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The Renewables Obligation:

Can it Deliver?

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Synopsis

On 1 April 2002, the UK's renewable energy industry will receive a new lease of life. The launch of the Renewables Obligation [1] marks the next stage in the government's plan to meet 10% of our electricity needs from renewables by 2010 [2]. This aim, a commitment since Labour took office in 1997, is an ambitious one. Although renewable energy sources such as wind and small hydro have received public support for many years, progress has been slow.

The Renewables Obligation represents an opportunity for renewables in the UK to live up to their promise. It replaces a policy framework that had been in place for a decade: the Non-Fossil Fuel Obligation (NFFO). Renewables currently supply 3% of our electricity [3], a slight improvement on the level when NFFO was introduced in 1990, which was just under 2%. The NFFO competitive bidding process led to some renewables projects bidding too low which, coupled with a challenging planning environment, meant that some projects selected for NFFO support have not been constructed.

This Briefing presents a prospective commentary on the Renewables Obligation from Tyndall Centre researchers [4]. Its aim is to introduce the new policy and then sketch out some of the challenges that lie ahead in meeting the 2010 target – from the electricity market, the planning system, established modes of energy regulation, and innovating in new renewable technologies.

The Renewables Obligation

The Renewables Obligation creates a new England and Wales market in what are commonly known as tradable green certificates. These Renewables Obligation Certificates (or ROCs) will have to be produced by every energy supplier to prove that they have sourced a set percentage of their electricity from renewables. This percentage starts at 3% for 2002/03 and rises gradually to 10.4% for 2010/11 and subsequent years [5]. According to the details of the policy drawn up by the Department of Trade and Industry, these suppliers can meet their obligation in three ways:

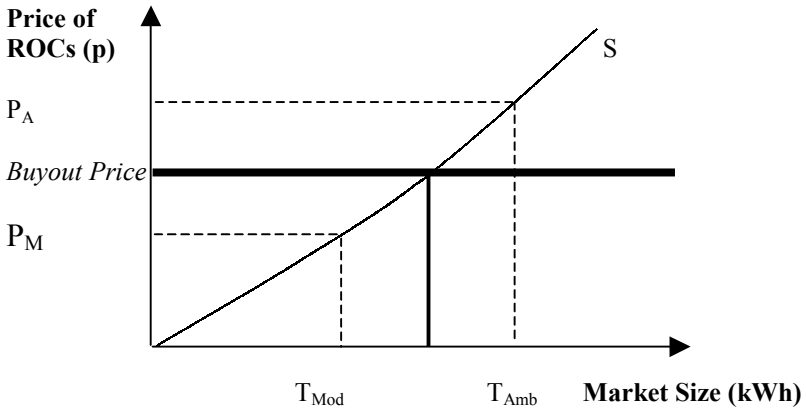
1. By producing ROCs to show that they have generated or bought electricity from recognised renewable energy generators.
2. By buying ROCs on the open market from other suppliers with a surplus.
3. By paying the 'buyout price' of 3p per unit (kWh) to make up the shortfall between their stock of ROCs and their statutory target. Buyout price receipts will be recycled back to suppliers in proportion to their holdings of ROCs.

As a result of this new policy, renewable energy generators will now earn revenue from two markets: the electricity market and a separate market in ROCs. The assumption is that this should give renewables an extra revenue boost by adding a subsidy of up to 3p/kWh to the wholesale market price of electricity (which is currently around 1.8p/kWh).

How the Market Should Work

The operation of a tradable green certificate market such as that designed to meet the Renewables Obligation is theoretically simple (see Figure 1) [6]. As the supply curve S illustrates, when the price of ROCs rises, more and more developers will be encouraged to build renewable energy generation capacity. Moreover, market mechanisms introduce competition between renewables generators for ROC revenues. This is to the advantage of cost competitive generators and encourages others to follow suit.

Figure 1 – An Ideal Market in Renewables Obligation Certificates



By including a fixed 'buyout price' for suppliers, the UK scheme places a boundary on the operation of the ROC market. If the target for renewable energy supply is modest (represented by demand-line T_{Mod}), generators of renewable electricity will sell ROCs at price P_M. If, however, the government sets a more ambitious target in the future (T_{Amb}) such that the price for ROCs climbs above the Buyout Price to P_A, then not all of that obliged demand will be met. Only generators that can profit below or at the Buyout Price will meet demand. In this way, an upper financial limit is imposed on support for renewables expansion.

This simple supply-demand analysis underpins the Renewables Obligation policy instrument. While useful heuristically, the analysis overlooks many of the factors that will determine the actual expansion in renewable capacity in practice. The market in ROCs will create a positive financial signal for promoting renewables, but it is only one signal amongst a host of others. Technological, regulatory and planning issues will shape the real ROC supply curve, perhaps in complex and unanticipated ways. Moreover, if supply should exceed the obligated demand then the ROC price will drop and the revenues to renewables generators will also fall. This market uncertainty could discourage investors.

The remainder of this Briefing Paper introduces some of the challenges confronting the government's plan to more than triple renewables capacity in the UK by 2010. These challenges are:

- The process of obtaining planning permission for new renewables projects, particularly wind.
- Recent reforms to the rules and operation of the wholesale electricity market that favour incumbent fossil-fuel generators over renewables generators.
- Technical and institutional problems in connecting renewables to electricity networks.
- Whether ROCs will stimulate innovation across a range of 'next generation' renewables technologies that will be needed to move beyond the 10 per cent target in the longer-term.

A coherent set of policies working across all these fronts is important not just for meeting the 10 per cent target but also for building a solid foundation for further expansion beyond 2010.

Planning Difficulties

The difficulty of obtaining planning permission – particularly for wind energy schemes – has presented a major barrier to renewables expansion over the past decade. Difficulties with the NFFO can be partly attributed to protracted planning disputes. The government has been relatively sanguine about the rate of success amongst renewables planning applications. Under the successive 'orders' of the NFFO scheme, only 11 per cent of the third order projects were refused planning permission, and six per cent of the fourth order were also refused. By 1999, 18 per cent of third order projects had not applied for planning permission, and 46 per cent of the fourth order projects had not yet done so. The fourth order projects were given the green light and assured price supports in 1997 [7]. Many renewables projects have been going ahead – but not all of them.

The above data relates to numbers of *projects* rather than renewable generating *capacity* installed. The majority of these projects have generated electricity from landfill gas [8]. Analysis by the Confederation of Renewable Energy Associations excluded landfill gas projects and focused instead on total generating capacity from other renewables. CREA claims that only 855MW of a total renewables capacity of 3638MW had obtained planning permission by 2000 (i.e. only 23 per cent of all renewable capacity supported under the old NFFO system, excluding landfill gas) [9]. The picture is complicated by project commissioning rules under the old NFFO system – some NFFO projects bid too low and never went ahead on commercial grounds. However, it is clear that other projects are finding it difficult to get planning permission, particularly wind power [10].

Such planning issues are likely to impact on the market for ROCs in the early months of the Renewables Obligation. Many analysts agree that a shortfall in renewables capacity will push the price

of ROCs above the artificial ceiling of 3p/kWh [11]. Recent bids by suppliers for output from existing renewable energy plants (for the period April to November 2002) imply a ROC price of at least 4.3p/kWh. This inflation is partly due to renewable electricity benefiting from an exemption from the Climate Change Levy (of 0.43p/kWh) charged to the business use of energy. However, it could also be due to an anticipation on the part of suppliers to maximise their share of recycled 'buyout' money in an under-supplied ROC market.

In response to planning bottlenecks, the government is requiring each English region to set strategic renewable targets for 2010 (similar to the traditional setting of strategic targets for housing). These targets are expected to cascade down into the structure plans and local plans of local authorities and become a material consideration in local planning decisions. This will take several years to achieve. The targets set by the regions will, at best, just meet the national target of 10 per cent, and at worst fall short by 3.5 per cent [12]. The government is currently seeking to streamline the planning process for certain types of development, which could include renewables projects. However, there is a risk that such top-down imposition of renewables upon local communities, under a planning process reduced in local democratic content, could dent opinion towards sustainable energy. Complementary mechanisms that build support from the community-level upwards might be explored. These include designing renewable developments such that they give local communities a direct financial stake in the benefits (e.g. a share of the profits or reduced electricity bills), and policies that educate and bring home the environmental consequences of our energy use (such as a carbon tax).

Facing up to NETA

Planning difficulties have recently been compounded by a number of market and regulatory barriers to renewables deployment. Perhaps the largest challenge of all is posed by the reformed electricity trading market, known as NETA (the New Electricity Trading Arrangements). NETA was launched in April 2001. It was designed to correct perceived imperfections in the wholesale electricity market, and lower prices.

So far, NETA has delivered on this overall promise – prices have fallen significantly. However, there are concerns with some of its side effects. From the start of the reform process, the Department of Trade and Industry (DTI) was keen to point out that NETA should be designed to promote the use of renewable energy sources [13]. Unfortunately for the renewables industry, this has not happened in practice. Renewable energy sources have fallen foul of NETA's in-built preference for predictable sources of generation. This can leave intermittent sources of generation (such as wind power) at a relative cost disadvantage under NETA [14].

Is NETA standing in the way of the government's renewables expansion plans; and, if so, what can be done to help? The utilities regulator OFGEM, which was jointly responsible for NETA with the DTI, has shown little willingness to entertain further modifications to the market. A review of the first three months of NETA acknowledged the problem, but felt that it was a minor issue when compared with the general record of electricity price reductions [15]. Moves to try to help renewable generators have focused on the development of consolidation services to spread the risk of unpredictability across larger numbers of renewables plants. The renewables industry is unhappy with this solution, and consolidation arrangements have been proceeding slowly [16].

It remains to be seen whether the consolidation approach will be successful in preventing NETA penalising intermittent renewables. Investors in new intermittent renewables technologies will have to consider consolidation if they do not wish to be at a disadvantage under NETA. OFGEM and DTI must continue to monitor the performance of NETA and the new consolidation arrangements, and be open to further reforms if necessary. The Utilities Act 2000 provides government with the scope to do this. The Act allows government to develop social and environmental guidance which should be taken into account as OFGEM conducts its business. The draft guidance published in May 2001 makes reference to the UK Climate Change Programme which includes the 2010 renewables target. It states that 'the Government invites [OFGEM] to seek to exercise its functions in a way consistent with the objectives set out in this [Programme]' [17].

Regulating for Embedded Generation

Whilst NETA may not be good news for renewables, at least in the short term, a move to cost reflective charges for the use of electricity distribution networks certainly could work in their favour. If small renewables plants are embedded within distribution networks at particular locations, their economic value to the electricity system can be substantial. This value largely stems from the avoided cost of reinforcements to the distribution and, ultimately, the high voltage transmission system.

At present, the charging structure for connection to the UK electricity distribution system and for using it to export power is not particularly sophisticated. As a result, smaller generators are unable to capture the value they bring to the system as a whole. Instead they are often penalised by electricity distribution companies because the networks are designed for the traditional transmission of power from large generators down to consumers. An embedded generator wishing to connect to the distribution system is expected to pay the costs in full, including any upstream reinforcements to the transmission system. Not surprisingly, this can be expensive for proposed renewables schemes. The revenue support from ROCs will need to offset these network charges.

Embedded generation could be promoted further under a shift towards more 'active' distribution networks designed to balance large numbers of small generators as well as transmitting power in bulk. This shift requires substantial investment enabled by a more cost-reflective charging structure for the use of distribution wires. Distribution companies need to be able to make the necessary infrastructure investments – investments which would currently fall foul of OFGEM's rules because they are not seen as 'essential' to current operations. In short, distribution companies currently have little incentive to promote embedded generation from renewables.

The need for reform has recently started to attract some government and regulatory interest. A joint DTI/OFGEM working group on embedded generation produced a report in January 2001 [18] which set out options for new charging structures. The successor to this group is continuing to work on the issue. As with NETA, there is considerable debate about the merits of altering the charging structure for distribution wires, and some reluctance to change a system that has delivered price reductions to consumers.

Stimulating Innovation

The Renewables Obligation targets and the associated market in ROCs will give investors in renewable technology an additional revenue stream to recover costs. Yet, as we have illustrated in this briefing paper, the renewables investor still faces considerable supply-side uncertainties besides the operation of the ROC market. Ultimately, moving beyond the 10 per cent renewables target, possibly to meet a longer term target of 20 per cent by 2020 [19], will require significant innovation in our electricity supply systems.

The Renewables Obligation does not distinguish between renewables technologies. The ROC market requires all renewables technologies to compete against the standard of the incumbent market leader. This means that promising 'next generation' technologies, such as wave power or photovoltaics, will have to compete against the cheaper technologies, such as on-shore wind power and energy-from-waste (which, incidentally, both court planning controversy). The single market in renewables may not prove to support the longer-term innovation of a range of new renewables technologies. The experience of NFFO was that competitive support for renewables did not nurture a renewables industry in the UK. Ironically, developers imported the cheapest renewables technology from countries such as Denmark and Germany that had developed a vibrant domestic renewables industry under different systems of support [20].

Studies into past transformations in energy systems have noted just how uncertain the transformation process was in its early stages, that interconnected innovations in many new technologies were required, and that some of these proved to be dead-ends [21]. Many innovation experts in academia and government recognise the value of investment in diverse portfolios of new technologies as a means of stimulating innovation, building up skills and capabilities, and insuring against the risk of locking into sub-optimal technological dead-ends [22]. Promoting systems innovation implies uncertainty, experimentation and a certain degree of economic 'waste' - in the sense that some experiments will fail to become viable technologies yet will still create valuable new knowledge [23]. Encouraging investors to take such risks will mean offering them higher potential returns on their investment (compared to other, less risky money-making opportunities). Moreover, stimulating innovation and the growth of new industries is a long-term endeavour [24].

There is hope in the UK in the form of government capital grants support for demonstration projects in these less developed renewable technologies. The government has promised £260 million over the next three years, primarily for offshore wind and energy crops, and with a little support for photovoltaics, wave and tidal power [25]. This capital funding must link to the assured revenues needed if a portfolio of renewable technologies is to seriously displace incumbent fossil-fuel and nuclear electricity generation. Will support for demonstrations include market formation (i.e. deployment) activities for successfully demonstrated new technologies? Market formation is a vital bridge between the demonstration projects and the entry of commercial investors.

Will the New Policy Deliver ?

It is clear that the Renewables Obligation represents an opportunity for renewable energy in the UK. Yet this new policy instrument alone could struggle to deliver a break from past trends and deliver a transformation in our electricity supply system. Nor should we expect it to. A portfolio of competitive renewable technologies is not sitting waiting to be taken off the shelf, plugged-in and put to use like a new washing machine. If the UK wishes to displace a significant proportion of the incumbent system of large, centralised, fossil-fuel and nuclear electricity generation with renewables, then it will need a range of well-developed renewables technologies. Even when sufficiently well developed, any expansion in renewables technology will have to interact with planning processes, electricity markets, and transmission issues.

A renewables policy package must address barriers and challenges in all of the areas set out in this Briefing Paper. Electricity markets must be sensitive to the intermittent nature of some renewable generating technologies. The value of embedded generation in local distribution networks must be rewarded. Planning controls exist for good reason, to control land use and protect public amenity, and any policy to greatly expand renewable technologies will have to work with local communities if that expansion is to proceed smoothly. Most critically, innovation policy must

stimulate a diverse range of renewable technologies and niche market formation initiatives. In pursuing this goal, policy-makers must recognise that this is a long-term activity. The Renewables Obligation and ROC market will provide welcome support for the renewables industry in the UK, but policy-makers must maintain their vigilance over any bottlenecks and uncertainties that might impede progress towards the 10 per cent target and beyond.

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Notes

[1] Department of Trade and Industry *New and Renewable Energy: Prospects for the 21st Century - The Renewables Obligation Statutory Consultation* (August 2001).

[2] Under the DTI Energy Paper 68 medium economic growth scenario, the 10 per cent target implies at least 37.1 TWh of electricity by 2010 (1 TWh = 1 thousand million kWh or 10 million 100W lightbulbs switched on for one hour).

[3] This is 10.48 TWh, of which 46 per cent comes from large-scale hydroelectricity (i.e. a technology unlikely to expand in the future).

[4] Details of the project 'Integrating Renewables and CHP into the UK Electricity System' conducted by researchers from UMIST and SPRU, University of Sussex can be found at http://www.tyndall.ac.uk/. The Paper also draws upon research from a European Commission funded project 'Interaction in EU Climate Policy' – see http://www.sussex.ac.uk/spru/environment/research/interact.html

[5] See the draft statutory instrument, *The Renewables Obligation Order 2002* The Stationery Office (2002).

[6] Morthorst, P.E. 'The development of a green certificate market', *Energy Policy*, 28: 1085-1094 (2000).

[7] Environmental Data Services, 'Ministers look towards regional renewable energy targets', *ENDS Report*, (November, 1999).

[8] Under the fifth NFFO order (1998) 68 per cent of new capacity will come from landfill gas projects, and 29 per cent from onshore wind projects.

[9] Hartnell, G. *Planning and renewables: implications for meeting the targets*, Paper presented at the CREA Conference on Regional Planning Targets: rationale, progress and practical implementation (22nd March, 2001).

[10] Mitchell, C. 'The England and Wales Non-fossil fuel obligation: history and lessons', *Annual Review of Energy and Environment*, 25: 286-312 (2000).

[11] N Steen 'ROCs Market Rockets' *Environmental Finance* (March 2002)

[12] OXERA Consulting/ARUP Economics & Planning, *A Report to the DTI and DTLR on Regional Renewable Energy Assessments*, (6th February 2002).

[13] DTI 'John Battle Pushes Forward Reform of Electricity Trading Arrangements' Press Release (8th October 1998).

[14] There is also evidence to suggest NETA is placing operational pressure on the combined heat and power industry and larger gas-fired power stations, who are already suffering under high gas prices – see David Green 'Small is Beautiful ? The Embedded Generators Story' Presentation at Institute of Energy Conference *NETA – the experience. Where do we go from here ?* (31st October 2001); Author's conversations with operators of gas-fired CCGT power plants.

[15] OFGEM 'Report to the DTI on the Review of the initial Impact of NETA on Smaller Generators' (31st August 2001).

[16] ENDS Report, 'Small generators blast OFGEM over NETA report', Issue 325 (February 2002).

[17] DTI *Statutory Guidance to the Gas and Electricity Markets Authority on Social and Environmental Objectives* Consultation Document (May 2001).

[18] OFGEM/DTI Embedded Generation Working Group *Report into Network Access Issues* DTI (January 2001).

[19] Performance and Innovation Unit, *The Energy Review*, The Cabinet Office (February 2002).

[20] Mitchell, C. 'The England and Wales Non-fossil fuel obligation: history and lessons', *Annual Review of Energy and Environment*, 25: 286-312 (2000).

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[23] Grabher, G. and D. Stark, 'Organising diversity: evolutionary theory, network analysis and postsocialism', *Regional Studies*, 31, 5: 533-544 (1997).

[24] The German wind-turbine sector became successful after 10 years of nurturing – see Johnson, A. and S. Jacobsson, 'The emergence of a growth industry: a comparative analysis of the German, Dutch and Swedish wind turbine industries', in Metcalfe, S. and U. Cantner, *Transformation and Development: Schumpertarian Perspectives*, Physica/Springer, Heidelberg (forthcoming).

[25] Chief Scientific Adviser's Energy Research Review Group, *Report of the Group to the Performance and Innovation Unit*, Office of Science and Technology (2002).

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