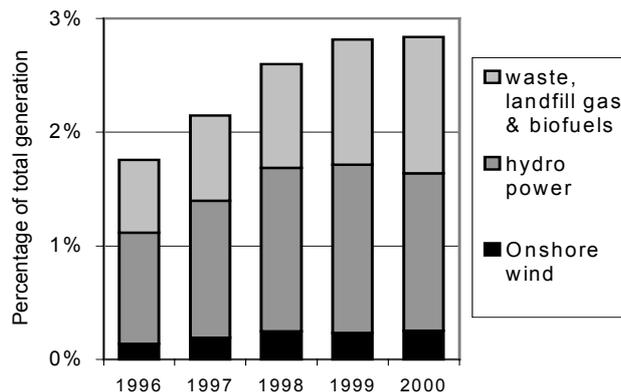
#### Natural sources

- **hydro-electric power**, subdivided into *large-scale* (4.9TWh) and *small-scale* (0.2TWh). Most hydro schemes are located in Scotland and Wales and the capacity for further large-scale development is limited.
- **wind**, subdivided into *on-shore* (0.9TWh) and *off-shore* (nil). In early 2001, leases were issued by the Crown Estate (the owner of the seabed) for possible development of off-shore wind generation.
- **solar** (virtually nil). The sun's energy can be directly converted into electricity using photovoltaic (PV) cells.
- **wave and tidal flows** (virtually nil) where the movement of water and sea is used to generate electricity.

#### Sources from human activity

- These include *landfill gas* (2.2TWh), *municipal waste combustion* (1.4TWh), *sewage sludge digestion* (0.4TWh), and *other sources* (0.5TWh) e.g. energy crops, and combustion of poultry litter, farm wastes and scrap tyres. More advanced and efficient waste treatment techniques such as gasification and pyrolysis are currently being developed but are not yet commercially viable (POSTnote 149, *Incineration of Household Waste*, December 2000).

### UK electricity from renewable energy (Source: DTI)



These policies operated through contracts with generators who were guaranteed premium prices for the electricity produced. The contracts could last up to 15 years and were financed from a levy on customers' electricity bills. They were issued as a series of tranches known as Orders: 5 in England and Wales, 3 in Scotland, and 2 in Northern Ireland.

Overall, because of planning difficulties, only a quarter of the electricity contracted under NFFO schemes has been delivered. To boost implementation rates, the Government will allow the more recent projects to be 'portable' – i.e. planned and built in locations other than originally specified – subject to legislative change.

No new NFFO orders will be made, and since February 2000, UK renewables policy has consisted of:

- the proposed Renewables Obligation (RO) - discussed later - which effectively replaces NFFO. This will require all electricity suppliers, from January 2002, to obtain a specific but increasing proportion of electricity from eligible renewables. The RO will become the key policy in the Government's strategy for renewables.
- the exemption of electricity from renewables from the Climate Change Levy (CCL)<sup>4</sup>.
- an expanded programme of capital grants for new and renewable energy (see box below).
- the development of a regional approach to strategic planning and targets for renewables.

#### **Capital grants for developing renewable energy**

Recognising the fact that some potentially large sources of renewable energy are not yet commercially viable, the Government is making available capital grants to encourage investment in the following areas:

- £50 million from the National Lottery (New Opportunities Fun), at least £33 million of which is to be committed to energy crops, £10 million for offshore wind, and £3 million to small-scale biomass heat and combined heat and power projects.
- £39 million recycled from Climate Change Levy (CCL) receipts for offshore wind.
- £12 million recycled from CCL receipts for energy crops.
- an increase in DTI funding for industry renewable energy R&D from about £36 million to £55 million.
- an additional £100 million announced by the Prime Minister in March which will be allocated on the basis of the energy review currently being carried out by the Cabinet Office Performance and Innovation Unit (PIU).

These figures represent funds available over the next three years, averaging around £85 million a year.

#### **The Renewables Obligation**

The RO requires all licensed electricity suppliers to obtain an increasing proportion of electricity from 'eligible' renewable sources, defined as:

- onshore and offshore wind
- wave and tidal stream power
- photovoltaics
- geothermal (tapping energy from hot water under the earth's surface)
- biomass (e.g. wood chippings)

- energy from waste using advanced technologies such as pyrolysis, gasification, and anaerobic digestion<sup>5</sup>
- landfill and sewage gas
- existing hydro less than 20 MW<sup>6</sup>, and all new hydro.

The proposed level of the obligation will rise from 3% in 2002-03 to 10.4% in 2010-11, and will remain at that level for at least the duration of the RO (until 2026-27). The Government specifically states that it may increase the level of the obligation after 2010.

The Office of Electricity and Gas Markets (Ofgem) will administer the scheme. It will issue 'Renewable Obligation Certificates' (ROCs) to accredited renewable generators for each MWh of electricity produced, and to suppliers holding NFFO and possibly SRO contracts. It is anticipated that a market for the trading of ROCs will develop involving suppliers, generators, and third-party traders.

Under the RO, suppliers need to demonstrate compliance with their obligations, and can do so by presenting a sufficient number of ROCs to Ofgem. As ROCs will be issued in 1MWh units, a supplier with an obligation to provide 1000MWh of renewable electricity would need to present 1000 ROCs.

If suppliers do not present sufficient ROCs to equal the amount of renewable electricity they should buy, they must pay an amount proportional to the shortfall. This is known as 'buyout', and the draft Order sets the initial buyout price at £30 per MWh. In the early years of the Obligation, it is anticipated that there will be a shortage of eligible electricity from renewable sources and most suppliers may therefore use a combination of ROCs and buyout to meet their obligations.

The fact that there is a buyout will limit the price to which ROCs can rise. Supply companies may pass on the costs of buying renewable electricity to their customers. Therefore, as suppliers can choose to pay the buyout price rather than buy renewable electricity it also limits price increases for consumers. The DTI has calculated that, on the basis of a £30 per MWh buyout the maximum overall cost to consumers by 2010 would be £870 million: a 4.9% real-terms increase from 1999.

All proceeds from buyout payments are to be recycled to suppliers in proportion to the number of ROCs they present. This may increase the value of ROCs and some industry sources have suggested that they may trade at £10 to £20 per MWh above the buyout price. This will provide an additional financial incentive to purchase renewable electricity, and thus stimulate investment in new generating capacity, and it may allow more marginal technologies to become more commercially viable. DTI has estimated that overall, the RO will create extra demand for renewable energy worth over £1 billion by 2010.

## Issues

### The Renewables Obligation in practice

Industry sources are broadly supportive of the RO as a way to encourage the growth of renewable electricity generation, but its introduction raises a number of issues.

#### Administration

There are concerns over the administration costs falling on both Government and industry, but the Government has no figures on this, even in the Regulatory Impact Assessment. For instance, the RO is similar to some features of the CCL (eg the accreditation of generators), but it is administratively distinct and definitions of eligible renewables differ. This raises concerns about possible duplication between the two schemes, though Ofgem has stated that it will seek to avoid this where it can. In addition, the introduction of a greenhouse gas emissions trading scheme will add further complexity to the web of policies and regulations in this area. Some industry sources have suggested a need for rationalisation to reduce unnecessary administrative burdens.

#### Encouraging innovation

The RO includes only a single buyout price, set at £30 per MWh. It cannot, therefore, differentiate between technologies at different states of development, or provide financial incentives for those that are further from the market. For example, wind power is rapidly becoming commercially competitive whereas waste treatment using pyrolysis or gasification is not yet viable. One option might be to introduce a range of buyout prices that reflect the state of development of different technologies.

DTI considered this option but decided against it for a number of reasons, including:

- the need to avoid undermining the market-based approach of the RO by introducing further government intervention into a liberalised energy market
- a probable increase in costs to consumers
- the availability of other more cost-effective ways of supporting emerging technologies (e.g. capital grants).

#### Market issues

Concerns have been expressed that uncertainties in the ROC market could decrease their value and thus adversely affect investment in renewables. Such concerns focus on:

- whether the market will continue to rise after 2010 because the Obligation is proposed to remain at 10.4% renewable electricity from 2010 to 2027. This might be balanced to some extent by continued growth in total electricity demand, the fact that some renewable technologies may have become commercially viable by 2010, and the possibility of trading in Europe.
- whether the trading of ROCs can be adequately monitored. Ofgem requires suppliers to demonstrate provenance when presenting ROCs but are not currently proposing to operate a central registration system to track transfers and trades.
- the proposed rules for trading across the Scotland to Northern Ireland electricity interconnector (see

POSTnote 163) might exclude NI generators from selling electricity into Great Britain and reduce incentives to develop renewables themselves.

- the possibility that the scheme might be changed significantly during its lifetime. For example, if it were opened up to EU-wide trading as part of the development of a single market for energy, this could 'flood the market' with competing sources of renewable electricity and reduce ROC prices. Such moves would require legislative amendment.

### The electricity trading market

The RO is being introduced amid great changes in the electricity market, and there is a danger that it might be in conflict with more widespread moves to reduce electricity prices. The New Electricity Trading Arrangements (NETA) went 'live' on 27 March 2001, after two years of consultation. NETA was primarily designed to reduce electricity prices for industry and consumers by encouraging a more competitive market akin to those for other commodities (see box below).

#### The main features of NETA

- Suppliers and generators must contract with each other for the amount of electricity to be supplied and inform the system operator (eg NGC in England and Wales) every half hour of the amount of electricity likely to be generated in 3.5 hours' time.
- There is a mechanism in which the system operator monitors planned and actual generation and demand, and takes action to correct any imbalances (see POSTnote 163).
- Financial penalties (imbalance or 'cashout' charges) fall on generators who fail to generate their contracted level and on suppliers who demand more than they have contracted to buy.

There were concerns both during the consultation and in the first few weeks of its operation, that NETA would adversely affect smaller embedded<sup>7</sup> and renewable generators. For example, smaller generators argued that they could not take part in trading directly because of the costs and financial risks involved in setting up their own systems for administering trading and forecasting output.

Recognising such concerns, the Government asked Ofgem to conduct a review based on the first two months of the new arrangements. Key findings<sup>8</sup> were that prices obtained by smaller generators had fallen by 17% and that output by 44%. Analysis of the Ofgem's figures indicates that, in April and May 2001, the profit per unit output for small generators fell by 72% compared with the same period in 2000.

As explained in the box above, NETA penalises generators who fail to meet their contract requirements. Over the first two months of NETA, the Ofgem review shows that such generators have had to pay on average £60 per MWh for any shortfall. Because the output of electricity from generating sources such as wind and combined heat and power (CHP) tends to be more variable than from other sources (see POSTnote 163),

their output is particularly exposed to these imbalance charges. Following the introduction of NETA, Ofgem reports that, in April and May 2001, the output from small CHP<sup>9</sup> and wind generators dropped significantly (61% and 13% respectively) compared to 2000.

There is, however, provision within NETA to allow small generators to 'club together' within a mechanism known as consolidation – i.e. aggregating the outputs from a number of generators to reduce the variability of the total output from those generators. But Ofgem reports that a consolidation market has not developed as anticipated. Seven companies originally indicated that they might provide such a service. Only one has taken any steps to do so, while the others are watching how the market develops. Some in the industry remain sceptical over the development and effectiveness of consolidation.

Ofgem's view is that it is too early to assess the impact of NETA and that it will take some time for the new arrangements to 'bed down'. It states that it is appropriate for NETA to reward reliability of electricity supply. Indeed, Ofgem's Chief Executive has stated<sup>10</sup> *"...if, for wider environmental reasons, the Government wishes to encourage particular forms of renewable energy which are less predictable and reliable, this will give rise to additional costs which should be recognised."* But Ofgem does not believe that NETA is the best way to reflect these costs, and that other means are available (e.g. increasing the RO buyout price).

Therefore, market barriers and disincentives arise within the new arrangements which appear to be working in opposition to the intent of the Renewables Obligation. By driving wholesale prices down and penalising variable generation, this sends contradictory signals to investors and customers and creates an unfavourable climate for investment in renewable energy technologies.

### Prospects for meeting the Government's targets

As explained above, the RO target amounts to sales of 33.6TWh of electricity from eligible renewable sources. The DTI has not published any forecasts of growth by type of renewable generation but has suggested that on and offshore wind, eligible waste technologies, and biomass might each constitute a quarter of this target.

By the end of 2000, generation from the technologies currently eligible under the RO totalled around 4.2TWh. Meeting the target therefore would require an eight-fold increase in renewable generation over the next 10 years – an additional 3TWh to be added each year – equivalent to around 70% of current total eligible generation. However, growth in renewable generation has levelled out in the last two years with only 0.4TWh added in 2000 (though the industry may have been holding back further investment pending the introduction of the RO). This is only one-eighth of the growth required to be on course to meet the target. Indeed, the percentage of electricity from renewable sources in 2000 remained at the same level (2.8%) as it was in 1999.

In the present climate, doubts remain over whether current policies will be sufficient to achieve the step change anticipated. In the short term, at least, prospects for boosting renewables will largely depend upon the success of the latest rounds of NFFO. The new rules on allowing NFFO contracts to be portable should help this, although many firms holding NFFO licenses are wary of further investment due to planning difficulties and the changed economic climate created by NETA.

There are also concerns over the capacity of the renewables industry to respond adequately to the financial incentive offered by the RO, in view of the disparate technologies and small scale of many of the companies involved. Also, difficulties in developing and connecting to electricity networks provide a further hurdle for them to overcome (see POSTnote 163).

## Overview

The Government has set challenging targets for the growth of renewable energy in the UK. However, the effect of electricity trading arrangements on renewable generators (particularly wind), and the difficulty of obtaining planning permission raise concerns. The RO presents an opportunity to boost development in renewable energy technology but doubts remain whether its full potential can be met. Parliamentary debate on the RO Order and the current Energy Review (which is being undertaken by the Cabinet Office Performance and Innovation Unit, and is due to report by the end of 2001) offer opportunities to consider ways of furthering the development of renewable energy.

### Endnotes

- 1 The Renewables Obligation Order 2001 will pass through Parliament as an affirmative resolution. The Government plans for the RO to come into force in January 2002. A similar RO for Scotland is proposed but there are no plans to have an RO in NI.
- 2 Total generation in 2000 was 369 terawatt-hours (TWh).
- 3 One terawatt-hour is roughly equivalent to the electricity supplied to a quarter of a million homes for 1 year.
- 4 The CCL aims to encourage energy efficiency and a switch to low-carbon energy sources. Renewables are exempted and firms can be largely exempted if they take on negotiated agreements.
- 5 Electricity from the combustion of municipal solid waste in conventional waste incinerators is not eligible.
- 6 Subject to refurbishment of plants larger than 1.25MW.
- 7 Embedded generators are those connected directly to electricity distribution networks (see POSTnote 163).
- 8 See Ofgem 'Report to the DTI on the initial impact of NETA on smaller generators', August 2001. This can be found at: <http://www.ofgem.gov.uk/public/pub2001.htm>
- 9 Some suggest that the fall in CHP output has resulted equally from the effect of NETA and an increase in gas prices.
- 10 Letter to Minister of State for Industry and Energy from Callum McCarthy, Chief Executive of Ofgem, 31 August 2001.

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