RESPONSE TO

CONSULTATION DOCUMENT ON

OPTIONS FOR FUTURE RENEWABLE ENERGY POLICY, TARGETS AND PROGRAMMES

ISSUED BY

DEPARTMENT OF COMMUNICATIONS, MARINE AND NATURAL RESOURCES

FROM

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PREFACE

Hibernian Wind Power Ltd. has been an active participant in the formulation of the detailed position paper prepared by the Irish Wind Energy Association in response to this call for consultation.

It is broadly supportive of the industry consensus which that paper reflects.

In the interest of furthering debate on policy going forward it is including herein its own individual views.

I. Policy goals

Ireland's electrical energy consumption is expected to continue to increase for the foreseeable future.

Its over-dependence on a small number of sources of fuel imported to generate that energy needs urgently to be replaced with a diversity of energy sources, suppliers and supply routes.

Its excessive rate of emission of greenhouse gases needs urgently to be curtailed with minimal adverse impact on economic growth, and its electricity generation sector needs to contribute a significant share of that curtailment.

It should urgently exploit its renewable energy sources to the economically optimum extent and seek to continue to track that optimum indefinitely.

Hydro generation technology matured a century ago and Ireland's viable hydro resource has been effectively exploited for decades past.

Wind generation technology having matured only in the past decade, the exploitation of Ireland's wind resource has only just begun.

Given Ireland's prodigiously energetic wind resource and the state of maturity of wind generation technology, the energy cost of wind-generated electricity is not greatly in excess of the cheapest alternative, and no other renewable energy resource is likely to come close to competing with it in terms of energy cost in the foreseeable future.

Whenever the externalities associated with the supply (geopolitical 'defence' and security etc.) and consumption (health and environment etc.) of fossil fuels get to be internalised to even a modest degree, wind generation will become the lowest-cost source of electrical energy in Ireland. Pending that, a degree of support is required. National energy policy should therefore focus on determining the economically optimal amount of wind energy generation in the short term and on facilitating its attainment at minimal cost without delay.

The cost of wind-generated electrical energy is a function of:

- the wind regime on the site for which planning permission has been secured
- the size and height of turbines for which planning permission has been secured
- the cost and quality of equipment obtainable on the open market
- the cost of construction – site-specific
- the cost of connecting to the grid – location-specific.

Its competitiveness in terms of energy cost depends critically on:

- the efficiencies of the thermal generation mix

- the cost of fuels – liable to volatility
- the emissions production rates of the thermal generation mix
- the cost of those emissions – markets expected imminently to emerge.

The value of wind-generated electrical energy (in common with that generated by any other means) is additionally a function of how effectively its idiosyncrasies can be complemented by the balance of the generation mix and other grid-connected equipment.

As stated above, some level of support will need to be provided for the development of the wind industry in Ireland until fossil fuel externalities are properly internalised. It is also recognised that such support should be provided at minimal cost to the electricity consumer. It is therefore difficult to justify a support scheme that would differentiate between different classes of wind energy developments. The reasons are set out in the following.

Although economies of scale favour **large-scale** wind projects over **small-scale** wind, the awarding of premium-rate contracts to small-scale wind projects, which was introduced in AER III, persisted throughout AER V and AER VI. This differentiation:

- increased the cost to the electricity consumer without bestowing any additional environmental benefit
- has repeatedly led to the granting of power purchase agreements to projects represented as stand-alone small-scale projects, yet contiguous with other projects and cumulatively constituting large projects, thereby confounding the size limit rules
- distorted the market by making viable a number of small projects capable of securing *distribution* grid capacity through a faster process than that faced by more economic larger projects needing to secure *transmission* grid capacity, and thereby potentially displacing them where capacity conflicts arose
- further distorted the market by making viable a number of small projects capable of being connected to the *distribution* grid with lower levels of technological compliance than those demanded of more economic larger projects needing to connect to the *transmission* grid – which is furthermore disadvantageous as it tends to increase the cost of connecting all future wind generation capacity to either the distribution or the transmission grid
- increased greatly the cumulative zone of visual influence of wind energy projects in Ireland while delivering relatively minor incremental environmental benefit.

Nonetheless, it is recognised that the activities of many small developers have contributed to the positive profile and public acceptance of sustainability in general and the wind industry in particular. It is also a legitimate government goal to seek to foster and support the development of small and medium-sized enterprises. It can be argued, however, that the goal of a renewable support scheme is to meet targets for particular technologies *at the least cost to the ultimate consumer*, and that if for legitimate social reasons small-scale wind energy projects are to be given preferential treatment, such support should be provided from a source other than the electricity consumer. An

example of this is the BES schemes which cap the eligible investment in a project and thus confers an advantage on small wind projects.

If the case for maintaining some special category within an overall renewables support mechanism for small wind projects were to prevail, then certain caps should be created to avoid undue distortion of natural economics. Examples of these would be allowing a price premium of up to 10% above that offered to large projects to be conferred on projects of less than 5 MW that have at least 50% ownership living within 5 km of the site, and limiting such support to, say, 10% of overall wind capacity. The support mechanism proposed in Section IV (A) below is capable of being used for this purpose if required.

Although electricity production from **offshore** wind projects is significantly more expensive than that from good **onshore** wind sites in Ireland for which planning permission is still being secured, several large offshore wind projects are proceeding on the far side of the Irish Sea in conditions comparable to those prevailing on this side. With the Arklow Banks project already in operation, and the Kish and Bray Banks projects having been awarded AER VI contracts, the demonstration phases of offshore technology have already been provided for. It is difficult therefore to justify the need for further premium-rate contracts to be offered in support of further offshore projects. As the relative economics of onshore and offshore wind projects evolve in response to:

- technological advances
- market forces
- prevailing climate in relation to the granting of planning permission and foreshore licences
- associated constraints in relation to:
    - location
    - scale
    - size
    - impact mitigation requirements
    -

the balance between onshore and offshore wind will follow the market to the advantage of the electricity consumer.

If the argument for nurturing an indigenous Irish offshore wind industry were accepted, it might best be fostered with direct fiscal support rather than from the electricity consumer. If, however, a decision were made to maintain a special category for offshore wind projects within an overall renewables support mechanism, then the mechanism proposed in Section IV (A) below is capable of being used for this purpose too.

In summary, Hibernian Wind Power believes that:

- Wind power offers the greatest potential to meet Ireland’s long-term energy needs in a cost-effective, non-polluting and sustainable way

- Government policy should provide support for development of wind energy in the interim until more of the costs of externalities and future price risk are properly reflected in conventional energy sources

- Such support policy should allow the market to determine how the targets can be met at least cost to the consumer, rather than discriminating between classes of wind projects by size or type.

II. Future targets

Ireland needs urgently to shift from its serious overdependence on energy imports and its serious exceedance of emissions limits.

The cost of mitigating the idiosyncrasies of wind generation or any other type of capacity tend to increase as the relative amount of that capacity increases. These become more acute as the amount of such capacity approaches the level of system demand, even at the minimum values it can reach on summer nights. This is particularly true of wind energy as constraining its output is financially punitive because no fuel or operational savings accrue from the constraint and no intrinsic storage is available that would allow subsequent unconstrained generation to be correspondingly augmented.

The capacity of wind generation that can be economically accommodated on the Irish electricity system depends on several factors outlined above. It is likely to be increased by:

- system operators developing confidence in advanced wind forecasting techniques
- system operators developing and seeking to optimise strategies for controlling the overall system in a manner that maximises the gains offered by wind generating capacity
- operators of existing generation plant responding to economic signals to better mitigate any adverse system effects of wind generation by using all potential resources and flexibilities at their disposal
- new market entrants[1] doing likewise and thereby modifying the mix
- the advent of considerable east-west interconnection capacity as announced by Minister Ahern this month
- potential upgrading of north-south interconnection capacity emerging from the joint studies commissioned by ESBNG and NIE
- anticipated upward pressure on world energy prices
- anticipated emergence of a lucrative international market in tradable green credits.

[1] In addition to generators, future market entrants could include specialised purveyors of ancillary services such as voltage control and energy storage in the timescales of inertia, primary spinning reserve, minutes / hours / diurnal energy storage, etc.

As the projections and risk assessments associated with the factors outlined above are complex and fraught with imponderables, a major programme of rigorous analytically-based studies is required to:

- develop credible scenarios
- assign appropriate probabilities to them
- model the parameters associated with them
- identify and quantify threats and opportunities
- calculate costs and benefits
- rank results and identify the optimum
- modify market design as required to ensure appropriate signals are given
- continuously track the evolution of the optimum going forward.

The time and effort required for this programme of studies will be considerable.

The current Government target is to have about 600 MW of wind energy in operation by the middle of this decade. It appears reasonable to aim to increase the target to about 1,500 MW by the end of this decade. We further believe that the programme of studies will find that it should at least double to 3,000 MW in the course of the coming decade.

Appropriate targets for installed wind capacity would therefore be:

2005	**2010**	**2020**
600 MW	1,500 MW	3,000 MW

The reasonableness of these targets is evidenced by the fact that there is already in excess of 1,500 MW of onshore wind potential with full planning permission and a lot of further potential in the planning process, not to mention the extensive potential offshore.

The economic justification of the targets is based on the fact that the wind regime in Ireland is such that turbines on good sites here generate about double the energy that they would on what would be considered to be comparably good sites in The Netherlands, Denmark or Germany, the current world leader in wind energy deployment, while conventional energy prices in Ireland are higher than in those countries. The fact that nuclear power is not currently politically an option for Ireland clinches the argument. There is no viable alternative.

It would be easy to justify targets of double those shown if the penetration of wind were merely a function of the industry's capacity to build and the relative cost of production. The grid and system issues discussed below do, however, constitute a barrier. The conservatism of the targets shown above acknowledges this.

The development of strategies for energy, environment and economic growth needs to be closely and sustainably integrated. While this requires long-term investment, delaying prudent action now would necessitate more dramatic, disruptive and expensive action later. The anticipated rates of development of wind energy in Ireland and abroad should

allow it to achieve economies of scale and maturity and reduce its costs. It is imperative to provide a market framework and long-term policy measures which will give investors, developers and consumers the right incentives, confidence and sense of long-term commitment to find the best mix and penetration levels.

While the annual cost of the necessary support is estimated to be of the order of €50 million by the end of this decade and €100 million by the end of the coming decade (based on the preferred support mechanism described below), the figures are likely to reduce in time as technology improves and production runs increase, and in the event of significant upward pressure on the cost of fossil fuels – as occurred twice in the 1970s – they would be supplanted by a direct saving.

Hibernian Wind Power envisions a continuous trajectory over which Irish wind energy generating capacity could and, driven by free economic forces, probably should increase indefinitely over the foreseeable future. It will continue to require a modest degree of support pending progress in the internalisation of externalities associated with the competing fossil fuel sector. The focus of Government policy should be allowing wind generating capacity to expand in the short term to a much higher level than at present, and position it to earn considerable levels of wealth for the country in the medium to long term.

III. Barriers to RES-E deployment

Introduction

The main barrier to the financing of wind energy projects is the lack of coordination between the award of:

- planning permission
- power purchase contracts[2]
- grid connection.

These three key elements, which have to be present simultaneously, are:

- awarded by different and diverse agencies
- disadvantaged by lack of joint ownership, monitoring or oversight by any agency
- mismatched in respect of:
  - the timescales associated with securing them
  - the order of magnitude of costs associated with applying for them

[2] Which must be sufficiently lucrative to provide an adequate return after all costs – not all of which can be estimated with confidence until late in the development process – have been covered.

- the order of magnitude of costs associated with securing them
- when they are available
- how long they remain available
- how rigorously the rules pertaining to holding onto them are enforced
- how difficult they are to secure.

Furthermore, these mismatches fluctuate dramatically with time, leading to further instability in the marketplace and further diminishing of investor confidence. Attempts to introduce order by specifying one as condition precedent for another have been unsuccessful and possibly counter-productive. The small number of projects that have succeeded in securing all three key elements simultaneously is evidenced by the poor delivery of renewables to date.

Co-ordinating the overall process effectively in the past would have been challenging. It did not happen. Unravelling the legacy of the un-coordination now is considerably more challenging. Failure to get it co-ordinated expeditiously – and keep it co-ordinated thereafter – is not an option.

Grid constraints

The interconnection developments will naturally tend to increase the amount of wind generating capacity that can be economically accommodated on the Irish system as the interconnected system demand will be greatly increased and as Ireland is generally endowed with a far superior wind resource than is the remainder of the interconnected region.

The only energy storage facilities currently at the disposal of the grid operator are at Turlough Hill pumped storage station (which was conceived and constructed by ESB specifically to mitigate the idiosyncrasies of a proposed nuclear generating facility) and the several hydro schemes with upstream storage reservoirs which can range from local to as far as 150 km away as in the case of the Shannon. An earlier proposal by ESB to provide pumped storage facilities at one of the hydro stations it built and still operates on the Liffey was not pursued. As economies of scale favour large-scale energy storage facilities like Turlough Hill, there is no case for distributed energy storage facilities to be provided locally in association with wind or any other generating facilities.

The fact that all energy storage technologies tend to be expensive and to have considerable efficiency losses associated with the charge-discharge cycle leads naturally to the consideration of more efficient use of surplus supplies of electrical energy. In the environmental context this often leads to consideration of a future hydrogen economy where hydrogen could be generated by the electrolysis of water and then stored and transported as required for automotive and other distributed uses. Serious technical and economic challenges, however, stand in the way of such a radical development, and a country of Ireland’s modest size can probably offer little to their early resolution.

Pending the prospect of such radical developments, however, there may be scope for the Irish economy to gain considerably from the generation of electricity significantly in excess of its business-as-usual projected demand. With the future advent of tradable green credits, Irish wind power could become a significant source of international revenue, and if expensive infrastructural constraints prevent it from exporting the surplus energy generated at times of high wind, there may be even be added-value product alternatives that it could export instead[3].

National targets set by Government for wind penetration in Ireland, and indicative national targets set by the EU, have been in circulation for several years. For topographical and population distribution reasons, the grid infrastructure tends to be weakest in those parts of the country where the wind resource is greatest. Therefore Hibernian Wind Power believes that the design of the current multi-billion-Euro grid infrastructure upgrade programme should take cognisance of the associated infrastructural needs of wind generation. This should be done as a matter of urgency in the interest of overall national economic advantage.

Bonding of grid connection applications

Grid connection offers must have associated bonding levels pitched high enough to deter speculation by developers not yet in a position to proceed, inhibiting bona-fide developers who are ready to deliver their projects. Time limits must be respected and seen to be respected in every case with the ultimate sanction being the rescinding of the offer. No bonding has been required to date for distribution connections and those for transmission connections have been pitched too low to deter speculation. Moreover, bonds are seen by some developers as unlikely ever to be forfeited. One ramification of failure to respect these time limits, in addition to its unfairness to competitors, is distortion of the market with less competitive projects which have tied up grid capacity eventually getting developed instead of more competitive projects which had been unfairly excluded, thereby imposing an additional burden on the final customer. Planning permissions and power sales contracts represent the fruits of considerable investment by developers. The fact that they too are time-limited reinforces the case for a zero-tolerance approach in this matter. The issue and practicalities of how grid capacity is to be allocated when the moratorium is lifted also warrant consideration.

[3] One potential such alternative could be the production of *aluminium*, with the power consumption being modulated to allow available wind energy to be availed of, the system's reserve requirements to be met, and conventional plant to be operated protractedly at its optimum load. About 50,000 MW of electricity is consumed worldwide in its production mostly at plants located in regions where electricity production exceeds local demand. While this is perhaps a trivial example, more advantageous prospects may well exist. For Ireland to be in a position to benefit from such a development if and when the right circumstances prevailed, strategic coordination of national energy, environmental and industrial development policies would be necessary. If such an option were to be pursued, a natural transition to becoming a significant producer and exporter in an emergent *hydrogen* economy could become a prospect in due course.

IV. Support mechanisms

The consultation document rightly sets out the four main support options and it is appropriate to comment on each in turn.

Option 1: Competitive tender

While this option has the advantage of familiarity, experience to date of the competitive tendering system in the Irish market is patchy at best. The principal drawbacks have been the sporadic nature of the competitions and the reality that a lot of the projects which secured contracts were not ultimately delivered.

While it may be possible to improve on the intermittent nature of contract rounds by setting out a clear timetable for future competitions, it will be very difficult if not impossible to address the project delivery issue. Past efforts have focussed on raising the entry standards by requiring that projects have planning permission before entering the competition. This has, however, merely had the effect of increasing costs on developers and has not guaranteed delivery. The key issue is the level of competition and the relative inexperience of many of the competitors in delivering/developing these projects. The reality is that there are considerably more projects with planning permission than potential contract awards, and developers are under-bidding projects in a desperation to secure contracts, often because planning permission is expiring on their projects, without the necessary financial backing to secure ultimate delivery. The current mismatch between projects with grid connection offers and those with AER VI contract offers is symptomatic of the problem of delivery.

Option 2: Fixed feed-in tariff

The fixed feed-in tariff option offers the potential to address the delivery shortcomings of the competitive tendering system as outlined above. By having a declared price available for different technologies it allows project developers to concentrate on overcoming the various hurdles to a successful development, secure in the knowledge that a fair price will be available if they succeed. It removes the difficulties associated with inexperienced speculative bidding and rewards those developers who have the capacity to ultimately deliver. While it would be necessary to offer long-term contracts, a quota system could apply whereby contracts would be awarded only until a predetermined target of MW's was achieved. A key issue would then be the allocation method. The fairest might be the first-to-completion, although the method of grid allocation would then be critical.

With the experience gained from the recent AER VI round, and the use of an equivalent wind BNE calculation, it should be possible to strike a fair but competitive price for new projects. If desired, different prices could be set for evolving technologies. Ideally there would be a central purchaser, possibly the System Market Operator (SMO). With the

introduction of the new Market Arrangements for Electricity (MAE) the electricity produced would simply be sold into the pool and purchased by the SMO. It should be possible to calculate accurately on a retrospective basis the total subvention required. This could then be recovered through the PSO mechanism from all suppliers as is done now from all consumers.

A disadvantage of this support mechanism in its simplest form is that it does not send any market or location signals to generators. Once a particular project can make a return on the declared feed-in price then it can effectively ignore what is happening to the market price for electricity and whether or not the project in question is adding to the congestion on the network.

The adoption of the Spanish-type option whereby the generator gets a fixed premium over and above the prevailing electricity price at their particular node would address this issue. In addition, both Government and consumer could more accurately budget the additional cost of supports going forward.

Option 3: Production tax credit

This method of market stimulation is unlikely to work in Ireland as corporate tax rates are very low and the tax credit alone is unlikely to provide sufficient stimulus for development of renewables. Experience to date with the Section 486(b) tax relief tends to reflect this. There are relatively few large companies with a strategic interest in the electricity/renewables sector, and even if it were to be effective it could have the effect of driving the small player out of the market completely. To be effective it would have to be on offer to individual tax payers, a direction which appears to run counter to current Government thinking.

Option 4: Renewables obligation

The primary attraction with this form of support is that it is market-based and offers the potential to be self-regulating. The demand is set by Government policy which dictates the proportion of renewables that suppliers must acquire. Pricing is set by striking a penalty or buy-out price for suppliers that do not meet the quota. In essence the support relies on providing a premium over and above the electricity market price.

The danger with a renewable source, such as wind, where the marginal cost of production is very low (practically zero) is that if supply outstrips demand then prices will tend to collapse to zero very quickly. For a renewables obligation to be successful it is necessary for demand to be seen to outstrip supply for a number of years going forward and the buy-out price needs to be sufficiently attractive to encourage investment. While it is often heralded as having a self-regulating price mechanism, in reality it acts to regulate demand rather than price. Pricing will tend to stay close to the buy-out price while demand exceeds supply and investment will stall once the target penetration is neared.

There is concern that the Irish electricity market is not sufficiently mature and that it does not have sufficient market players to facilitate a true market for renewables certificates. One has to be mindful, however, of the potential for future integration with the NI, GB and ultimately the greater EU electricity markets. A renewables obligation type system if implemented over a larger market has the potential to work, as is evidenced by current activity in the UK.

Integration with international systems provides a long-term potential for the Irish renewables industry. Given the enormous renewable potential that exists in Ireland it is possible that Irish renewables could contribute to meeting more than just Ireland's needs in the future. Development of an integrated international support system could facilitate further development of renewables in Ireland, over and above national targets, without imposing a burden on the Irish consumer.

(A) Preferred approach

Preference	Mechanism	Short term (5-year horizon)	Longer term
1	Fixed feed-in tariff Variant. Support provided by means of a long-term contract guaranteeing a premium over and above the prevailing electricity price.	Premium of 1.2c / kWh, giving an initial price of 5.5c / kWh. This assumes: • 15-year contracts fully indexed • wind electricity trades at a 10% discount to current BNE of 4.79c.	Replaced with a renewables obligation when market matures around 2010.

Notes

- The treatment of wind energy within the proposed new electricity market trading arrangements will determine what the long-term sustainable electricity price for wind will be, and will be critical to these projections.
- The annual premium equates to some €3.3 million for every 100 MW of wind supported, based on an average capacity factor of 32%.

Hibernian Wind Power advocates the adoption of a staged approach to the support of renewables. While a renewables obligation system has many attractions, financiers will need to translate the short-term price available for renewables certificates into long-term contracts with reputable suppliers. In advance of the integration of electricity markets it is felt that this will be difficult to sustain as there will be inadequate competition among suppliers. A renewables obligation should, however, be the long-term goal.

As an initial interim measure it supports the introduction of a variant of the fixed feed-in mechanism whereby a central purchaser – most likely the SMO – will enter into long-term contracts for the purchase of renewables certificates (which would be granted to generators for each kWh of renewable electricity produced) at a fixed, declared price until either certain targets are met or the electricity markets are sufficiently integrated to allow for international trade. An obligation to purchase these fixed-price renewables credits should then be allocated amongst suppliers in proportion to their share of the

market. The price and terms of the long-term contracts should be set by Government, balancing the policy targets for renewable energy and the ultimate cost to the consumer.

Under the proposed initial system generators will still be exposed to fluctuations in the price of electricity, and the market trading arrangements can dictate the true value of wind-generated electricity to the pool. The level of support will therefore be transparent – which should satisfy the wishes of the CER.

Such a system would also allow for future integration with a renewables obligation type system, such as prevails in the UK, without placing any burdens on the Irish electricity consumer. If developers can secure sufficient support for their renewables certificates abroad, this system has in reality the potential, by increasing the supply of cheap renewable electricity on the Irish system, to drive down electricity prices in Ireland.

(B) Duration of support mechanism

Estimated price <u>premium</u> per kWh					
Preferred mechanism	**Duration of support mechanism**				
	5 years	8 years	10 years	12 years	15years
Fixed feed-in tariff Variant	2.47 cent	1.73 cent	1.49 cent	1.34 cent	1.2 cent

<u>Notes</u>

- It is assumed for illustrative purposes that a fixed return must be made in all cases and that the price reverts to wind electricity market prices (assumed at BNE less 10%) after the support is withdrawn.
- Of particular importance to this calculation will be the treatment of wind within the proposed new electricity market trading arrangements. These arrangements will determine what the long-term sustainable electricity price for wind will be.

(C) Technology or regulatory developments

No dramatic regulatory or technological developments are foreseen. While cost improvements in wind turbine technology are anticipated, they are likely to be partly offset by increased spend on compliance with grid codes, the effects of constraints, and a general move away from the windier sites as these become exploited.

(D) Constraining-off / non-firm status

The introduction of constraining-off for wind projects will be a key issue going forward. For any financial investment to be soundly based, an accurate prediction of future revenue is required. Constraining-off as a solution to limited grid capacity could be accepted if either a means of payment for forced constraint existed (as it does in the current electricity market) or in the event that no payment is proposed (as is suggested

under the new market arrangements) the amount of constraint could be quantified and guarantees secured that it would not exceed certain thresholds. While the proposal for FTRs in the new market mechanism appears to be designed to cater for this issue, no detail has been provided on their implementation. In the absence of clear proposals on this issue it is impossible to comment further.

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