Making It Happen - Faster

Accelerating Trading of Renewable Electricity

A Consultation Paper issued by the
Director General of Electricity Supply
For Northern Ireland

August 2001

1. Introduction

1.1 Northern Ireland needs to generate and consume a larger proportion of its electricity from renewable sources. At present renewables account for about 2% of the electricity generating capacity in Northern Ireland and the share is very gradually increasing.

1.2 The market for the sale of renewable electricity in Northern Ireland is technically fully open – a renewable generator or supplier has the right to sell to any customer. To allow this technical position to be translated into actual trading opportunities, Ofreg has convened a representative body, known as the Trading Renewables Implementation Group (TRIG) to discuss the issues surrounding both small-scale renewables and larger renewable schemes.

1.3 The aim of this consultation is to expand upon the work carried out by TRIG, and to seek responses from interested parties to assist it to come to firm conclusions.

1.4 This paper will not consider such areas as the technical capacity of the electricity system to handle renewable technology, nor will it deal with any potential policy implications in future which set either renewables levies or targets to be achieved. This paper will instead consider the practical steps which can be taken within the existing regulatory framework to promote and encourage the development of renewables generation through the operation of an efficient market structure for renewable energy.

2. The Existing Market

2.1 While generators and suppliers and their transactions are subject to regulation by Ofreg and DETI, renewable electricity is not subject to price control. There already exists a limited form of renewable trading in Northern Ireland, through the Northern Ireland Electricity Eco Energy Tariff. The Eco Energy Tariff allows customers (including domestic) to opt to take a proportion of their electricity from renewable sources and pay a 6% premium above the usual tariff. NIE then source the energy from renewable generators. Although modest in scale, the energy has a growing number of customers – currently 3,000 – and annual sales of about 30 GWh, which make it much more successful than the majority of British renewable energy tariffs in the market.

2.2 Further trading takes place through small schemes where a renewable generator sells output to a local customer, either by wheeling power through the NIE network or through construction of a direct line. For those renewables (or Combined Heat and Power) operators which use the NIE network to wheel power, a "transmission credit" applies, where the charge is reduced to take account of the fact that the renewable generator is connected only to the distribution system. It is also possible for customers to install their own small renewable generation e.g. small wind turbines to cover their own use, with the remainder exported and sold as "spill" energy to NIE at a fixed price.

2.3 Renewable trading also takes place across the North-South electricity interconnector. At present the market structure is more developed for renewables in the Irish Republic than in Northern Ireland, and a shortage of capacity in the Republic has led to renewable electricity being exported from Northern Ireland. In the longer run it is likely that the Republic's comparative advantage in renewables and Northern Ireland's higher electricity prices may reverse this flow. Alternatively, the Republic's CO_2 constraints may lead it to seek to import renewable electricity to supplement its own production.

2.4 While there has been slow but steady progress in renewables, none of the initiatives described above has been successful in increasing substantially the

stock of renewable generation in the Northern Ireland market, nor has there been significant investment by large scale renewable generators. It is important to note that while the renewables target for the UK stands at 10% by 2010, with an interim target for 2005 of 6%. With a supportive renewables trading regime we should be moving towards 6% by 2005 in Northern Ireland.

2.5 There are at least two distinct sub-divisions in the renewables market : the market for small renewables (and self-generators) and the large scale renewables sector (which in Northern Ireland, now and for the immediate future, will be wind power). It is important to note that the majority of large scale wind projects in Northern Ireland have been developed under the Non-Fossil Fuel Obligation (NFFO) orders of 1994 and 1996. There has been some subsequent entry of non-NFFO wind generation, but this has not yet significantly added to renewable capacity.

2.6 There are a number of common areas of importance which affect both small and large scale renewables, which will be addressed in the following sections.

3. Top-up and Spill Arrangements

3.1 A feature of all electricity markets is the need for a system to deal with physical imbalances between generation and demand. The facilities in place in the liberalised (large users >0.79GWh per annum) part of the NI market at present are such that in each half hour generators and customers (suppliers) must be in balance with their nominated energy flows or top-up and spill implications occur.

3.2 Where a top-up position occurs (i.e. generators or suppliers must buy energy from the system to make up their shortfall) this is charged at the average price of generation under contract to the NIE Power Procurer ie the published Bulk Supply Tariff (BST). Where a spill occurs this is bought at a fixed price (1.5 p/kWh in summer and 2 p/kWh in winter).

3.3 This arrangement is simple and effective for the large user market, but presents difficulties when applied to renewables, especially intermittent renewables like wind (and to some extent small scale hydro). Such top-up and spill arrangement place the full risk of profile imbalance on smaller renewables suppliers such that they could be discouraged from entering the market. In order to accommodate smaller generators it may be necessary to either exempt them from the top-up and spill arrangements, or modify these arrangements in some way for such participants. This will be discussed further in the section on Net Metering.

3.4 Windfarms are the main large renewable generation in the Northern Ireland system. The potential exists for a modern windfarm to operate at a cost which enables it to compete with fossil fuel generation. The Climate Change Levy adds further to the scope for large scale renewables to compete profitably in the market. However, the Northern Ireland imbalance arrangements are such that they could prove to be a barrier to wind energy in the market. At present all energy imbalances are calculated half-hourly, and due to the intermittence (and unpredictability) of wind there is significant risk that the wind generators output and customers' demand will not match, creating top-up and spill costs.

3.5 Conventional generators can manage their output to within exact parameters so that the imbalance is effectively only the forecast error of customer demand or operating effectiveness of the machinery. This is not possible with wind turbines. Given that top up and spill are significantly different, and that there is a winter capacity charge applied to top-up energy, the potential risk of imbalance has been a factor discouraging the entry of commercial wind generators to the Northern Ireland market.

3.6 There are a number of potential solutions to the problems of wind intermittence, but each could impose some other costs on system users. In order to effectively identify the possible magnitude of these costs, further work will be needed.

3.7 To summarise, the options range from offering a modified top-up and spill arrangement to large scale wind generators which reduces the scale of imbalance charges, allowing a wind operator to net output against demand over a longer period (e.g. a year) or developing a "credits" system where, say, one unit of top-up would have to be compensated by the generator by more than one unit of spill, to reflect the difference in value to the system of spill units.

Respondents are asked to consider the practicalities of these approaches, with a view to conducting further quantitative analysis.

4. Net Metering

4.1 Very small generators, whose output is intended mostly to cover their own consumption, and who periodically dump surplus energy onto the network, have commented that the existing arrangements are too complex, and a number of suggestions have been made to the TRIG panel. Such generators might use photovoltaics, small wind turbines, or micro hydro turbines.

4.2 The concept of net metering is in use in certain parts of the United States, whereby an autoproducer, when exporting to the grid ie generating in excess of its own needs, runs its meter backwards, effectively netting off the electricity it takes from the grid against the electricity it puts on the grid.

4.3 This could allow a small generator, which may not be able to generate in the same pattern as its own use, to be exempted from the need to apply the top-up and spill arrangements as at present. Currently there would need to be an export meter and an import meter, with a spill calculation and a demand calculation. Net metering could provide a simple solution to this area of renewable development, if suitable rules (e.g. meter must never fall below zero, netting off must be within a defined period such as a billing quarter etc) were applied. If small autoproducers were domestic customers they would be exempt from the Climate Change Levy. Their "exports" to the system would not be traded but value would be enhanced by the avoidance of greenhouse gas emissions and the avoided fuel costs of conventional power stations.

Views are sought on the acceptability of net metering for small scale autoproducers; on the meter not going below zero and the accounting periods being the normal quarterly billing period.

5. Use of System Charges

5.1 The NIE Use of System (UoS) charge is levied on all users of the NIE network, and recovers regulated revenues to meet the costs of operating the wires business. The wires system also allows smaller users to access it to wheel power. The UoS charges are based on several factors including time of day, time of year, connection voltage and so on as defined in the UoS charge statement. These charges were initially designed to be applied to large suppliers, and their complexity has been highlighted by small renewables producers as a barrier and increased source of uncertainty in operating.

5.2 Allowance is made at present for renewables which are connected to the distribution system, in that they are exempted from the transmission element of UoS charges, and losses are grossed up to Transmission levels in certain cases. At present on average this saves renewables customers in the region of 0.5p per unit (actual rebates vary depending on connection voltage, time of year, peak, non-peak etc). By what may be an anomaly Eco-Energy tariff customers do not receive this benefit.

5.3 However, there is a case for simplifying the UoS charge paid by small renewables. This could be achieved by applying a flat charge per kWh for renewables. And as, in general, a small renewable generator will tend to "use" only a relatively small part of the distribution system, this could be set at a small discount on the average distribution component of UoS.

Views are sought on:

(a) whether renewable suppliers should be offered a simplified and predictable Distribution Use of System charge;

(b) if they should be offered a lower charge, and if so, how much lower;

(c) if there is any case for treating Eco Energy customers less favourably than other renewable customers in this market; and

(d) whether larger renewables generators should be offered this type of exemption?

6. Common Metering and Billing Service

6.1 A feature of the England & Wales liberalisation of the electricity market has been the introduction of competition in meter provision and operation. In a market as small as Northern Ireland, such competition might be nugatory, and a common meter provider could make economic sense. This principle can be extended to the metering of renewables, large and small, such that a low cost method of metering and billing could be developed.

6.2 At present NIE's Eco Energy Tariff uses NIE Supply's billing and metering service, merely instructing the service which customers to bill at the Eco Energy Tariff. In principle this facility must be available on the same terms to other renewable suppliers such as small scale renewables, which can deliver only relatively small amounts of energy to the system. These generators may supply only a small number of customers and the cost of billing and administration if carried out individually by each small operator could be prohibitive.

Respondents are invited to comment on requiring NIE to provide such a common metering and billing service to all renewable suppliers, and the best method to apply e.g. use of load profiles for non-half hourly metered customers or the application of other rules for allocation of output and demand.

Respondents are also invited to comment on other options for metering and billing, including allowing each supplier to manage this for themselves or establishing a new independent metering and billing service outside NIE.

7. Embedded Generation

7.1 Embedded generation is generation attached to the low voltage network. To deliver consistent value to the system it has to be dispatchable and so is unlikely to be wind. The location of embedded generation in the distribution system may offer potential for customers to achieve savings in distribution costs in certain circumstances. These savings may not be such that a universal policy of encouraging renewables in every case is economically justified given differing system conditions. NIE's view is that it would not be practicable for it to test an embedded generation alternative to network reinforcement in every case where network reinforcement is deemed necessary. However, NIE should evaluate the avoided network reinforcement cost of embedded generation proposals put to them by renewable generators and, if the outcome is favourable, could (subject to regulatory approval) financially assist such a project. Therefore, where there is potential justification for the installation of embedded generation it would be for the customer/generator to identify the opportunity and take the initiative to bring a proposal to NIE.

Views are sought on the reasonableness of this approach to embedded generation and alternative ideas on how embedded generation potential could be realised.

8. Conclusions

8.0.1 The development of renewable energy can be promoted by modifying existing regulatory structures for both small renewables and commercial renewable generators. This paper makes no reference to government policy regarding renewables in any future utilities legislation, nor does it consider the appropriateness or otherwise of levies and target levels.

8.1 Small Scale Renewables

8.1.1 The problems identified with small scale renewables are largely due to the complexity of metering and UoS charges for wheeling, the inability to match output with load, and the associated spill arrangements. A number of relatively straightforward solutions present themselves for consideration:

8.1.2 A small producer which wishes to offset its own load and is not interested in trading its excess could be offered the opportunity to apply net metering, with the provisos that the meter could never go into a net positive position and that the netting would be carried out over a defined time period to minimise the effect of the seasonal variation in energy value to the rest of the system.

8.1.3 A small producer which wishes to export its excess to customers, but whose output is still small, may wish to make use of the NIE wires system. A modified flat charge, based on a small discount on the existing average distribution cost element of the UoS charge could be applied. This would add clarity to the cost of wheeling power to small generators.

8.1.4 In order to allow trades to take place between small producers and any customer (including domestic customers) it may be most cost-effective to operate a single regulated metering and billing service, which carries out metering and billing on behalf of small trading renewables for a regulated fee. The methodology and cost would be subject to further examination.

8.2 Large Scale Renewables

8.2.1 Wind is the primary near-market priced large scale renewable resource in NI. In order to make the trading system more accommodating to the intermittent nature of the technology, modifications will be required. The nature and cost of changes will require analysis. A possible solution is to allow windfarms to be exempt from normal half-hour balancing, and instead allow a longer period to balance output with customer demand. This under the most probable scenarios imposes costs on the rest of the system, as electricity has different values at different times of the day and year. There are variations on this theme, where e.g. a yearly reconciliation would be carried out on the basis that one top-up unit is compensated by x-times spill units. This factor of x could potentially be seasonally or time of day weighted.

8.2.2 Alternatively special price changes could be introduced to reduce the cost of top-up and/or increase the price of spill. Each of the possible options needs to be costed. It is important to note that the Climate Change Levy is set at 0.43 p/kWh, which in effect gives a cushion for renewables generators, and should be factored into any analysis of necessary changes.

8.2.3 It would not be economic to remove all profile risk from wind generators – any generator must profile its output to its load but the degree of additional risk placed on wind generators may warrant some alternative arrangement. Any excess costs of such arrangements must be transparent, and as such must be considered to be in the public interest to bear – ie there must be a positive social benefit from allowing changes to proceed when compared to the do nothing scenario. The encouragement of the market in renewables must be demonstrably beneficial to consumers as the least cost way in which renewables can be enabled to take a larger share of electricity production.

8.3 Green Corridor

8.3.1 It could be possible to reserve an amount of capacity on the Moyle and North/South interconnectors for the exclusive use of renewables traders. This

has been the subject of two separate consultations under the "Greening the T&D Price Control" and the last consultation paper on interconnector trading.

8.3.2 Consultation has raised concerns about the possibility that a Green Corridor would result in non-realisation of the full value of the interconnectors and in an implicit cross subsidy from non-green interconnector users.

Views are sought on how charging on a Green Corridor could be managed so as to avoid this unintended effect.

8.4 Cost Implications

8.4.1 The options that are outlined in this paper to create a more fertile environment for growing trading opportunities in renewables energy have some potential cost. It is not possible in advance to say how large such a cost might be, since many of the options involve reducing risk rather than direct cross subsidy. For example, if the wind blew consistently during peak demand periods and not at all during summer nights, there might be little top-up cost to wind generators. But if the wind failed consistently at periods of peak demand the top-up costs could bankrupt a small windfarm operation.

8.4.2 There may be financial instruments, developed in the marketplace, which could enable renewable generators to diversify this sort of risk.

8.4.3 Nevertheless there is likely to be some cost involved in a more renewable-friendly marketplace. While the number of renewables is small - and for many years it might be expected that the impact of micro autoproducers would be de-minimis – in principle any excess generation or system costs incurred as a result of promoting the renewable sector should be recovered from all customers through a Public Service Obligation levied on all customers.

8.4.4 Once renewables reached a critical mass on the system there would also be savings in avoided system reinforcement, avoided Climate Change Levy,

avoided need for new generation and, possibly, avoided need for a renewables levy.

9 Responses

Ofreg would welcome response from interested parties, including alternative suggestions.

Responses should be made by 30th September 2001 to:

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Please include a one page summary with any responses.