



Commission for Energy Regulation

An Coimisiún um Rialáil Fuinnimh

Submission

**Consultation on “Options for Future Renewable
Energy Policy, Targets and Programmes”**

27th February 2004

Executive Summary

In the design of a future renewable energy policy and in setting future renewable targets the Commission would question the further promotion of wind technology on a large scale. Following from the Alternative Energy Requirement (AER) scheme and also from the success of the independent suppliers almost 800MW of wind have connection offers and there are strong indications that up to 90% of this will be delivered.

The ability of the system to accommodate levels of wind above this level needs to be fully investigated. Wind, due to its intermittent nature presents a number of difficulties for system security and stability. With regard to security of supply wind does not provide firm capacity, requiring stand-by generation. In addition, the contribution of wind to capacity is eroded as the level of wind penetration increases. In particular the level of wind already contracted is untested on a small isolated system such as ours. With regard to the impact of further interconnection this is not a cure-all in terms of resolving the technical issues or safeguarding security of supply.

It is also vital that a complete cost-benefit analysis is carried out on the economics of a higher level of wind penetration. This analysis should take into account the cost of the required stand-by generation, the associated emissions of SO₂, NO_x and CO₂ and the impact on the economics and operation of conventional plant (required for system security). The Commission favours the investigation of the full spectrum of renewable technologies, in particular that which provides secure, dependable capacity.

In line with its duty to protect the interest of final customers, the Commission favours a least cost renewable support mechanism. This is particularly salient in light of the price increases already anticipated from the Environmental Directives (e.g. Emissions Trading, Large Combustion Plant, National Emissions Ceilings).

There is also a need to highlight the impact of the Environmental Directives on the economics of renewables. These measures will serve to internalise the external costs of conventional plant, leading to higher prices. This may in time allow renewables to compete on a level playing field with conventional generation. Any future renewable support mechanism should include an in-built flexibility to facilitate responsiveness to this.

The Commission considers that a renewable support mechanism, where required, should operate outside the Market Arrangements for Electricity (MAE) in order to afford transparency and to guard against distortions. The renewable support mechanism under consideration may be accommodated under the new market arrangements.

In the design of a future renewable support mechanism the Commission considers that measures should be included, where necessary, to guard against market dominance in order to ensure a vibrant competitive renewables market. The Commission also favours a renewable support system, which is compatible with an all-island market.

Introduction

The Commission for Energy Regulation ('the Commission') welcomes the opportunity to input into the Department of Communications, Marine and Natural Resources' Consultation on "Options for Future Renewable Energy Policy, Targets and Programmes".

At the outset it should be stated that the Commission fully appreciates the importance of working towards and ultimately achieving stated environmental and sustainability objectives, which underpin the need for a renewable energy programme.

The Commission's submission briefly discusses the following key issues regarding the design of future renewable energy policy:

- The need to pursue the most cost-effective support mechanism in light of the impact on electricity prices;
- Concern at the combined cost impact on customers of the proposed measures together with other measures in the environmental area, primarily emissions trading;
- The requirement to consider security of supply and system stability, in particular, associated with the impact of intermittent energy sources;
- The need to explore the potential of the full spectrum of renewable technologies, particularly those providing firm capacity;
- A requirement for realistic targets, maintaining due regard for system security, system reliability;
- The interaction of a future renewable support mechanism with the Market Arrangements for Electricity (MAE).

Concerning the transposition of the Renewables Directive (2001/77/EC), the Commission provides input on the following:

- The definition of renewables;
- The establishment of a Renewable Energy Guarantee of Origin (REGOs) system (Article 5);
- Priority dispatch for renewables (Article 7);
- Grid issues (Article 7).

Background

i) Renewables and Market Liberalisation

Under the Electricity Regulation Act, 1999, the Commission has the duty to promote the use of renewables. Renewable energy is defined as using 'as its primary source one or a combination of more than one of the following - wind, hydro, biomass, waste (including waste heat), biofuel, geothermal, fuel cells, tidal, solar, wave.' To date, the main focus of development has been in exploiting the potential of wind energy since wind is at present the most economic of these technologies.

To date the Commission has made a number of key decisions in order to assist the promotion of renewables. Since February 2000, the market has been 100% open for green energy. This means that everyone has the right to

purchase electricity from a green supplier. On a number of occasions the Commission has agreed to the amendment of the Trading and Settlement code in favour of the green sector. For instance, for increased flexibility and in recognition of the intermittency of wind energy the Commission has permitted the renewable sector to mix green and non-green electricity in their bilateral trades and in their trades across the Interconnector. However, the Act stipulates that the holders of green licences must balance their green sales with green energy. The Commission has established that this should be done within a 5% margin on an annual basis. Further, this balancing period is initially set at 2-years to assist new entrants.

Following from market opening and a favourable trading regime, a green supplier – Airtricity - is the third largest supplier of electricity in the market, currently supplying 28,000 businesses with green electricity. The vast bulk of authorisations and licences issued by the Commission are for green electricity. Since its establishment, the Commission has authorised the construction of 320MW of wind and issued Licences to Generate to 275MW of wind.

The Commission was pleased to approve the funding of the Grid Upgrade Development Programme for Renewables (Cluster Scheme) in April 2003.

The Commission is interested in the promotion of the full spectrum of renewable technologies. With this in mind it will be examining, in consultation with the Department, the potential for promoting new technologies such as tidal and wave energy through the establishment of a special R&D Tariff.

I. Policy goals

i) Least Cost

The Commission welcomes the recognition in the Minister's foreword that in determining future targets and support mechanisms there is 'an overarching legitimate concern about the cost impact of any such proposals on electricity consumers' (p.4).

In line with its duty under the Electricity Regulation Act, 1999, to protect the interests of consumers the Commission is concerned with the impact of renewable supports on the overall cost faced by final customers. In addition, the cost of a future renewable support mechanism must be viewed in the context of the requirements already placed on the electricity sector under the Emissions Trading Directive (COD(2001)0245), the Large Combustion Plant Directive (2001/80/EC) and the National Emission Ceilings Directive (2001/81/EC). These will serve to internalise the external costs of conventional generation. The increased costs will be passed on to customers.

At present, the cost of the Alternative Energy Requirement (AER) is recovered through the Public Service Obligation (PSO) levy, which the Commission calculates based on S.I. 217 of 2002. The total costs for the 2003 PSO for AER was €6.568m and in 2004 €16m, an increase of €9.518m or over 150%. The impact of this on the average electricity tariff will not be insignificant.

The PSO levy also erodes the competitive margin for new entrants in the supply of electricity as it is paid by all customers.

In comparing the cost of the various renewable technologies it is necessary to include the cost of the required back-up thermal generation. Wind provides limited capacity credit, which is eroded as the level of wind penetration increases. For example, when the level of wind on the system is below 200MW, 1MW of wind contributes 0.3MW to generation adequacy. Above penetration levels of 800MW an additional MW adds just 0.13 capacity credit. This has further cost implications since it means that the more wind installed the greater the amount of conventional plant required on the system, above the optimal level ('Generation Adequacy Report 2004-2010', p.45). The associated emissions from this also need to be factored into an analysis of the environmental benefits. It is notable that the figures presented in the Consultation document outlining the cost to customers to achieve varying levels of renewable penetration 'do not include additional costs and emissions from any fossil fuel generation required to operate as back up generation for intermittent RES-E technologies' (p.21). The total costs should be made clear.

An ESB National Grid study ('Impact of Wind Power Generation in Ireland on the Operation of Conventional Plant and the Economic Implications', February 2004) is instructive in this regard. It was found that generation costs increase significantly with high levels of wind penetration due to both the need for 'surplus'¹ conventional capacity for generation adequacy and the operation of all conventional plant in a sub-optimal manner. For example, with wind levels of 1,500MW an additional 1160MW of conventional plant is required for generation adequacy and the capacity factor (output) of mid-merit plant decreases from 51% to 29.5%. This has associated cost implications, as the conventional plant needs to recoup its fixed costs over a fewer number of running hours, thereby increasing the price per unit of output.

A further impact on conventional plant is the increased number of 'start-ups' and the 'average load change per hour, in the absence of wind the average number of start-ups for mid-merit plant is 12 per year (once every 4.3 weeks), with 1,500MW of wind this increases to 103 per annum (once every 3.5 days). Such a regime potentially has a detrimental impact on plant reliability. Fuel savings from increased wind levels are eroded by inefficiencies resulting from increased start-ups and the lower loading levels required for system security: with 500MW of wind there is a fuel saving of 6.1%, whereas for 1,500MW the reduction is only 15.7%. Similarly, as levels of wind increase, the efficacy of adding wind to reduce emissions declines: for 500MW of wind CO₂ emission savings are 5.4%, whereas at a level of 1,500MW this is only 12.9%.

The study finds that for a system with a peak of 6,500MW, with a generation portfolio comprising combined and open cycle gas turbines (which may be used as a proxy for the system post 2010) 1,500MW of wind generation

¹ The intermittent nature of wind requires the system for system security reasons to operate with a capacity 'surplus' as backup. The 'surplus' is defined as the additional capacity required above that which would be required if the generation portfolio was comprised of conventional plant only.

(11.7% penetration) raises costs by €196m per annum, increasing electricity generation costs by 15%. Under this scenario, 2,500MW of wind would increase generation costs by €310m or 24%. Generation costs comprise on average 43% of the cost to customers; the retail price impact will vary by customer tariff category. It must also be underlined that these figures do not incorporate the additional cost of a renewable support for wind.

It concludes that the reduction in CO₂ emissions under the 6,500MW system scenario for 1,500MW of wind is 1.42m tonnes. However, the cost increase is found to be €196m giving an abatement cost of €138 per tonne of CO₂. This finding is significant in the context of the policy objective of reducing greenhouse gas emissions by increasing the penetration of renewables, largely wind. It highlights that in meeting national obligations under the Emissions Trading Directive and Kyoto a more economically viable option for the Irish Government in order to maintain competitiveness, would be the purchase of Clean Development Mechanism (CDM) and Joint Implementation (JI) credits internationally.

As the level of renewables increase the ability of consumers to absorb these additional costs must be considered. Furthermore there is a need to consider the electricity price increases anticipated due to the impact of environmental directives on the powergen sector. A study carried out by ILEX, on behalf of the CER, indicated that emissions trading could lead to wholesale price increases in the order of 14.5%, 29.6%, or 45.7% in 2008 (CER/03/284).² In addition, it is anticipated that the National Emissions Ceiling Directive will result in a 2% tariff increase. Higher electricity prices adversely impact on overall national competitiveness. In terms of broader societal effects, increased electricity prices have a disproportionate impact on the poorest members of society.

ii) System Stability and Security of Supply

A further concern is the issue of system stability and security of supply. Under the Renewables Directive 'renewable energy sources' are defined as 'wind, solar, geothermal, wave, tidal, hydropower, biomass, landfill gas, sewage treatment plant gas and biogases'. In Ireland renewable development has been focussed on on-shore wind energy to date since it is the most cost-effective renewable technology at present.

However, it must be recognised that the specific technical characteristics of wind present difficulties for the system. Wind cannot be controlled and even with a geographically diversified spread there will still be periods when the wind does not blow and there is no production. What do we do to cover these periods? Also what do we do with sudden surges where a large amount of wind-produced electricity suddenly comes onto the system? These are critical technical issues that must be tackled in order to enable significant volumes of wind to be accommodated on the system.

On the 3rd December 2003 ESB National Grid requested an interim pause on wind connections to the end of the year. This arose from a dramatic increase in wind connections. Presently, there is 166MW of wind operating

² Assuming 100% pass-through of permit costs, allocation on the basis of historical emissions and a carbon price of €10, €20 and €30 per tonne respectively.

on the system, 775MW of wind has connection offers and there is a further 500MW in the process, totalling some 1,275MW. The impact of this volume of wind is untested on a small, isolated system such as ours. In particular, the technical characteristics of wind present a number of well-documented difficulties for the security and stability of the grid. With regard to the impact of further interconnection this will not resolve the technical or security of supply issues. For example, the CER/Ofreg commissioned Garrad Hassan report ('The Impact of Increased Levels of Wind Penetration on the Electricity System of the Republic of Ireland and Northern Ireland', February 2003) found a positive correlation between the weather systems of the UK and Ireland. Therefore, there may be no wind generation in either country at times of high system demand.

The Commission expressed its concern that any future remedial measures are necessary and proportionate to the threat facing system reliability by the scale of wind connections. In keeping with its policy of openness and transparency the Commission requested the National Grid to host a public forum to outline the issues. This was held on 17th December 2003 and was attended by a large number of interested parties. In addition, the Commission held a Public Consultation process. 20 submissions were received and have been published. On the 19th December the Grid requested an extension of the pause for 3 months. The Commission sanctioned this subject to a number of agreed actions taking place during this period:

- An Accelerated Programme for the Grid Code Review for Wind;
- A survey into wind connections agreed to date in order to assess projected timeframes and potential system impacts;
- ESB National Grid to produce a detailed programme and timetable for the modelling of wind generation plant and the impact of greater penetration of wind on the transmission system;
- ESB National Grid to submit a detailed work plan on the programme of work for the next three months, which will be published.

The Commission will actively monitor progress to ensure timelines are respected. In addition, the Commission has established a representative working group containing both the transmission and the distribution system operators, Sustainable Energy Ireland, the Irish Wind Energy Association and Meitheal na Gaoithe to monitor progress.

The Commission considers that there is a need to be aware of the outcome of this process in the design of a future renewable support mechanism and in setting future renewable targets.

In the design of a future renewable energy policy and in setting future renewable targets the Commission would question the further promotion of wind technology on a large scale. Already following from the AER scheme and also from the success of independent suppliers almost 800MW of wind have connection offers. Significantly, a survey commissioned by the Commission has given initial findings that up to 90% of this plant will be built in the short-term.

The Commission is of the view that the full spectrum of renewable technologies should be examined. In particular, the contribution of

dispatchable, predictable renewable technologies to security of supply should be explored. In terms of a cost-benefit analysis the provision of secure, dependable, capacity from indigenous energy sources must be recognised.

The Commission along with the department for Communications, Marine and Natural Resources has appointed DKM Consulting and the ESRI to carry out a study examining future fuel diversity options for the Irish power system. The overall objective of this study is to examine the appropriate levels of fuel diversity of power generation in the Irish power system and to propose approaches to achieve diversity that complement the evolving MAE at least cost to consumers. In particular, this study will examine the risks and consequences of potential increased levels of gas dependence in the future. Options for reducing this gas dependence and the associated costs and benefits of each fuel diversity option will also be considered. This analysis will include evaluation of the contribution of increased penetration of renewables.

II. Future Targets

The Minister's foreword to the Consultation document refers to a need to 'set challenging yet realistic targets for the long term development of the renewable energy industry' (p.4). The Consultation paper presents potential renewable targets of 22% and 33% of projected total final electricity consumption (excluding large-scale hydro) in 2010 and 2020 respectively (p.16). However, a range of targets is presented ranging from 13.2-20% for the year 2010 and 15-30% for the year 2020 (p.21).

The level of wind penetration assumed is 975MW, 1086MW and 1541MW for the 13.2%, 15% and 20% 2010 renewable targets respectively and 1352MW, 1632MW, 1910MW and 2000MW for the 15%, 20%, 25% and 30% 2020 targets (p.23). The issue of whether these levels of wind can be accommodated on the system must be examined further. There is a necessity to take into account the difficulty in accommodating high levels of wind on a small isolated system in setting targets and designing future renewable strategy. There is also a need to carry out a full analysis of the associated costs including in terms of wind generation the cost impact on conventional plant as highlighted in Section I (i) above. The CER questions whether at present the expected high levels of wind penetration may not be economically or technically sustainable.

The Commission considers that future targets must be realistic and take account of system requirements. In particular, it must be recognised that the specific technical characteristics of wind present difficulties for the system. Wind cannot be controlled and even with a geographically diversified spread there will still be periods when the wind does not blow and there is no production.

The issue of how much wind the system can accommodate is being examined in the context of the wind moratorium. It is vital that the development of a future renewable policy and future renewable targets is carried out within the context of the outcome of the present pause on wind connections.

The technical characteristics of wind present a number of difficulties for the security and stability of the grid. A high level of wind penetration significantly increases generation costs due to its negative impact on the operation and economics of conventional plant (which is required for Generation Adequacy). Following from this, the Commission is of the view that future targets should be based on a realistic appraisal of how much wind may be handled on the system and should attempt to encompass the full spectrum of renewable technologies, (particularly those that can provide firm capacity), while taking into account cost considerations.

The Commission welcomes some recognition of this in the Consultation document, 'Whilst onshore wind has been the prominent contributor to date, other technologies will be increasingly required to meet future targets' (p.20-1). In addition, the Commission agrees as stated in the paper that harmonisation of renewable targets on an all-island basis would be desirable (p.25).

III. Support Mechanisms

A) Alternative Support Mechanisms

In terms of the four options proposed the Commission considers that the present competitive tender system represents a costly mechanism as indicated by the PSO costs cited above. In addition, the PSO removes the competitive margin for new entrants in the supply of electricity. Further, there are difficulties associated with a competitive tender process for renewable developers due to its 'stop-go' nature.

With regard to the option of a fixed feed-in tariff the Commission is of the opinion that this will prove to be a high-cost option. For example, German experience with this system has seen inefficiencies with the exploitation of low wind sites. There is also the issue that the level of renewables on the system is uncontrolled under this mechanism. A cap could be placed on the level of subsidy provided. However this would result in the same 'stop-go' issues as experienced under a competitive tender mechanism.

The production credit system is also hampered by the difficulty in decreasing the premium paid meaning that customers may pay more than necessary and an inability to control the amount of plant that is built.

The Commission considers that a renewable obligation and tradable renewable certificate system offers a market-based mechanism, which can be achieved at least cost while affording the Government the ability to control the level of renewable penetration i.e. by altering the level of the renewable obligation. With regard to administrative costs, these can be minimised by coordinating the system with the implementation of REGOs, as has been done in other EU countries. The CER would be willing to administer such a scheme (as Ofgem does in the UK)

The use of this support system would allow renewable generators to benefit from the higher wholesale electricity prices anticipated following the implementation of the Environmental Directives. The Government may respond to electricity prices by altering the price cap (i.e. penalty price) for renewable certificates. This inbuilt flexibility allows the achievement of

renewable targets in a cost-effective manner. In the detailed design of the system there would need to be measures put in place to counteract market dominance, ensure liquidity in the market and incentivise both small and large players in order to guarantee a competitive renewables market.

In terms of policy development towards an all-island market a renewable obligation and tradable certificate system is being put in place in Northern Ireland. The adoption of a similar scheme here would be in line with a harmonisation of renewable policies north and south. It would also serve to minimise distortions i.e. if inconsistent policies are pursued this would encourage renewables to locate in the jurisdiction where the most favourable support mechanism is in operation.

(C) Technology or regulatory developments

The Commission favours in-built flexibility in the design of a future renewable support mechanism, allowing a reduction in price support once a renewable technology is in a position to compete with conventional plant on a level playing field. This issue may be significant in the light of the costs imposed on conventional plant by environmental directives e.g. emissions trading (See section (E) below).

D) Constraining off/non-firm status

The issue of 'constraining off' is being examined by the Commission and the National Grid in the context of the moratorium on wind connections.

(E) Other

Impact of Environmental Directives

The Commission notes that Emissions Trading, the Large Combustion Plant and the National Emission Ceilings Directives will bring some of the external costs associated with emissions to bear on conventional plant. The combined impact of these measures will increase the relative competitiveness of renewable generation by increasing the cost of generating electricity from fossil fuels. The effect is likely to be an increase in spot market prices, making renewables more profitable.

The net effect will be a beneficial impact on the economics of renewable generation. As stated above, any future renewable support mechanism should have sufficient flexibility to ensure that it may be reviewed once a renewable technology may compete on a level-playing field with conventional plant.

Interaction with Market Arrangements for Electricity

The Commission is mindful of renewables in the design of the new Market Arrangements for Electricity (MAE), which will come into effect in 2006. Indeed there are clear benefits for renewables under the new trading arrangements, such as a guaranteed market for generators, implicit capacity payments, simple bidding strategies and no requirement for balanced schedules.

The Commission is of the view that a renewable support mechanism should operate outside the market arrangements as indicated in the Consultation paper 'Implementation of the MAE in relation to Renewables, CHP and Distribution-connected Generation' (CER/03/253).

The MAE will not contain any 'special rules' for renewables. If required, the Commission is in favour of supporting renewables outside of the trading arrangements as this would allow true market signals to be seen, afford greater transparency and minimise market distortion and system operation costs.

The MAE is compatible with the four types of renewable support options outlined in the Department's Consultation document. Under the MAE, a competitive tender or fixed feed-in system can be accommodated via a Contract for Difference (CfD). A green certificate and production credit mechanisms can operate alongside the market arrangements.

Competitiveness

The Commission is of the view that in line with a liberalised electricity market any future renewable support mechanism should treat all suppliers equally. The Commission also considers that any future support mechanism, where necessary, should put in place measures to address the issue of market dominance in order to ensure a competitive renewables market.

IV. Requirements under the RES-E Directive

(B) Article 2

The Commission wishes to highlight the need for clarity in the transposition of the definition of renewables under Article 2 of the Renewables Directives, in particular, to have consistency of interpretation in both the Republic and Northern Ireland.

(E) Article 5

With regard to Article 5 of the Renewables Directive, the Commission is of the view that a REGOs system should be put in place. The Commission considers that the System Market Operator (SMO) should act as the Authority to administer the REGOs registry under the MAE (i.e. 'green' tracking.)

The benefit of REGOs is that it is a EU wide scheme enabling the certified trading of green energy throughout Europe. Further, this system has been established in both the UK under SI 2003 no. 2562 and Northern Ireland under Regulations 2003 no. 470. The use of the REGOs scheme here would be consistent with an all-island market.

The Commission will discuss this issue further with the Department including its potential utility for the administration of a future renewable obligation and tradable renewable certificate system, thereby minimising administrative costs.

(F) Article 6

The Commission has put in place a streamlined authorisation and licensing procedure for small-scale generators less than or equal to 5MW.

(G) Article 7

The issue of providing priority dispatch to renewable generators is being addressed by the Commission in the context of the design of the MAE rules.

Timetables for the connection process are included in Section 9 of the Guide to the Process for Connection to the Distribution System (see http://www.esb.ie/esbnetworks/downloads/connections_metering/connection_process_doc_250602_ade.pdf)

Table A12 in the Charges for Connection to the Distribution System document is an indicative generator connection charges table (see http://www.esb.ie/esbnetworks/downloads/connections_metering/charges_for_connection.pdf)

As part of the Tariff Structure Review currently being undertaken, the Commission will be examining the charges paid by users of the transmission and distribution system to ensure they are fully cost-reflective. The Commission will be considering if and how embedded generation could be rewarded if it decreases losses on the system. This review is expected to be completed in the first half of 2004.

At present transmission-connections are contestable. The Commission favours the extension of contestability to distribution-connected generators.