Summary of Consultation Responses to

ALL-ISLAND ENERGY MARKET:

Renewable Electricity – A '2020 Vision'

Ref: 05P1587

Date: 29th November 2005

Foreword

Angela Smith MP, Minister for Enterprise, Trade and Investment, Northern Ireland and Noel Dempsey T.D., Minister for Communications, Marine and Natural Resources, Republic of Ireland have committed to the development of a shared vision of how the future energy needs for Northern Ireland and the Republic can be best met in a sustainable way.

The desire to enhance the sustainability of energy supplies is set within the context of the All Island Energy Market Development Framework and is driven by the goal to bring long term, mutual economic and social benefits to consumers, North and South.

The process of policy development in this area commenced in July 2005 with the Ministerial statement on a "2020 Vision" for the collaborative development of Sustainable Energy Supplies. The statement was accompanied by a preliminary consultation paper on electricity from renewable energy sources 2020 and beyond, to which we have received many detailed responses.

This document brings together the principal themes of those responses the full details of which are available on the DCMNR and DETI websites.

It is the intention to advance the process by way of a plenary forum to take place early in the New Year. This will afford sufficient time for a full reading of the responses and allow for the preparation of options to be shared and discussed at the forum.

All respondents will be directly advised of the date and venue in due course

David Taylor,

Chairman, Sustainable Energy Working Group

Executive Summary

In July 2005 the Department of Enterprise, Trade and Investment (DETI), Northern Ireland and the Department of Communications, Marine and Natural Resources (DCMNR), Ireland published a consultation document entitled *All-Island Energy Market: Renewable Electricity – A '2020 Vision', Preliminary Consultation Document.*

The Consultation Document is the first of a series of papers on the topic of sustainable energy that the Sustainable Energy Working Group (SEWG) of the Joint Steering Group (JSG) for the All Island Energy Market was asked to prepare. This work is set within the framework of the All Island Energy Market Development Framework and the need to bring long term and mutual economic and social benefits to consumers, North and South.

Forty-two unique submissions were received by the departments in response to the Consultation Document. This document is a synthesis of the responses received from both NI and ROI. It attempts to provide the essential content of the submissions in a brief format. It does not purport to be a comprehensive representation of all submissions nor does it include any value judgements on the responses. The views expressed are solely those of the respondents and this document is provided to support the dialogue in this area of energy policy.

It is envisaged that the full responses will be put in the public domain shortly. In general, the respondents felt that the process of considering longer term policy objectives was very useful.

Some important points set out in the responses include:

- There was general agreement among all of the respondents for the requirement for a holistic approach and 'joined up' policy implementation between relevant Departments and Agencies, including those with responsibility for energy (supply and demand management), agriculture, competition, environment, forestry, waste, regional development, planning, marine and industrial development. A number of respondents reasoned that a RES-E policy should form part of an overall energy policy; a subset of these respondents specifically called for an all-island energy policy.

- In general, respondents agreed that the opportunities and obstacles facing RES-E associated with resource, infrastructure and the physical environment on the island of Ireland are broadly similar in both jurisdictions. However, several participants cited differences in the current regulatory and legislative framework in NI and ROI that result in different opportunities and obstacles in both jurisdictions.

- There was general consensus that enhanced interconnection could deliver potential benefits to RES-E in Ireland. Several participants extolled the benefits of enhanced North – South and East – West interconnection including *inter alia* facilitation of trading, promotion of competition in the marketplace, reduction in overall generation investment though sharing of resources, reduction in reserve requirements, system balancing, minimisation of wind generation variability across the regions and improvements in security of supply. However, there were differing views with regard to how interconnection should be operated.

- Respondents submitted a range of 2020 all-island generation levels for RES-E. The levels ranged from the middle illustrative RES-E generation scenario set out in the Consultation Document (20% of gross electricity consumption) to well over 50%. Respondents also put forward 2020 levels for specific RES-E technologies – onshore wind, offshore wind, biomass (co-firing), wave and tidal.

- Respondents' views differed considerably on the question of whether NI and ROI should seek to lead in any RES-E technologies. Some expressed reservations about the use of public funds for fundamental research, while others called for investment in RES-E technology development. Several respondents submitted that NI and ROI should be seeking to lead in finding innovative solutions to allow the increased penetration of RES-E in small synchronous systems, as this is an area in which Ireland is in need of additional research in the short term and is developing relevant expertise.

- Respondents submitted divergent views with respect to the scale and type (technology) of RES-E plant that should be promoted on the island. However, many acknowledged the benefits of a diverse portfolio of RES-E generation.

- There was a widely held view among participants that a market based support mechanism is most appropriate for supporting RES-E in Ireland and that the mechanism(s) should be at least consistent and compatible across both jurisdictions. The majority of respondents expressed support for an NIRO-type mechanism to be implemented throughout the island. Others submitted their preference for a Feed in Tariff in an open ended scheme as the primary policy mechanism.

- A range of supporting policies were suggested to facilitate RES-E deployment and particularly to support less mature RES-E technologies.

- It was widely acknowledged among respondents that the type, specification, size, location and timing of new non-RES-E plant additions to the system(s) and the retirement of existing non-RES-E plant from the system(s) will have significant impact on the ability of the island to accommodate large amounts of RES-E capacity. Many respondents called for study in this area in the short term so that RES-E policy may strive towards the attainment of an optimum portfolio of plant, including conventional generation, RES-E plant, interconnection and grid infrastructure.

- Respondents identified several obstacles to RES-E deployment. Some are common to both jurisdictions, while participants submitted that others manifest themselves more severely in one jurisdiction than in the other. Obstacles cited by consultees included those associated with planning, grid connection, system operation, grid development as well as some legislative constraints.

- Several respondents submitted that the direct and indirect costs and benefits of RES-E electricity should be measured and quantified in a holistic manner. A wide range of factors were submitted by respondents for consideration when undertaking a rigorous cost benefit analysis of RES-E on the island. Notwithstanding this, very few respondents provided actual costed estimations for these factors.

- Respondents submitted a wide range of useful recommendations for work streams to be incorporated into a work programme to facilitate RES-E goals. The suggestions included holistic policy studies, detailed cost benefit analyses, specific studies, specific Infrastructure developments, assessments & modelling of complex system operations and fundamental research, development and demonstration. A number of respondents suggested that some form of all-island forum should be established to co-ordinate the work programme.

This document is structured around the nineteen questions posed in the consultation document, and will be utilised by DETI and DCMNR in considering further steps in the process of formulating long term RES-E policy.

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1.0 Introduction

In July 2005 the Department of Enterprise, Trade and Investment (DETI), Northern Ireland and the Department of Communications, Marine and Natural Resources (DCMNR), Ireland published a consultation document entitled *All-Island Energy Market: Renewable Electricity – A '2020 Vision', Preliminary Consultation Document*.

The Consultation Document is the first of a series of papers on the topic of sustainable energy that the Sustainable Energy Working Group (SEWG) of the Joint Steering Group (JSG) for the All Island Energy Market was asked to prepare. This work is set within the framework of the All Island Energy Market Development Framework and the need to bring long term and mutual economic and social benefits to consumers, North and South.

The objective of the consultation was '*to stimulate debate with industry participants and representatives, potential investors and consumer groups.*' A total of forty-two unique submissions were received in response to the Consultation Document - fourteen submitted to DETI and twenty-eight submitted to DCMNR[1].

This document is structured around the nineteen questions posed in the consultation document and is a synthesis of the responses received from both NI and ROI. It attempts to provide the essential content of the submissions in a brief format. It does not purport to be a comprehensive representation of all submissions nor does it include any value judgements on the responses. The views expressed are solely those of the respondents and this document is provided to support the dialogue in this area of energy policy.

A full list of respondents is set out in Annex 1. It is envisaged that the full responses will be put in the public domain shortly. In general, the respondents felt that the process of considering longer term policy objectives was very useful.

We would like to express our thanks to all those who took time to prepare submissions and contribute to this process.

[1] Some participants in the consultation process submitted identical responses to DCMNR and DETI; hence the apparent discrepancy in number of submissions received.

2.0 Responses to Specific Questions in Vision Document

2.1 Q1. What are the drivers for RES-E policy, and can they be prioritised?

Most respondents concurred with the three primary drivers for RES-E policy set out in the Consultation Document, viz.: environmental obligations, security of supply and cost competitiveness, whilst acknowledging that there is '*a potentially wide and complex range of environmental, political, social, and economic drivers influencing the development of renewable energy in Ireland.*'[2] Several submissions included useful dissertations on these themes.

With respect to environmental drivers, ESB argued that the main driver for RES-E deployment is shifting to a sustainable energy system, not CO_2 abatement per se, that CO_2 abatement may be a '*consequential benefit*' of such a shift and that CO_2 emission reduction in the electricity sector is addressed by the EU Emission Trading Scheme. ESB added that renewable electricity is a very high cost CO_2 abatement measure.

Several respondents acknowledged the importance of ensuring that whatever objectives form the basis of the renewable energy policy are achieved at an acceptable cost. The CER, among others, submitted that the provision of RES-E at least cost to the final customer will support competitiveness and the IBEC-CBI Joint Business Council submitted that a central objective in considering a future RES-E policy should be maintaining and enhancing the competitiveness of the island.

Some respondents, including Invest NI, Bord na Móna and Hibernian Wind Power added that the desire to create socially beneficial economic activity with associated employment, particularly in rural areas, is also a valid driver for RES-E policy. The Several respondents, especially those involved in the ocean energy sector, proposed that another driver should be the creation of an indigenous industry through the development of expertise and manufacturing capability for plant and equipment in emerging RE fields.

A number of potential drivers in the agricultural sector were not specifically mentioned in the Consultation Document, but were set out in a number of submissions, including the Nitrates Directive, Cross-Compliance and the Single Farm Payment scheme. '*Cross-Compliance and the Single Farm Payment may afford considerable opportunities to develop energy crops, however, this is unlikely to occur unless agricultural and energy policies are harmonised.*[3]' Edenderry Power corroborated this view, adding '*in establishing a sustainable supply of renewable fuels for the purpose of co-fuelling there would seem to be a significant synergy between the requirements of the RES-E directive and future potential developments in agriculture and waste policies*.'

[2] NIE

[3] Environmental Protection Agency

2.2 Q2. How should RES-E policy interact with other government policies (e.g. waste, agriculture, environment, etc.)?

There was general agreement among all of the respondents for the requirement for a holistic approach and 'joined up' policy implementation between relevant Departments and Agencies, including those with responsibility for energy (supply and demand management), agriculture, competition, environment, forestry, waste, regional development, planning, marine and industrial development. Some participants called for a cross cutting approach instead of complimentary policies or actions. Invest NI suggested that '*the appointment of a central agency for the implementation of the common North – South policy and who will be responsible for liaison with the respective government departments*' could potentially enhance the success of such a holistic approach. WWF NI also suggested that an '*all island renewable / sustainable energy agency*' could be established to '*achieve greater/full integration of energy policies with other policies.*'

A number of respondents, including Airtricity, IBEC-CBI Joint Business Council, ESB and ESB National Grid, stated the need for RES-E policy to form part of an overall energy policy. ESB expressed the view that '*it is difficult to see how definitive conclusions can be reached with regard to policy on renewables in the absence of an overall energy policy in which to frame the discussions.*' Some of the respondents specifically called for an all-island energy policy.

Bord na Móna noted the difficulties in achieving interdepartmental co-ordination of policies in a single jurisdiction, yet alone in two. They suggested therefore that a pragmatic level of tolerance of sub-optimisation between the various policies is likely to be required in order to make progress in realistic timeframes and to enable the major objectives of the policies to be achieved. On a similar theme, the IEE noted that the harmonisation of different government policies '*will inevitably require 'horse-trading' and priority setting across the sometimes conflicting policies*' and suggested that this area could be addressed through the creation of a Steering Board which would '*clearly need recognition and authority within different government departments, and in the case of an all-island solution, across national jurisdictions, which suggests that the Steering Board's role would be, in part, akin to that of the European Commission. Ultimately, an all-island regulator would be needed to ensure efficient operation of the market and possibly a common dispatching system.*'

Some specific recommendations relevant to inter-departmental policy included:

- Targets for reduction in energy demand should be adopted in ROI, ideally resulting in integrated, long term, ambitious targets for reduction in energy across the island (WWF NI);

- All RES-E policies should be pro-competitive and allow the greatest possible diversity of generation ownership (The Competition Authority);

- All new sewage treatment facilities must have digestion systems to produce Methane (UCC Hydraulics & Maritime Research Centre).

2.3 Q3. Do the opportunities or obstacles facing RES-E differ between the two jurisdictions?

In general, respondents agreed that the opportunities and obstacles facing RES-E associated with resource, infrastructure and the physical environment on the island of Ireland are broadly similar in both jurisdictions. However, several participants cited differences in the current regulatory and legislative framework in NI and ROI that result in different opportunities and obstacles in both jurisdictions, including those set out below.

- A number of respondents maintained that securing planning permission for RES-E projects and for the associated grid connections is more of an obstacle in NI than in RoI (see § 2.14.1 on Planning).

- Conversely, a number of respondents submitted that the NI Renewables Obligation system facilitates better opportunities for RES-E project deployment (in NI) by providing '*sufficient revenue certainty to financiers*'[4] than the AER systems in ROI. Airtricity summarised that '*ROI policymakers could benefit from the positive benefits of the ROCs scheme and system operator strategy in NI, whilst the NI policymakers could learn from the planning processes in place in ROI.*'

- ESB Independent Energy (ESBIE) identified differences in the imbalance regimes in both jurisdictions as being potential obstacles affecting the economics of RES-E, including the Renewable Output Factor (ROF) which is '*now adding cost to the renewable market.*' ESBIE further submitted that '*the key issue for suppliers going forward is not energy price support but imbalance risk management…Suppliers will require either guaranteed or predictable 'top up' prices. This support should ideally be provided through the Pool but otherwise could be provided externally.*'

- Airtricity maintained that SONI's policy of passing the charges for deep reinforcement works back to the embedded generator is an obstacle to RES-E deployment in NI. They would favour a TUoS charging mechanism, similar to the one in ROI.

Hibernian Wind Power submitted a cautionary warning that reflects a view expressed by a number of respondents, viz., that '*given the different mechanisms operating in each jurisdiction it is important that a robust tracking mechanism for all RES-E projects is in place to avoid double counting the same project.*'

[4] Aitricity

2.4 Q4. Are there areas of RES-E policy that should not be considered on an all-island basis, and why?

This question did not elicit a widespread significant response; however a number of participants highlighted some relevant areas.

- WWF NI pointed out that '*given some issues, like taxation, will be dealt with separately by each jurisdiction, there may be some issues specific to each jurisdiction that can not be fully integrated.*' Airtricity also responded that the application of carbon taxation at consumer level may remain separate in both jurisdictions.

- Although supportive of the advantages of an RO type support mechanism versus the existing AER system in ROI, ESB expressed the view that '*the scenario of separate support mechanisms which are functioning effectively and efficiently in both jurisdictions should not be dismissed simply to facilitate the adoption of a single support mechanism that may result in higher overall support costs.*'

- The Energy Saving Trust submitted that '*policies to support mass market renewables [microgeneration] do not need to be considered on an all-island basis.*'

2.5 Q5. To what degree are RES-E policies currently aligned – North & South?

The general consensus was that there is currently little alignment between RES-E policies in NI and ROI, other than at high level, some policies are driven by EU-level legislation.

Notwithstanding this, there was general support for the principle of aligning policies as soon as possible and ensuring '*that targets, policy, legislation and regulation with respect to emissions trading and renewable energy are at least compatible and mitigate the risk of market distortions.*'[5] CER echoed this common view, submitting that '*any distortions that could arise from the continuance of different approaches to supporting renewables post 2020 on the island should be examined.*'

Bord Gáis Energy Supply warned that '*any two different jurisdictions which operate under separate policies and development practises will have the potential of producing arbitrage opportunities, which serves only to increase production / consumption in one jurisdiction at the expense of the other.*' They cited the current differences in the 'green' classification of large-scale hydro in the two jurisdictions as an example of this.

On a similar theme, IWEA submitted that '*a factor to be addressed in the development of an all-island approach to promoting RES-E is the conflict between the introduction of the*

[5] IBEC-CBI Joint Business Council

All-Island Market and the requirement under the NI Renewable Obligation Certificates (ROCs) for electricity to be consumed in NI for the purposes of ROC accreditation. During the transition period to an all-island policy and incentive scheme, tariffs should be such that they do not unfairly discriminate or support wind energy in one jurisdiction at the expense of the other.

Several respondents, including RES-E developers and ESB Networks maintained that the technical requirements of the Grid Codes and Distribution Codes in both jurisdictions should be harmonised to facilitate investment North and South, delivering financial benefits to developers through common design specifications and to operators through identical operating environments and requirements.

ESB National Grid pointed out that it '*maintains regular contact with NIE and SONI to ensure that any differences in approach to the integration if renewable generation is minimised*' in the context of the Single Electricity Market.

With regard to future policy and market alignment, the IBEC-CBI Joint Business Council recommended that '*the test by which the value of a fully integrated all-island energy market should be judged is that users in both parts of the island have access to competitive energy vis a vis their competitors in the EU and other markets, with commensurate security and quality of supply.*'

2.6 Q6. How should all-island RES-E policy inform and be informed by EU and UK RES-E Policy?

Invest NI submitted that '*EU and UK policies should be incorporated into the all island policy to give legitimacy to the overall policy and where economically practical targets have been set these should be adopted / exceeded where beneficial to the island.*'

WWF NI submitted that '*both jurisdictions could and should learn from other examples, be that on a country scale or smaller, but there is no reason why both jurisdictions can not set their own, integrated, ambitious targets which could surpass the targets set elsewhere in the UK and / or Europe, given that the setting of ambitious targets is a matter of political will.*'

IWEA advocated that market support structures should be designed to facilitate '*future integration with UK and EU support structures (e.g. Renewables Obligation Certificates and Renewable Energy Certificates). In the long term the IWEA feels the move from All-Island to All-Islands energy market will be a positive one for wind energy in Ireland.*'

With regard to the EU ETS implemented earlier this year, NIE pointed out that '*the coexistence of the EU ETS with an all-island renewables policy instrument could potentially raise three important issues which would need to be carefully managed; target setting, double counting, and the fungibility of trading commodities.*'

A number of respondents highlighted that the island faces particular issues which are not faced by most of the larger countries, including the UK. '*The UK has a much bigger*

electricity market than exists in Ireland and policy instruments that may be successful in the UK may not be equally successful in an Irish all-island market if adopted without appropriate modification.[6]' The IEE pointed out that '*the all-island market will have an impact upon the renewables programme in Great Britain and vice-versa. Therefore there is the need for both RES-E policies to co-exist and for there to be co-operation between the two islands albeit, there is a significant difference between the electricity demands of Britain and Ireland.*'

2.7 Q7. What effects will interconnection (North-South & East-West) have on RES-E, and how should it be operated and regulated?

2.7.1 Overview

There was general consensus that enhanced interconnection could deliver potential benefits to RES-E in Ireland. Several participants extolled the benefits of enhanced North – South and East – West interconnection including *inter alia* facilitation of trading, promotion of competition in the marketplace, reduction in overall generation investment though sharing of resources, reduction in reserve requirements, system balancing, minimisation of wind generation variability across the regions and improvements in security of supply.

WWF NI proposed an alternate view, submitting that '*interconnection will likely supply energy predominantly generated from fossil and / or nuclear sources via the NI / GB interconnector and as such is likely to restrict the development of renewable sources.*'

Bord na Móna warned that '*in a gross pool market, if interconnection reduces the opportunities for intermittent RE generators to operate when prices are at their higher levels (especially if RES-E projects were participating in the market without any policy mechanism providing fixed or additional reward for their output) it would have a negative effect. A scenario such as this could make RES-E projects un-bankable if it introduced high levels of risk in projected revenue streams.*'

In their submission, the RSPB warned that by opening up competition across borders and interconnection could lead to the possibility of developers opting for 'preferential' development criteria. '*This raises the fear of reducing environmental regulation to the lowest common denominator as countries seek to attract developers.*'

[6] Bord na Móna

2.7.2 New North – South Interconnector

Several RES-E developers and the IWEA submitted that the selection of a Western rather than an Eastern corridor for a new transmission link between the two jurisdictions '*is an essential facilitator of wind energy development on the island in the longer term.*[7]'

2.7.3 New East – West Interconnector

Airtricity stated their preference for a new 1,000 MW East – West interconnector to be installed before 2020.

2.7.4 Operation of Interconnectors

There was a widespread view that the manner in which interconnection is operated and regulated will have a major impact on the realisable scale of these benefits (if any). However, participants expressed different views with regard to the operation of interconnection assets. Some of the main views submitted are summarised below.

- ESB National Grid (ESBNG) highlighted that '*differences in policies could lead to substantial interconnection flows.*'
- Bord Gáis Energy Supply warned that the advantages associated with the provision of system back-up for intermittent generation are only valid if the System Operators have '*real time access to short notice generation and interconnector access. This can lead to inefficient use of the interconnector which may incur additional costs for consumers.*'
- The Competition Authority submitted that interconnectors, particularly the East – West interconnector, '*should be operated in a manner which maximizes the ability of Irish renewable energy to compete in the UK with domestic renewable resources.'*
- Airtricity believe that '*the market should decide power flow and reserve allocations. Trading arrangements for the East-West interconnector should be aligned with those of the Moyle interconnector.*'
- The IWEA submitted its desire for RES-E to be granted priority status within the allocation provided for reserve for both interconnectors, in accordance '*with the EU RES-E Directive (2001/77/EC) which stipulates that electricity from renewable energy should be granted priority access to the electricity network.*'
- Hibernian Wind Power maintained that all East-West interconnection '*should be operated and regulated in the overall interest of the customer without regard to sectoral interests. Rather than being used at full capacity to provide base-load*

[7] Hibernian Wind Power

import or export, their bidirectional capabilities and unparalleled responsiveness capabilities should be fully exploited to match the varying needs of the system.'

2.8 Q8. What could the level of penetration of RES-E electricity be in 2020 on the island of Ireland? (Please include any analysis that supports your response.)

Note: At the time of preparing the Consultation Document there was a paucity of data regarding wave energy resource in ROI and NI. Therefore, the resource value included for wave energy in ROI in Table 4 were taken from *Options for Future Renewable Energy Policy, Targets and Programme* (DoCMNR, 2003)[8] and in NI from *Renewable Energy in the Millennium – The Northern Ireland Potential* (DED, NIE, 1999) which concluded *that "the wave energy resource of Northern Ireland is insignificant".* However these figures should not be interpreted as a limit on the potential wave energy resource in 2020. A comprehensive study on the wave energy resource in the island of Ireland is currently underway and it is understood that this assessment has identified significantly higher wave energy resource levels.

Respondents submitted significantly varying estimates for levels of RES-E penetration by 2020. Some focussed on one or two specific technologies, while others gave overall values for total RES-E. The degree of supporting analysis provided varied considerably between submissions. The range of levels submitted in response to this question are summarised below. The values apply to total RES-E, unless specific technologies are referenced.

- '*20% of the generation capacity by 2020*' (Invest NI).
- In its submission the IWEA proposed that with '*appropriate support and the lowering of technical, market and administrative barriers, by 2020 RES-E can contribute over 50 % of the All-Island final electrical energy consumption with a positive impact on prices to the consumer.*' The IWEA also submitted a breakdown of its proposed 2020 target, viz., 9,300 MW of RES-E (excluding large scale hydro) across both jurisdictions broken down between 5,000 MW onshore wind (> 5 MW), 1,000 MW onshore wind (≤ 5 MW), 2,000 MW offshore wind and 1,300 MW other renewables[9]
- Additional 500 MW per year for 10 years up to about 7,000 MW of wind energy capacity by 2020 (Hibernian Wind Power).

[8] The table note for ROI wave energy resource in Table 4 of the Consultation Document incorrectly cited *Bioenergy in Ireland –A Strategy for Action* (DoCMNR Bioenergy Strategy Group) as the source for the 6 MW resource figure. This figure was in fact sourced from *Options for Future Renewable Energy Policy, Targets and Programme* (DoCMNR, 2003).

[9] All other renewable generation other than the 220 MW of existing, large-scale hydro

- '*The potential to connect 6,000 MW and beyond to the Irish grid by 2020 is entirely feasible. Beyond 6,000 MW we would envisage robust links to the UK and Europe, bypassing any potential backbone constraints in Ireland.*' (Airtricity)

- Edenderry Power maintained that the three modern peat fired power plants, '*which together have a total 350 MW capacity, it is very feasible to co-fuel these plants with up to 50 % Biomass by 2020. This would provide 175 MW of dispatchable renewable energy from Wood Residues and Dry Agricultural Residues.*'

- WWF NI suggested that target levels of 15% and 35% of electricity in NI from RES-E should be adopted. '*Similar targets could be set in the ROI.*' WWF also submitted that '*renewable energy sources could supply a majority of our demand if the will was there to fully develop and utilise the potential that exists here for renewable energy sources.*'

- '*By 2020 a significant (possibly 25%) fraction of the electricity could be generated by renewable means*' using wind turbines of 2 to 3 MW and biomass technologies. (IEE)

- '*The RSPB advocates higher targets such as the 40% by 2020 set by the Scottish Executive.*'

- Bord na Móna submitted that '*targets, while they need to be tempered by realism, should also be challenging if they are to have any real driving effect. With allowance for the technological development that will invariably take place over the target timeframe period there is no insurmountable reason why, with appropriate policies in place, a RES-E penetration of 50% in 2020 cannot be achieved.*'

- The Marine Institute referenced an '*accessible electrical power flow for the latest generation of offshore floating wave energy devices*' of 1.645 – 1.925 GW and stated that there is an accessible annual electrical energy of 11.2 – 16.8 TWh. The Marine Institute proposed a 2020 wave energy target of 200 MW installed capacity (525 GWh output) and a 2020 tidal energy target of 100 MW installed capacity (output of 250GWh).

- Wavebob submitted a much higher accessible resource for wave energy (35 TWhe), while ESBI suggested a value of 9.76 TWh in its response. Other respondents also submitted their views on appropriate values for wave energy capacity for 2020. They included the Hydaraulics and Maritime Research Centre in UCC (200 MW), Ocean Energy (500 MW, 30 MW by 2010) and Wavebob ('*several hundred or over 1,000 MWe*').

The Consultation Document did not address the potential for geothermal energy to contribute to RES-E by 2020. Conodate submitted that '*information on the indicated resources present on our island is based on incomplete data. There is a strong need for more detailed information to validate this reserve.*'

Several respondents set out some key criteria that would be need to be in place to facilitate the levels set out above, including the requirement for optimum generation mix (see § 2.15.3).

2.9 Q9. How should suggested levels of penetration be decided?

The CER, among other respondents, welcomed '*the recognition that a full and detailed techno-economic analysis of the costs and benefits of increased renewable penetration is required in order to inform future target setting. This must include an analysis of both direct and indirect costs and greenhouse gas savings associated with increased levels of renewables on the systems, compared to those related to alternative measures.*' CER added that the output from this analysis will facilitate the development of appropriate targets and support mechanisms.

The Department of Finance (ROI) submitted that '*the setting of sensible, yet ambitious, long-term targets for renewable energy is essential if real progress is to be made in this area.*' WWF NI stated that it '*would wish to see ambitious targets being set on both sides of the border for the development of renewable energy sources, given the enormous potential that exists…would anticipate that these targets can and will be surpassed rather than being upper limits which will not be passed.*'

A number of RES-E developers expressed views consistent with that of Airtricity's; that is '*that optimum plant portfolio, optimal infrastructure upgrades and enhanced system operating strategies should all be examined with view to steering policy and steering system design to accommodate maximum levels of renewable generation at minimum cost to the consumer.*' In deciding on appropriate penetration levels for RES-E, Viridian Power & Energy proposed that '*the optimum future energy mix for Ireland should be determined by a market where primary input commodities, i.e. carbon and fuel, are priced by a large liquid market.*' The School of Electrical, Electronic and Mechanical Engineering at UCD submitted that, among other things, the levels of penetration should be determined by '*coming up with a robust answer*' to the following: '*Taking into account all significant drivers i.e. cost, security of supply, environment etc., what is the optimal plant mix for the island of Ireland in 2020 and beyond?*'

Hibernian Wind Power put forward an iterative methodology incorporating *inter alia* economic analysis, technical assessment, scenario modelling and market projections to determine the optimum rate of deployment for different RES-E technologies.

ESB Networks submitted that '*the stability of the transmission system is the primary limiting factor in relation to the levels of penetration*.' NIE expanded on this theme, stating that the level of penetration '*will depend on a number of factors including predictability / availability of output of embedded generators, variability, controllability and real time information, technical properties of generators, adequate infrastructure and stability of systems under a wide range of situations.*' With regard to estimating future demand for electricity NIE submitted that the impacts of parallel activities for carbon abatement '*such as end use energy efficiency investment need to be factored into this assessment.*'

Some other specific submissions with respect to the identification of 2020 penetration levels included:

- Levels should be set '*firstly, based upon its international environmental commitments, and secondly, taking into account any aim of reducing off-shore fossil fuel energy dependency.*' (IEE)

- The Energy Saving Trust submitted that a separate target should be adopted for microgeneration from renewables.

- '*Penetration levels should be decided against the proven technologies likely to be employed over the target period and the speed at which they are likely to be installed.*' (Invest NI)

2.10 Q10. Should NI and RoI be seeking to lead in any technologies?

There were differing views in response to this question with some participants calling for Ireland '*to take the lead in technologies, which are at an early stage of development and in which Ireland currently has a high level of expertise and a rich accessible resource.*' This view, expressed by the Marine Institute with respect to wave and tidal energy was backed by a number of university-based research centres. '*Wave energy development provides a niche area where we already have considerable momentum, but need a targeted investment programme which can see us compete with the best worldwide. An excellent mix of research and development expertise is available on the island of Ireland and with Ireland's considerable wave energy climate and growing energy requirements (together with the imperative to reduce carbon emissions), there is a compelling case for investing in this area.*'[10] *'A pro-active approach should be taken to develop this industry as the rewards are potentially huge with a world market estimated over €200 billion.*'[11]

Between them, the different respondents to this question proposed that Ireland should seek to lead in nearly all other RES-E technologies that could be deployed in Ireland between now and 2020. With regard to R&D, the IBEC-CBI Joint Business Council identified '*a particular challenge will be to ensure a higher uptake and participation in relevant EU funded programmes, where private sector participation has traditionally been very low.*'

Other respondents, including Viridian Power & Energy, expressed reservations '*about large sums of RD&D budgets being spent on fundamental research on renewable technologies given that Ireland can never compete with large countries development programmes.*' Instead of undertaking such fundamental research ESB Networks submitted that '*maximising existing technologies and processes, proven to be successful in other countries, would lead to more immediate renewable connections.*'

Several respondents submitted that NI and ROI should be seeking to lead in finding innovative solutions to allow the increased penetration of RES-E in small synchronous systems. '*Doing so would have a twofold effect; (i) it would help the country to get efficient utilisation of its renewable energy resource and (ii) it would create an expertise and competence within parts of the industry that could be marketed and exported as*

[10] Department of Electronic Engineering, NUI Maynooth

[11] Hydraulics and Maritime Research Centre, UCC

product offering in its own right.'[12] ESBNG submitted that '*Ireland already finds itself at the leading edge in terms of some aspects of integration of wind power. Policy should recognise this and encourage innovation in this area. In order to facilitate R&D in new technologies ESBNG would be willing to connect pilot schemes of a manageable size that would not have an adverse impact on system security.*' Fields suggested by respondents included *inter alia* optimum generation mix, forecasting, optimum dispatch, demand-side management, remedial action schemes, grid and network planning criteria, energy storage techniques and intelligent control systems.

2.11 Q11. What type of plant (RES-E) should be promoted through appropriate financial, regulatory and / or planning policies?

Most respondents acknowledged that onshore wind energy is likely to be the main contributor to additional RES-E generation on the island up to 2020. Notwithstanding this general agreement, different respondents expressed their preferences for the promotion of a wide variety of different RES-E plant types. Some focussed exclusively on one technology; others highlighted the benefits of promoting a range of RES-E technologies; and others enunciated the benefits of certain groups of technologies, e.g. non-intermittent generation.

Bord na Móna submitted that '*the rational approach is to put a range of policies in place that enable plants that use the more mature technologies to be developed in a manner that gives sufficient support to ensure that developers get an adequate return while the consumer gets the benefits (many of which are not priced into the final cost) of greater levels of RES-E. Technologies that are less commercially viable at present should receive support for demonstration or pilot projects that will help to create confidence in the technology or supply chain as appropriate.*'

Other than onshore wind energy the RES-E plant types most favoured for promotion by respondents were:

- Offshore wind
- Biomass: Hibernian Wind Power submitted that '*the application of the law of diminishing returns to the incremental value of their [onshore wind farm's] proliferation is likely, however, to favour complementary development of biomass-fired generation within that planning horizon.*' Edenderry Power highlighted the potential benefits that could be realised from co-firing with up to 50 % biomass in peat burning power stations in terms of providing a short term demand for energy crops and for providing an environmentally sustainable disposal route for certain agricultural wastes. The EPA maintained that the relevant regulatory bodies must work together to ensure that the landfill gas resource is efficiently utilised (304 MW by 2020).

[12] Bord na Móna

- Ocean energy (wave & tidal). Some respondents cited the potential of wave technology for variability reduction when combined with wind energy.

Several participants also expressed a preference for the promotion of embedded or distributed generation, though ESB Networks set out that '*the accommodation of significant levels of dispersed generation on the distribution system will require new approaches to operating and protecting the system.*' Other respondents expressed preferences for solar thermal systems, CHP and biomass heating technologies.

In framing their responses to this question, several respondents noted the importance of adding only the most appropriate type(s) of non-RES-E plant to the generation mix (see § 2.15.3).

2.12 Q12. What primary policy mechanisms should be put in place to meet the suggested penetration level and how should it be applied? What prices are required? (Please include any analysis that supports your response.)

There was a widely held view among participants that a market based support mechanism is most appropriate for supporting RES-E in Ireland and that the mechanism(s) should be at least consistent and compatible across both jurisdictions. Several respondents call for a single primary support mechanism for the island.

The CER submitted that '*merchant build is the preferred route but where support is required, this should be market based in order to attain value for the final consumer.*' The IBEC-CBI Joint Business Council added that '*these should be provided external to the trading system itself, without distorting the market.*' The Competition Authority also expressed a preference for market based mechanisms but warned that '*where public monies are disbursed in this way, particular care must be taken to ensure that funding is distributed fairly according to clear, equitable and transparent guidelines. This will avoid the potential for financial supports to be used anti-competitively to unfairly promote one technology or firm above another.*' The Department of Finance (ROI) acknowledged that '*appropriate, strategic investment by the State in this area [RES-E] may be appropriate in circumstances where there is clear market failure and where such investment is supported by rigorous cost benefit analysis.*'

Views differed considerably on the structure, level and extent of the support required. The majority of respondents expressed support for an NIRO-type mechanism to be implemented throughout the island. However, Hibernian Wind Power, among others, cautioned that '*it is unlikely that the terms of the UK ROC scheme could be implemented in ROI without considerable cost to customers.*' A number of respondents called for the RO to be banded to support less mature RES-E technologies.

Other respondents submitted their preference for a Feed in Tariff in an open ended scheme as the primary policy mechanism. Bord na Móna extolled the merits of a RES-E premium based system that '*could be used as an alternative after the current Feed-in Tariff and could help achieve convergence between the two jurisdictions.*'

The IWEA set out a detailed proposal for two alternative primary support mechanisms in an arrangement whereby generators could opt for either of the following alternatives:

- A fixed feed in Tariff – 15 year term, tariff of 6.027 €c/kWh (onshore wind > 5 MW), 6.662 €c/kWh (onshore wind ≤ 5 MW) and 9.161 €c/kWh (offshore wind) fully linked to CPI increases;
- '*A tariff based on the average price of electricity, plus a premium (MA+P). This premium would be transferred to form of tradable renewable energy certificate (REC) with an authenticated guarantee of origin (GoO) as soon as an appropriate redemption process is implemented.*' The premia above the average wholesale price (6.0 €c/kWh) proposed by IWEA were 0.427 €c/kWh (onshore wind > 5 MW), 1.062 €c/kWh (onshore wind ≤ 5 MW) and 3.561 €c/kWh (offshore wind).

The Association's stated objective for the dual system of support is to provide '*incentives for the development of wind energy in ROI in the short term and of moving towards a co-ordinated all-island mechanism of supporting wind in the medium and long term…Whenever market conditions are appropriate, this tariff system would be transformed into one similar to the UK's Renewable Obligation.*'

IWEA backed up the proposals the submission with an analysis of the potential impacts of the Association's proposed targets and support prices on average wholesale electricity process in 2010 and 2020. The IWEA's conclusion was that '*wind generated electricity can supply power and displace fossil-fuels competitively and will result in a decrease in wholesale prices in the short and medium term. In the longer term, wind power will deliver a clean, secure, renewable and indigenous supply of electricity that will reduce the cost of electricity in real terms.*'

The Marine Institute also proposed a range of primary support options for wave and tidal energy projects. They were ranked in descending order of preference in the Institute's submission, as follows:

- Advanced Feed in Tariff (20 €c/kWh for first 6 MW wave, 8.7 €c/kWh for projects installed around 2020), (20 €c/kWh for first 5 MW tidal, 8.7 €c/kWh for projects installed around 2020);
- Competitive tender (23 €c/kWh for 12 years for wave, 24-25 €c/kWh for 12 years for tidal);
- '*Specific Renewable Obligation*' (24 €c/kWh for 12 years).

A widespread view was captured by the IEE submission, viz., '*whatever methods of support are provided in the all-island solution should give consistent and unambiguous signals to developers and operators of renewables plant throughout the island.*'

Viridian Power & Energy submitted that '*the most important aspect of a government support scheme is to ensure that in the event of a scenario where fossil fuel prices drop that subvention ensures that the generator offtaker is not left with out of the market contracts.*' Viridian Power & Energy also submitted that '*the current market incentives and support provided in the market are satisfactory with the exception of carbon pricing*'. Viridian Power & Energy's difficulty with the latter is with the allocation of carbon credits to ESB on a historical basis whereas '*a new entrant must purchase around*

27% of their carbon allowances in the European carbon market and thus is subject to much higher carbon costs even though they are the entity that is reducing the overall emissions in the systems (new plant is typically much less carbon intensive than existing plant).'

2.13 Q13. What supporting polices are appropriate, and for what technologies?

Respondents discussed a variety of different policies and mechanisms required to further facilitate the deployment of RES-E in NI and ROI up to 2020 and beyond. Some of the key policies and mechanisms identified by respondents are set out below:

- ESB Networks submitted that '*the provision of additional [EU] funding to provide reinforcements to meet renewable projections and government targets should be provided.*'

- CER submitted that '*consideration should be given to secondary support mechanisms to promote relatively immature technologies. Where existing plant is suited to co-firing with renewable fuel sources, this should be considered.*'

- Several respondents identified fields of research that, in their view, should benefit from secondary support in the form of a co-ordinated and coherent research, development and demonstration capability.

- Several respondents expressed a preference for grants, '*such as the system of grant aid for offshore wind development in the UK*'[13] or a system which '*should be used to "plug" any gap between the revenues from the "base" ROCs scheme and the costs of the more "frontier" RES-E technologies*'[14]. Invest NI proposed grant assistance of 40% '*for technologies that are slow to develop and require infrastructure support*', demonstration grant assistance '*for tidal energy at a minimum of 50%*' and interest free loans for further development of some wind sites.

- The Marine Institute made a case for policy to '*facilitate the development of less evolved technologies. Capital funding and other support measures should be available for prototype and pilot systems, to accelerate the process of helping these technologies to become operational, and thereby attract private sector funding.*'

- A number of respondents recommended that a net metering scheme, which could facilitate *inter alia* private RE systems, should be developed and supported. Meitheal na Gaoithe proposed that simple net metering should be introduced '*for all renewable energy generators < 100 kW MEC*'.

[13] IWEA

[14] Aitricity

- A number of participants requested enhanced tax relief for RES-E projects. OpenHydro submitted that it '*would welcome the extension of this [S486B] tax relief to investors in renewable technologies, such as tidal energy, that support and fund the development of technologies to commercial deployment.*'

- Viridian Power & Energy submitted that '*the majority of renewable generators in the Republic of Ireland are contracted to ESB Public Electricity Supplier under the previous AER I – VI schemes. VPE suggests that DCMNR and CER makes the power from these contracts available to other suppliers by a 'green VIPP' scheme that is competitive in the retail market.*'

- Viridian Power & Energy and NIE expressed interest in green tariffs for consumers.

- WWF NI suggested that '*the administrations in each jurisdiction could make a firm commitment for all government buildings to be 100% supplied by renewables*.'

- Thermomax and the Energy Saving Trust set out the benefits of information and awareness raising campaigns.

The Energy Saving Trust maintained that '*supporting policies should to establish a clear long-term framework that provides sufficient certainty and market confidence to prospective developers, manufacturers, installers and purchasers to invest in the technology.*'

2.14 Q14. What are the principal obstacles for RES-E penetration to 2020? How can they be addressed?

Respondents cited a range of obstacles to RES-E penetration in their submissions, many of which have been addressed in detail in other publications. This section briefly summarises some of the key obstacles listed that are relevant to the longer term (2020) deployment of RES-E in NI and ROI.

2.14.1 Planning

Several respondents, particularly those with interests in the wind sector, identified difficulties in securing planning permission for RES-E projects and associated network infrastructure as a potentially serious obstacle to delivering significant amounts of wind based RES-E by 2020. Airtricity submitted that '*the current planning permission validity period of five years is inadequate when the system operator takes several years to issue grid offers and a further 3-10 years to build the necessary grid infrastructure to enable firm network access. Airtricity would contend that all planning permission durations for renewable plant should be extended to fifteen years duration.*' Another

respondent recommended the introduction of '*planning guidelines for smaller scale developments and a more positive planning approach to renewable energy.*[15]'

Several respondents elaborated on perceived planning obstacles in NI, where the RSBP stated there is an '*increasing public anti-wind farm feeling*'. Airtricity highlighted '*the absence of deadlines for notified parties to respond to planning applications [which] ensures that it can take 1 - 3 years for the planning process to run its course.*' A number of relevant recommendations were submitted '*to ensure timely delivery of renewable projects without undermining the challenge processes necessary to protect broader community and environmental objectives.*'[16] These included:

- The development of a planning policy statement in NI that is equivalent to the draft planning guideline in place in ROI and which should be accompanied by '*a strategic locational framework for renewable energy developments*' (RSBP);

- The introduction of a planning process similar to that used '*in Denmark for wind energy where each municipality is expected to identify areas within its boundaries where wind farms can be developed*' (WWF NI);

2.14.2 Grid Connection

The extended length of time required to secure a grid connection was widely cited as an obstacle to RES-E development in ROI. Several developers also highlighted the absence of a clear system or methodology in ROI to deal with applications submitted after December 2003. Metheal na Gaoithe called for '*simple grid connection protocols and options for renewable energy generators up to 2 MW*' and for grid connection costs to be recovered by the network systems operator through use of systems charges over the lifetime of the asset.

2.14.3 Other Barriers

- ESB Networks identified a requirement to '*to improve the reliability of the various forms of renewable generation, so that it reaches levels of reliability that can allow the system operators of the transmission and distribution systems on the island of Ireland to defer capital investment.*'

- Airtricity cited the '*mindset of system operations conditioned to operate large centralised energy flows*' as a major obstacle. Viridian Power & Energy submitted that '*system operators need to be adequately incentivised to ensure they are motivated to find the optimum solutions to challenges as they arise.*'

[15] Donall Mac An Bheatha

[16] Viridian Power & Energy

- Several contributors identified the importance of ensuring that market rules developed for the new Single Electricity Market (SEM) do not place any additional barriers on deployment of RES-E and that they are specifically designed to support RES-E. Bord Gáis Energy Supply added that the balancing mechanism applied to wind energy in the SEM should be consistent with the Top-Up 1 mechanism (ROI) or the existing ROF principle (NI). NIE submitted that the SEM rules should not '*discriminate against or unduly favour renewable energy development.*'

- In terms of co-firing peat stations with biomass, Edenderry Power set out a number of obstacles including the high cost of retrofitting Flue Gas Desulphurisation (FGD) to accommodate certain agricultural wastes and some constraints imposed by the fuel supply and purchase agreements in place at their facility.

- Comhar LEADER na hÉireann (CLÉ) maintained that an '*overly restrictive ban imposed by the Department of Agriculture and Food on the spreading of 'animal byproduct' derived materials on food producing land…is having the knock-on effect of inhibiting the development of biogas plants.*' CLÉ suggested that the government's regulations can be relaxed in this area and still comply with the Animal By-Products Directive.'

- A number of respondents argued that the regulatory, fiscal and structural environment is not sympathetic to small scale or local, embedded generation in ROI. CLÉ put forward a number of proposals in the area of connection policy that would facilitate the connection of small scale, embedded RES-E.

- The Energy Saving Trust identified the poor commercial non-viability of most microgeneration technologies due to low production volumes. The Trust submitted that '*clear and ambitious long term commitment targets and pump priming funding (grants) would help industry invest to overcome these barriers*.'

2.15 Q15. What are the impacts of increased RES-E on the power system and operation? How can they be addressed?

As with their responses to question 14, participants set out a wide range of impacts of increased RES-E on the power system. Several submissions included detailed assessments of these impacts. Only a very brief synopsis of some key impacts is provided here.

ESB submitted that '*it is important to recognise that that the anticipated full benefits of RESe development may not be always realised. In this regard the policy framework needs to acknowledge…the diminishing ability of further incremental wind generation to contribute to the capacity adequacy of the Irish electricity system.*'

2.15.1 System Operation

Both NIE and ESBNG provided background on the impacts of increased RES-E, and of increased wind generation in particular, on the system(s), including on frequency control and voltage control. Hibernian Wind Power set out some of the ramifications of the impacts of wind generation for system operation, including:

- '*A premium on accurate forecasts of wind power output a day or two ahead*
- *A similar premium on the confidence levels associated with such forecasts, particularly in relation to the timing of large changes*
- *Appropriate factoring of wind forecasts into unit commitment and economic dispatch algorithms*
- *The need for more advanced algorithms to ensure the most economic dispatch of ancillary services such as short-term reserve having regard to all non-wind plant including pumped storage and interconnectors*
- *The need for advanced algorithms to determine the economically optimal application of curtailment and constraint.*'

Several respondents identified the requirement to expedite the implementation of innovative solutions to allow the increased penetration of RES-E in small synchronous systems.

Viridian Power & Energy noted '*that the operation of the Turlough Hill pumped storage facility has a significant impact on balancing services and reserve in the market.*' A number of respondents suggested that the benefits of adding additional pumped storage capacity on the island, including a 230 MW project originally proposed for Camlough, Co. Armagh in the 1970s should be considered.

2.15.2 Allocation of Costs

Several contributors made submissions regarding the allocation of grid connection and system operation costs, as follows:

- ESBNG identified that '*there will be a need for clear rules governing curtailment.*' Bord na Móna submitted that '*whatever policy instrument is chosen it must ensure that RES-E is either not constrained in its output or if constraint is to be a feature of the system that there is appropriate compensation for it. Such compensation, were it to be the selected option, would need to ensure an equal level of return on projects as would be the case without any constraint.*'
- Bord Gáis Energy Supply set out that '*generation which is located at inefficient grid sites should make higher contributions towards system costs*.'
- NIE expressed the view that '"*green" generators should bear the same components of the cost of connection as any other generator and to the extent that certain*

technologies create additional system operational costs, the cost should be reflected back to the generator such that investors can make the most economically rational decision.'

- Viridian Power & Energy argued '*that costs should be apportioned to generators who create the need for these costs.*'

2.15.3 Generation Mix

It was widely acknowledged among respondents that the type, specification, size, location and timing of new non-RES-E plant additions to the system(s) and the retirement of existing non-RES-E plant from the system(s) will have significant impact on the ability of the island to accommodate large amounts of RES-E capacity. Many respondents believed that RES-E policy must strive towards the attainment of an optimum portfolio of plant (including interconnection and grid infrastructure).

Several participants stated that the effects of different generation mix on RES-E penetration in Ireland must be studied in detail in the short term. The results of this assessment should be incorporated into the RES-E policy. Airtricity added that '*specific policy, backed by expert scientific research, is urgently required in this area. Although this issue has been largely side-stepped historically, partly due to its technical and political complexity this is the key item that needs to be addressed in the 2020 vision.*'

Several respondents from the wind industry highlighted their view that appropriate signals should be put in place to ensure that any new plant added to the system(s) should be compatible with the deployment of more RES-E, '*especially in the context of reserve capacity*'[17]. Bord na Móna elaborated a common view in the sector that '*CCGT may still be the cheapest new entrant, on an individual plant basis, but it is no longer the 'best' new entrant in a system context. Where conventional plant is required, the policy should favour flexible plant that complements intermittent renewables to the benefit of the entire system and the customer in the long term.*' Open cycle gas turbine (OCGT) technology was cited in several submissions as being '*more appropriate [in] meeting the requirements of a system with large scale wind penetration*'[18].

ESB pointed out that the '*savings in emissions from operating wind farms may not be as large as anticipated due to additional emissions that will result from running conventional plant in a sub-optimal way so that they can provide fast acting back-up to the variable output of wind farms.*'

[17] IWEA

[18] ESB

2.15.4 Grid Development

Bord na Móna proposed that '*there should be a presumption in favour of RES-E projects and grid infrastructure planning and the application process itself should reflect this.*' Both Hibernian Wind Power and the IWEA submitted that the system operators should plan ahead for RES-E electricity generation in a similar manner to demand, and that the governments should give them the mandate to proceed with the investment. '*This would allow a more cost effective approach to grid connection and is essentially the logical extension of the clustering approach currently being implemented in ROI.*'[19] Hibernian Wind Power added that '*a pipeline of grid developments needs to be commissioned forthwith to come on stream at a pace to match the optimum pace of wind development. ESBNG and SONI should produce a prioritised, timed and costed list of strategic developments aimed at accommodating large amounts of wind capacity in those areas of the country which have been highlighted by major concentrations of capacity in the grid connection application process. If necessary, the mandate of the TSOs should be extended to include such development.*'

ESBNG maintained that '*any policy adopted should set a clear strategic direction to enable the system operators to plan and implement in a timely manner the infrastructure developments required.*' IWEA echoed this view by identifying the requirement for the necessary preparatory work, including '*design and costing studies for infrastructural improvement and capacity replacement*' to be expedited and '*adequately funded*.'

A number of wind energy developers called for a revision of the Transmission Planning Standards to '*avoid imposing uneconomic and unrealistic demands*' on wind generation.

In terms of specific grid developments, the Hydraulics & Maritime Research Centre at UCC outlined '*the potential to make a significant subsea link at the mouth of the Shannon Estuary connecting into the Moneypoint power station where the 400 kV lines run to Dublin. The creation of such a "hub" will encourage developers to install wave energy devices in Ireland.*'

2.16 Q16. What are the implications for future of different scales of RES-E (e.g. distributed generation vs. large scale wind)?

Several respondents supported the concept of a diversified portfolio of plants, citing the benefits to be gained from both large and small plants on the system(s).

Hibernian Wind Power submitted that '*economies of scale are likely to significantly favour large scale wind developments over distributed generation. Furthermore, the incremental environmental impact – in terms of visual and landscape amenity – of wind turbines in large-scale developments are much less than those of wind turbines in spatially distributed smaller developments. Therefore, within the context of developing RES-E policy per se, no grounds for seeking specifically to plan for or facilitate smaller-scale developments are apparent.*'

On the other hand, several participants extolled the benefits of small-scale embedded or distributed projects in terms of grid stability, environmental impact, public acceptance,

[19] IWEA

rural development, synergies with waste management, employment and access to an economic fuel supply (biomass) – '*the most favoured way forward for an all island renewable energy market would be for the development of small scale generators where practical and economically possible.*'[20] However, ESB Networks cautioned that '*the clustering of small wind connections has a similar impact on the system as a single large wind farm*' and ESB added that '*the full potential of distributed generation may not always be realised. Advantages of distributed generation in meeting local demand and thus reducing line losses are very much reduced where these facilities are built in decentralised but remote locations where there is little or no local load demand.*'

NIE acknowledged the widely perceived benefits of distributed generation but warned that '*if a large proportion of demand was met by output from generators less than 5 MW it may become difficult to balance the energy system because, with current facilities, there would be a lack of information and control.*' ESBNG also noted that '*high levels of distributed generation are likely to require substantial re-engineering of distribution networks and also to require a much greater investment in communications and control infrastructure than would be required for larger scale installations. Furthermore, at higher levels of distributed generation there may be increased losses and a need for network investment to accommodate the generation. The balance between distributed and large scale generation should be included in the scope of a comprehensive analysis of policy options.*'

ESBNG submitted that a significantly increased levels of RES-E '*will require a wide range of complementary actions to ensure satisfactory integration into the power system. These could include:*

- *Investment in major transmission infrastructure developments to cater for the resulting changes in power flows;*
- *Introduction of new approaches to system operation and control, with a need for investment in new communications and control facilities and decision support mechanisms.;*
- *Possible re-configuration of distribution systems to cater for increased levels of embedded generation.*

These and other measures will require substantial levels of investment which must ultimately be borne by electricity consumers. The policy which is ultimately adopted should set a clear direction such that the TSO, DSO and other agencies can adopt plans in the confidence that the associated investments are justified and are unlikely to be "stranded".'

ESBNG added that '*it is crucial that embedded generation (wind or other RES-E sources) complies with the relevant Grid or Distribution Code. Non-compliance increases the burden on the compliant units. This makes the safe operation of the system dependent on fewer units and consequently is more costly.*'

[20] Invest NI

2.17 Q17. How should the costs and benefits of RES-E electricity be measured and quantified?

Several respondents submitted that the costs and benefits of RES-E electricity should be measured and quantified in a holistic manner, '*accounting for the wide range of direct and indirect costs that apply to both conventional thermal generation and RES-E so that a clearer picture of the cost benefit can be built up.*'[21] CER submitted that the analysis should take account of:

- *'Reductions in greenhouse gas emissions associated with increased penetration of renewables, given the impact on emissions from conventional plant running at lower efficiency levels;*
- *The on going costs associated with existing support mechanisms such as AER schemes I to VI;*
- *Reductions in the capacity credit due to wind as total installed wind capacity increases;*
- *The impact on the economics of conventional plant of increased levels of renewables on the system, including impact on bidding behaviours and thus on electricity prices;*
- *The impact of various policy measures on the economics of renewable plant (e.g, emissions trading) and thus the necessity for support/requirement for flexible support mechanisms to take account of such impacts going forward;*
- *The potential for co-firing with renewable fuel at existing stations versus the requirement for new build;*
- *The magnitude of wind constraining as installed wind capacity on the system increases;*
- *System upgrade costs associated with increased renewables penetration; and*
- *The estimated annual cost to the final electricity customer of various penetration levels.'*

Contributors proposed a wide range of factors that should be considered when assessing the costs and benefits associated with RES-E in Ireland. Some of the additional factors cited include *inter alia* the cost of Kyoto fines, other environmental costs such as cost of emissions contributing to acid rain and impacts of visual intrusion, the macro effect of reduction in imports of fossil fuels through security of supply, hedging against volatile fossil fuel prices , employment generated, possible reduction in security of supply in real

[21] Bord na Móna

time operations due to variability, possible power quality degradation, subsidies for fossil fuels and impacts (positive and negative) on habitats and species.

2.18 Q18. What are the costs and benefits of increased RES-E penetration in the island of Ireland?

Very few respondents provided actual costed estimations of the costs and benefits of increased RES-E on the island. Relevant extracts from the submissions of those that did are included below.

In their submission IWEA set out a range of anticipated external environmental costs associated with CO_2, SO_2 and NO_X emissions from fossil fuel generation, including a figure of €4.65 /MWh for gas-fired CCGT (BAT). IWEA also quantified some of the benefits to the economy attributable to RES-E:

- '*Government revenues for foreshore leases for offshore wind (€0.0018/kWh)*
- *Value of increased security and less exposure to volatile energy, and particularly gas, prices (€0.0015/kWh)*
- *Rents and royalties, and employment for onshore wind (€0.0025/kWh)*
- *Employment for offshore wind (€0.0012/kWh)*
- *Employment during construction (€0.001/kWh)*
- *Future value of R&D (€0.0016/kWh)*'

The Marine Institute included an assessment of the potential economic benefits of ocean energy in its submission. This assessment indicated that '*the projected outline for the development of the industry resulting in 200 MW of installed capacity in 2020 would support the creation of 1,125 jobs in the economy by that year. The analysis also suggests that a supported programme where the price paid for the energy is around 10c per kWh would produce positive returns to the economy.*'

Airtricity submitted that '*by using accepted financial portfolio risk methodology, the benefit of increasing penetration of wind to the system (in Scotland) is a 5-10% reduction in electricity prices with a 30%+ wind generation penetration.*'

2.19 Q19. What work streams should be included in a work programme to facilitate RES-E goals?

Respondents suggested a wide range of useful recommendations for work streams to be incorporated into a work programme to facilitate RES-E goals. The suggestions included

holistic policy studies, detailed cost benefit analyses, specific studies, specific Infrastructure developments, assessments & modelling of complex system operations and fundamental research, development and demonstration.

The CER suggested that a forum similar to the Renewable Energy Development Group (the REDG) with representatives from stakeholders from both jurisdictions should be established at an early date to agree a work programme and expedite efforts in this area. On a similar theme, DARD proposed that '*in setting out the future work programme and deliverables, consideration should be given to the establishment of a multidisciplinary team of leading researchers to carry out regular reviews of developments of all aspects of renewable energy on an all-island basis.*'

The Department of Finance (ROI) proposed that '*the 2020 Vision should be 'rolled over' at least every three / four years to take on board changes affecting any of the key variables underpinning policy in this area.*'

3.0 Summary & Conclusion

Some of the key points set out in the responses include:

- There was general agreement among all of the respondents for the requirement for a holistic approach and 'joined up' policy implementation between relevant Departments and Agencies A number of respondents reasoned that a RES-E policy should form part of an overall energy policy; a subset of these respondents specifically called for an all-island energy policy.

- Several participants cited differences in the current regulatory and legislative framework in NI and ROI that result in different opportunities and obstacles in both jurisdictions.

- There was general consensus that enhanced interconnection could deliver potential benefits to RES-E in Ireland. However, there were differing views with regard to how interconnection should be operated.

- Respondents submitted a range of 2020 all-island generation levels for RES-E – levels ranged from 20% of gross electricity consumption to well over 50%.

- Respondents' views differed considerably on the question of whether NI and ROI should seek to lead in any RES-E technologies

- Respondents also submitted divergent views with respect to the scale and type (technology) of RES-E plant that should be promoted on the island.

- The majority of respondents expressed support for an NIRO-type mechanism to be implemented throughout the island. Others submitted their preference for a Feed in Tariff in an open ended scheme as the primary policy mechanism.

- A range of supporting policies were suggested to facilitate RES-E deployment and particularly to support less mature RES-E technologies.

- It was widely acknowledged among respondents that the type, specification, size, location and timing of new non-RES-E plant additions to the system(s) and the retirement of existing non-RES-E plant from the system(s) will have significant impact on the ability of the island to accommodate large amounts of RES-E capacity.

- Respondents identified several obstacles to RES-E deployment, including those associated with planning, grid connection, system operation, grid development as well as some legislative constraints.

- Several respondents submitted that the direct and indirect costs and benefits of RES-E electricity should be measured and quantified in a holistic manner.

- Respondents submitted a wide range of useful recommendations for work streams to be incorporated into a work programme to facilitate RES-E goals. A number of respondents suggested that some form of all-island forum should be established to co-ordinate the work programme.

Annex 1: Lists of Respondents

Respondent	DCMNR	DETI
Airtricity	Y	Y
Biofuels Northern Ireland		Y
Bord Gáis Energy Supply	Y	
Bord Na Móna	Y	
CER	Y	
Comhar Leader na hEireann	Y	
Competition Authority	Y	
Conodate	Y	
DARDNI		Y
Department of Finance	Y	
Donal Mac An Bheatha		Y
Donegal County Development Board	Y	
Edenderry Power Limited	Y	
EPA	Y	
ESB	Y	
ESB International	Y	
ESB National Grid	Y	
ESB Networks	Y	
ESBIE		Y
EST Northern Ireland		Y
Hibernian Wind Power	Y	
IBEC-CBI Joint Council	Y	
IEE		Y
Invest NI		Y
IWEA	Y	
Marine Institute	Y	
Meitheal na Gaoithe	Y	
NIE		Y
NUI Maynooth	Y	
Ocean Energy Ltd	Y	
Openhydro	Y	

Respondent	DCMNR	DETI
Phoenix		Y
RSPB Northern Ireland		Y
Thermacad		Y
Thermomax		Y
UCD		Y
University College Cork	Y	
University College Dublin	Y	
University of Limerick	Y	
Viridian	Y	
Wavebob Ltd	Y	
WWF Northern Ireland		Y