County Development Plan Review

Energy

Background Paper

November 2012

Planning Policy Unit
Cork County Council

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Note: Although November 2012 is the cover date on this document the data used to inform the document was largely collected in late 2011 and throughout 2012.

1.0 INTRODUCTION

1.1. This background study will be used to identify the key issues and principles which could be considered in the preparation of an approach to Energy including Renewable Energy for inclusion in the next draft county development plan.

1.2. This document sets out the following;

- The key information on the Energy Resources, Energy Infrastructure and Reserves in the County.
- The background and approach to wind energy development.
- A general approach to the development of other renewable energy projects in County Cork.
- A summary of the national and regional policy background

1.3. Energy generation and energy related activity in Cork is likely to change significantly over the coming years as the oil finds in Cork become operational and as the move to a low carbon economy increases. It is the study, its policies and objectives, contained within that draft county development plan which will set the strategic framework for assessing the future development consent of the various energy and renewable energy projects.

1.4. The development of an Energy Study provides useful background information which could help to position County Cork to support and take full advantage of the opportunities that will arise from the emerging energy and renewable energy sector in terms of sustainable jobs and contribute to the move to a competitive low carbon Green Economy.

EU and National Policy Context

1.5. There are numerous Policy and Legislative documents emphasising the importance of Renewable Energy including 'The EU Climate and Energy Package 2008'; 'EUROPE 2020 Strategy'; 'Delivering a Sustainable Energy Future for Ireland – The Energy Policy Framework 2007-2020'; 'National Climate Change Strategy 2007-2012'; 'National Energy Efficiency Action Plan 2009-2020', the 'Bioenergy Action Plan' the 'National Renewable Energy Action Plan, 2010' and the 'Strategy for Renewable Energy 2012 – 2020'.

1.6. The National Renewable Energy Action Plan (NREAP) sets out the Government's strategic approach and concrete measures to deliver on Ireland's target of 16% of the national gross final consumption of energy comprising energy from renewable sources by 2020 (under Directive 2009/28/EC). The Government plans that by 2020 the overall binding target will be delivered by approximately:

- 40% consumption from renewable sources in the electricity sector (RES-E),
- 12% of energy consumption in the heat sector from renewables and
- 10% of transport energy from renewables .

1.7. It is important therefore that Cork County sets out its ambitions with regard to renewable energy in this context and shows their ability to help contribute to these targets.

1.8. The Sustainable Energy Authority of Ireland (SEAI), Ireland's national energy authority, published a draft manual for public consultation 'Methodology For Local Authority Renewable Energy Strategies' in June 2012 to act as a guide to assist local authorities in the preparation of their Renewable Energy

strategies. This document states that it may be useful for local authorities to carry out the development of renewable energy strategies when reviewing county development plans and wind energy strategies and to incorporate the strategy in part into the county development plan. This Strategy has been developed having regard to the draft SEAI Manual 2012 and the Wind Energy Guidelines 2006. The general approach and methodology recommended in the Wind Energy Guidelines, 2006 and in the Draft Methodology for Local Authority Renewable Energy Strategies' 2012 is similar. The most accessible methodology for performing this task is the 'sieve' methodology outlined in Wind Energy Development, Guidelines for Planning Authorities published by the Department of Environment, Community and Local Government (2006). It is considered that the robustness of the methodology is such that it can be transferred to other types of renewable energy.

1.9. The development of GIS datasets and mapping allows the local authority to then transparently show prospective developers areas where renewable energy development may be most appropriate. It also allows the local authority to illustrate what types of receptors are considered particularly sensitive or valuable within the jurisdiction.

Regional Planning Guidelines 2012-2022

1.10. The Regional Planning Guidelines 2010-2022 for the South West Region provide a planning framework for the future physical, economic and social development of the Region. The Energy section of the RPG notes that the principal energy resources of the region comprise:

* The region's natural gas resource including an extensive associated pipeline network; The ConocoPhillips oil refinery at Whitegate, County Cork; Major thermal electricity generating stations at Tarbert, County Kerry; Aghada/Whitegate,County Cork and Cork City Docklands;

* Inniscarra hydro-electric scheme, County Cork;

*A growing network of wind powered electricity generating stations in both Cork and Kerry.

*A modern electricity distribution grid serving the region

1.11. The RPG notes that at present the electricity network in the region is at or near capacity and there will be difficulties in servicing major increases in demand and maintaining normal international standards of supply if significant investment is not progressed. Part of this involves an improvement in the capacity to take renewable energy into the National Grid and to build more network resilience through improving the electricity grid connectivity into adjoining regions.

1.12. Demand for electricity in the region is expected to rise by 60% by 2025. Wave and wind technologies are expected to play a significant part in meeting additional demand with excess renewably generated power being exported through an enhanced transmission grid to other regions within the state.

1.13. The SWRA Regional Bioenergy Plan 2009-2020 supports the development of bioenergy resources as a means of displacing or substituting fossil fuel in transport and heating operations and the Plan also supports the designation of the Whitegate area of County Cork as a National Bioenergy Energy Development Area. The Renewable Energy section of the RPG notes that the region has a key role to play in the attainment of the national renewable energy target of 40% supplied via renewable energy by 2020.

1.14. Within the region, the Regional Planning Guidelines support the sustainable development of renewable energy generation subject to the sustainable development of local areas and the protection of areas of high scenic amenity. Possible effects on Natura 2000 Sites, including effects on water supply and hydrology, wildlife disturbance, habitat loss and species mortality associated with collisions should be an

essential consideration when planning for renewables and these should be considered at the local or project-level stage.

Wind Energy Development, Guidelines for Planning Authorities 2006.

1.15. The current 2006 Wind Energy Guidelines supersede the Wind Farm Development Guidelines of 1996 issued by the Department and are the current statement of government policy on wind energy. These guidelines relate solely to land use and environmental issues related to on-shore wind energy. Offshore wind farms are excluded from the provisions of the P&D Act 2000.

1.16. The Guidelines aim to offer advice to Planning Authorities on planning for wind energy through the Development Plan process and in determining planning applications. They also provide a sample methodology for the identification of suitable locations for wind energy development within their boundaries and the treatment of planning applications for wind energy proposals, see Appendix 1.

2.0 ENERGY RESOURCES IN CONTEXT

The National Energy Picture

2.1. Currently the vast bulk of Irish energy comes from imported fuels – coal, oil and gas. The main exceptions are peat and renewables. As shown in Figure 1 these domestically sourced energy sources accounted for only a small share of the primary energy used in Ireland in 2009 with the overall breakdown of energy sources as follows; 52% Oil ; 29% Natural Gas ; 8% Coal ; 6% Peat ; 4% Renewables (Total) ; 1% Electricity Imports.

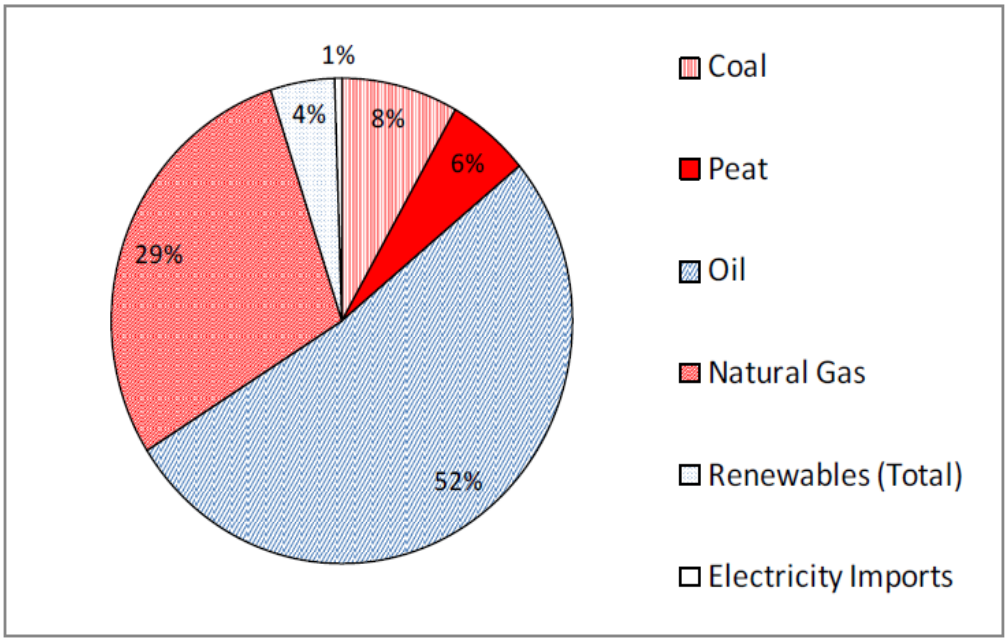


Figure 1: Source of Primary Energy, 2009, % by Fuel Source
(Source: SEAI, 2010, Energy Forecasts for Ireland to 2010, Dublin)

2.2. Ireland is very dependent on having readily available sources of supply of oil and gas. Even with some increase in renewables over the coming decade, this situation is not expected to change significantly in the period up to 2020 (A Review of Irish Energy Policy; John Fitzgerald ESRI April 2011; Devitt et al., 2010).

2.3. As shown in Figure 2, gas accounts for the bulk of fuel used to generate electricity in Ireland. In 2009 almost 57 per cent of all electricity generated in Ireland came from gas. Coal and peat together accounted for just over 23 percent of electricity generated and imports accounted for 2.7%. Renewables (including hydro) accounting for just over 14 per cent of the total. Therefore, Ireland is very dependent on imported gas to supply its electricity needs.

2.4. Natural gas has revolutionised energy usage in Ireland. It is the most environmentally friendly of all fossil fuels and requires no refining and minimal processing before use. Bord Gáis owns and operates 13,150km of gas pipelines, including the two sub-sea interconnectors with Scotland from where Ireland gets over 93% of its gas supplies.

2.5. In 2009, the share of electricity generated by Fuel Used, % ; 56.9% Gas ; 14% Coal ; 14.1% Renewables ; 9.2% Peat ; 3.2% Oil ; 2.7 % Imports ; (Source: SEAI, 2010, Energy in Ireland, 1990-2009, Dublin.

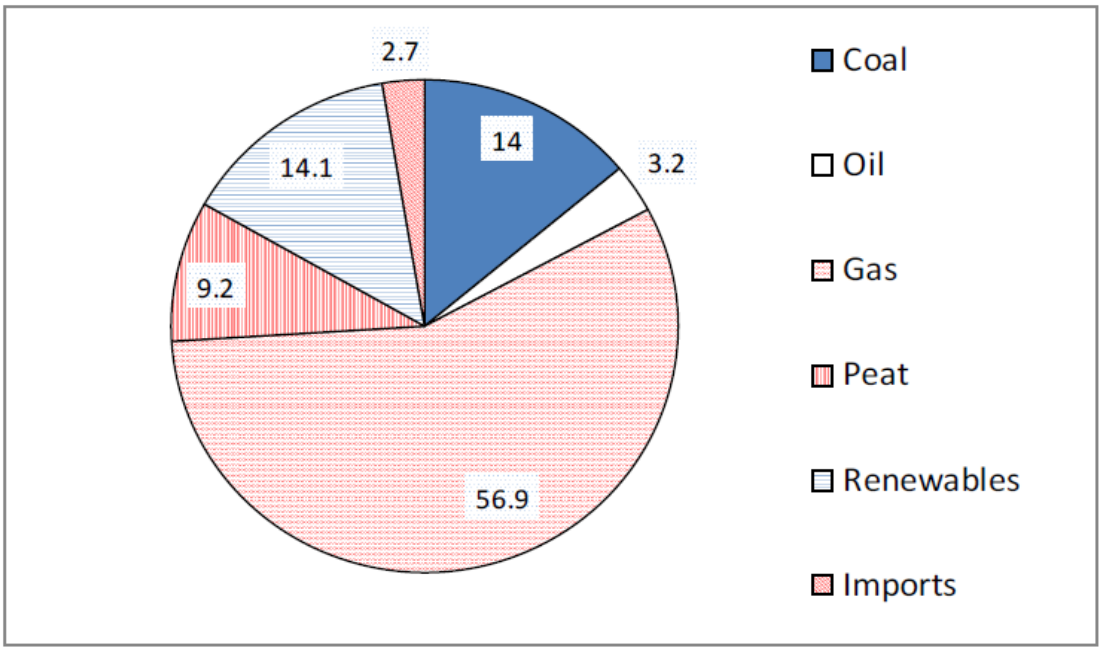


Figure 2: Electricity by Fuel, 2009, Share of Electricity Generation by Fuel Used, %.
Source: SEAI, 2010, Energy in Ireland, 1990-2009, Dublin.

2.6. Ireland's import dependency was 86% in 2010, down from a peak of 90% in 2006.

2.7. Natural gas has revolutionised energy usage in Ireland. It is the most environmentally friendly of all fossil fuels and requires no refining and minimal processing before use. Bord Gáis owns and operates 13,150km of gas pipelines, including the two sub-sea interconnectors with Scotland from where Ireland gets over 93% of its gas supplies.

2.8. Since 2007, Ireland's economy has contracted by 10%, returning in 2010 to 2005 levels. Energy demand has reduced by 9% to 2003 levels and energy-related CO2 emissions have fallen by 12% to 2000 levels. (Energy in Ireland 1990 – 2010, 2011 Report SEAI).

2.9. The importance of renewable energy should not be unstated and the contribution of renewable to overall energy demand rose from 2.3% to 3.9% between 1990 and 2008. The provisional 2009 figure is 4.7% and Ireland's target is to achieve 16% by 2020 under Directive 2009/28/EC.

2.10. Renewable electricity contributed 2.2% to the Directive target in 2008 (2.8% in 2009). Renewable transport energy contributed 0.4% in 2008 (0.5% in 2009) and the renewable heat contribution was 1.4% in 2008 (1.6% in 2009). (SEAI Renewable Energy in Ireland, 2010 Update).

2.11. Renewable energy can be defined as energy developed from sources that are constantly replenished through the cycles of nature and, unlike fossil fuels, are not finite. Energy contributes to three sectors – electricity, heating and transport. Ireland's National Renewable Energy Action Plan (NREAP), 2010, sets out the contribution envisaged from renewable energy in each of the three sectors, with the electricity sector

playing the most significant role.

2.12. Wind (onshore and offshore) and solar photovoltaic are used to generate electricity, hydro, wave and tidal have potential to do so in the future. Geothermal and biomass (Anaerobic Digestion AD) can be harnessed to contribute to both heat and electricity. Thermal solar energy is generally used for water and space-heating. Biomass is particularly useful for the heat sector (e.g. biomass based district heating, wood chip boilers etc), but can also be used to generate electricity. Biofuels and biodiesel contribute to the transport sector.

2.13. In 2010, gross final energy use from renewable energy was 5.5%. Ireland's target under EU Renewable Energy Directive is to achieve a 16% renewable energy penetration by 2020.

2.14. Electricity generated from renewable energy reached 14.8% of gross electricity consumption in 2010. The national target for 2010 was 15% of electricity consumption generated by renewables and the EU target was 13.2%. Ireland's target for 2020 is 40%.

2.15. Renewable energy contribution to thermal energy (RES-H) was 4.4% in 2010. Ireland's target for 2010 was 5% and the longer-term 2020 RES-H target is 12%. (Energy In Ireland 1990 – 2010, 2011 Report – SEAI).

2.16. Renewable energy in transport (RES-T) reached 2.4% in 2010. Ireland's target was 3% by 2010 and is 10% by 2020.

2.17. Energy-related CO2 emissions in the non emissions trading sectors in 2010 were 5.4% below 2005 levels. Ireland's target is to achieve a 20% reduction in total non- ETS emissions by 2020 relative to 2005 levels.

2.18. Renewable energy accounted nationally for 35% of indigenous energy production in 2008. In absolute terms the total final consumption of renewables doubled between 2003 and 2008 (20% annual average growth), largely due to the increasing contribution from onshore wind energy.

2.19. The existing transmission network and proposed upgrade projects will provide for the collection and distribution of significant amounts of electricity generated from on shore wind energy and other sources of renewable energy as they start to come on stream in significant quantites.

2.20. It is recognised that onshore wind energy is best placed to achieve national targets for the consumption of electricity from renewable energy and it is an objective of the planning authority to continue to support the development of wind energy. This study using the methodology set out in various guidelines has identified the key policy considerations that need to be taken into account in preparing a new Wind Energy Strategy and a Renewable Energy Strategy for inclusion in the draft County Development Plan.

Energy in County Cork

2.21. Cork plays a strategic role in Energy Provision in Ireland. Currently, 25 per cent of all national energy needs are produced in one square mile in Whitegate and 90 per cent of the oil reserves held in Ireland are stored in the Cork region.

2.22. Energy generation and energy related activity in Cork is likely to change significantly over the coming years as the oil finds in Cork become operational and as the move to a low carbon economy increases.

2.23. Cork accounts for 12-13% of Ireland's energy use and Cork accounts for (in 2010) 24% of Ireland's energy end use requirements (the rest of Ireland produces 21% and the remaining 55% is imported).

2.24. Cork accounts for 19% of Ireland's wind energy (17% of Ireland's installed wind power), 31% of Ireland's oil supply, 14% of Ireland's electricity (20% of Ireland's electricity generating capacity) and 8% of Ireland's natural gas (100% of indigenous gas). (Draft Cork's Energy Opportunity Report and Workplan 2012–2013, February 2012; Energy @ Steering Group).

2.25. The natural gas transmission network in Ireland is operated by Gaslink since 2008. The total transmission network length at the end of 2010 was 2,373 km while that of the distribution networks was 10,856km (Bord Gais Eireann, 2011). The high pressure transmission network conveys gas from two entry points (at Inch and Moffat) to directly connected customers and distribution networks throughout Ireland, as well as to connected systems at exit points in Scotland (the Scotland-Northern Ireland Pipeline) and the Isle of Man. The Moffat entry point, located onshore in Scotland, connects the Irish natural gas system to that of Transco in the UK, and allows for the importation of UK gas to Ireland but not exportation of gas from Ireland to the UK. The Inch entry point, located in Cork, connects the Kinsale and Seven Heads gas fields and the Kinsale storage facility to the onshore network. The Irish system has three compressor stations, Beattock and Brighouse Bay in southwest Scotland, and Midleton near Cork.

2.26. According to the latest forecasts from Bord Gais Eireann's annual report, Ireland's transmission network infrastructure has the capacity to transport the anticipated gas demand to all end consumers in 2010 and beyond. In the long term there will be an increasing reliance on the interconnectors to access European gas sources. The traditional sources of the Dutch and UK sectors of the North Sea are in decline and future gas supplies are projected as being delivered from more distant fields such as the northern Norwegian sector or via Liquefied natural gas (LNG) from outside the EU.

2.27. Ireland has one gas storage facility - off the south west coast at Kinsale. This facility has the capacity (depending on the levels of gas held in storage at any given time) to supply 48% of protected customers for up to 50 days, which equates to 10% of annual demand. The Kinsale facility currently has a working volume of circa 218 million cubic metres (Mm3), which is equivalent to approximately 4.2% of Ireland's annual gas consumption in 2009. Gas imports from Great Britain are used to refill the storage facility at Kinsale in addition to site production. The operator of the facility is currently examining the feasibility of developing additional storage at the site. (Energy Security in Ireland: A Statistical Overview.2011 Report).

2.28. Increasing gas storage will enhance gas energy security due to a diversification from the dependence on the UK market. Ireland's first storage facility commenced operations in 2001 in the Southwest Kinsale Field. The facility enables gas to be injected (stored) on minimum demand days during the summer months and delivered to the Irish market in the winter when demand is higher. The CER has licensed the facility and it was made available to third parties from 1st June 2006.

Whitegate/Aghada

2.29. Whitegate has a national important role in the energy sector being the location of the country's only oil refinery and also accommodating three power stations. The oil refinery which refines 25% of Irelands oil needs is a major industrial presence in the harbour and is owned and operated by ConcoPhilips Ireland with responsibility for the production of more than a third of Ireland's transportation and space heating fuels.

2.30. The Whitegate refinery (operated by Phillips 66) has the capacity to process about 71,000 barrels of oil a day. Most of the oil it refines comes from the North Sea or North Africa. The company reported a sharp rise in turnover primarily due to the increased costs of crude feedstocks in April 2012.

2.31. Whitegate/Agadha is proposed for an energy park with the overall strategic aims to promote its role as a location for the storage and processing of strategic energy resources, consolidating it's industrial and harbour related roles within this sensitive coastal setting and with limited expansion of residential uses.

2.32. Whitegate – Aghada is designated in the Cork Area Strategic Plan as a strategic industrial location particularly because of the capacity of the area to accommodate large scale industrial undertakings that require either dedicated port facilities, access to large volumes of sea water or strategic access to the natural gas network. Provision is made for both the expansion of existing undertakings and the development of new opportunities when they arise.

2.33. An area south of the existing refinery complex has been identified as a potential location for the storage of further strategic oil stocks on behalf the National Oil Reserves Agency. Operational stocks held at the Whitegate Refinery already form part of the oil stocks held by Ireland in line with its international obligations to maintain 90 day reserves of national strategic stocks.

2.34. The refinery is considered a key national and regional asset in terms of developing bioenergy and is responsible for the production of a significant element of the national bio-fuel substitution target. In 2010, it produced 82 million litres of biodiesel at the plant, benefiting from a tax relief scheme that has since expired.

2.35. Aghada Generating Plant comprises two stations; the first 528MW (Total 1, 2,3 ,4 in table below = 528MW) was commissioned in 1980 with the second 435MW added in 2010.

2.36. In April 2010, the capacity of the station was increased from 528MW to 963MW when a new state-of-the-art 435MW Combined Cycle Gas Turbine by Bord Gais entered commercial operation. The gas-fired plant is one of the most efficient and cleanest plants in Europe and generates enough electricity to supply approximately 8% of power demand in the Single Electricity Market.

Table 2.1 Fossil Fuel Electricity Power Generation in County Cork

Name **Associated Node and Voltage**	**Type**	**MEC (MW)**
Aghada 1 Aghada 220KV	Gas	258
Aghada 2 Aghada 220KV	Gas/ DO	90
Aghada 3 Aghada 220KV	Gas/ DO	90
Aghada 4 Aghada 220KV	Gas/ DO	90
Aghada (Combined Cycle Gas Turbine) CCGT Longpoint 220KV Connection 2010	CCGT	431
Marina Marina 110KV	Gas/DO	112.30

Source: Eirgrid July 2012

2.37. Bord Gáis Energy participates in the Single Electricity Market both as a purchaser of electricity and as a generator of electricity. It is making significant investment in traditional and renewable power generation including, the 445MW gas-fired power station at Whitegate in Co. Cork, operating 218MW of wind generation and is developing gas-fired peaking plants and a significant portfolio of wind farm

developments in various locations throughout the country.

2.38. The most recent wind energy data now indicates that Irelands total wind energy capacity is 2053.16MW generated from 175 wind farms in 26 counties. Corks wind capacity is 283.46MW from 20 wind farms which is approximately 13.8% of the Ireland's overall wind energy. (From IWEA website August 2012).

2.39. Cork has been identified as one of the best located counties in Ireland in terms of on-shore winds. While it may be technically possible to install enough wind turbines in Ireland to meet the future annual total electricity demand of Ireland, given the current technological limitations this would be highly unlikely (IWEA website). This is because Ireland is a relatively small metrological area and there will be times when generation is extremely low due to very low wind speeds and similarly periods where generation exceeds demand. A possible solution to this problem would be to integrate the national grid with a much larger grid such as Europe were electricity could be imported in times of shortage and exported in times of surplus. An East West Intercollector connecting Ireland and Wales commenced this year and is due to transmit power from 2012. However the IWEA suggests that the most likely long term sustainable solution to Ireland's electricity needs would be the contribution provided by other renewable energies such as wave, tidal and biomass in addition to wind energy.

Irish Marine and Energy Research Cluster Ireland

2.40. The Marine and Energy Research Cluster Ireland (iMERC) has been established to promote Ireland and Cork as a world class maritime and energy research and development location. It brings together a critical mass of expertise from UCC and the National Maritime College of Ireland (NMCI), working collaboratively with CIT, the Irish Naval Service and the Port of Cork.

3.0 TRANSMISSION NETWORK

3.1. The national grid is a nationwide electricity transmission network that consists of both overhead and underground high-voltage power cables. Bulk electricity produced from renewable and finite sources is transferred throughout the country via the grid infrastructure, and it is from the associated distribution network that domestic and commercial electricity supplies are obtained. At transmission stations, or transfer points, the generated electricity is converted to a usable voltage for onward distribution to customers.

3.2. Grid25 sets out a government-approved, high-level strategy for developing the necessary transmission infrastructure to support Ireland's national renewable electricity target and, in the long term, a more sustainable electricity supply. Grid25 provides the framework to build a more cost-effective and efficient system to cater for the shift towards the integration of increasing amounts of renewable generation over time. The transmission capacity assumptions informing this grid development strategy are based on the high-level principles of ensuring network safety, security of supply and economic transmission development, while delivering on the renewable target in the years ahead.

3.3. The Grid25 Implementation Programme 2011 – 2016 provides a foundation for more detailed work on specific reinforcements in coming years and will lead to plans for particular projects which will be delivered in consultation with the public and in line with planning legislation. Grid25 is fully consistent with the Gate process for the connection of Renewable Energy in Ireland.

3.4. Grid connection can be either through direct connection to the transmission network (110kV/220kV/400kV), controlled by EirGrid, or to a local distribution system (normally 38kV), controlled by ESB networks and depends on the amount of electricity generated.

3.5. Cork County is very well served by the grid with extensive 220 KV and 110 KV network including a 220kV line extending north/south and a 200KV line extending east/west through the County, a number of 110kV lines and 38kV lines thoughout the County. Recent committed project parameters; Clashavoon – Knockraha 220kv Line Uprate & the East Kerry NW Cork 220 kv Station – New Station.

3.6. Clashavoon – Knockraha 220kv Line Uprate: EirGrid is proposing a new 110kV electricity circuit to connect the existing Clashavoon substation, which is located north-east of Macroom, and the existing Dunmanway electricity substation, which is located on the outskirts of Dunmanway. The proposed development is required to remedy two identified transmission network problems in South West Cork ; Increase Security of Electricity Supply and Facilitate Connection of Renewable Generation. EirGrid submitted a planning application to An Bord Pleanala in April 2012.

3.7. East Kerry NW Cork 220 kv Station – New Station: Clashavoon – Knockraha 220kv Line Uprate: EirGrid is proposing a new 220/110 kV substation which will connect into the existing 220 kV transmission line which runs from Tarbert, Co. Kerry to Clashavoon, Co. Cork, a new 110 kV circuit will be required to connect the proposed new 220/110 kV substation to the planned Cordal 110 kV substation and a new 110 kV circuit will be required to connect the proposed new 220/110 kV substation to either the planned Knockacummer 110 kV substation or the existing Glenlara 110 kV substation.

3.8. To ensure future electrical power needs are met in the south and east of Ireland, EirGrid is investing an estimated €500 million in a new development called the Grid Link project. The project was launched in April 2012 and consists of a new high voltage power line linking Leinster and Munster. It is a vital development for the region and will deliver a wide range of benefits, including: Securing future electricity supply for homes, businesses, farms, factories and communities; Empowering growth in the south and east of Ireland; Helping Ireland to meet its 40% renewable energy targets. The Grid Link project represents a

significant upgrade of the electricity grid and involves the construction of a new power line linking Leinster and Munster. Based on assessments to date, EirGrid has determined that in order to best meet the needs of the south and east, the optimum solution is the construction of a 400 kV Alternating Current (AC) overhead line linking Cork and Kildare via Wexford.

3.9. East-West Interconnector; Eirgrid's East West Intercollector connecting Ireland and Wales commenced this year and is due to start commercial operation from October 2012 and transmit power in 2012. The Inteconnector was officially opened in September 2012 and will integrate the Irish national grid with a much larger grid such as Europe were electricity could be imported in times of shortage and exported in times of surplus.

3.10. The East-West Interconnector will connect the Irish power system to the electricity grid in Britain through undersea and underground cables. This infrastructure is vital to the development of Ireland's economy. The Interconnector will have a capacity of 500 Megawatts (MW) which is enough power to supply approximately 350,000 homes to be transported and traded between Ireland and Britain. The additional 500 megawatts of electricity will also open up a new market for energy exports, particularly exports of Irish wind energy. The Interconnector will cost around €600m, and is on target for completion in 2012. Further potential exists for a second interconnection from the south coast to France or Britain opening up markets for electricity. These inter-connectors could play a significant role in internationalising the Irish energy market and in building an international market place for renewable generation in the South West, by providing a means to export excess generation.

3.11. The Government also made a commitment to ensure that, through Eirgrid's Grid 25 strategy, the electricity transmission and distribution networks can accommodate, in a technically optimal way, targets for renewable generation in Ireland to 2020.

Gate 3 and the Group Processing Approach

3.12. Since December 2004 a Group Processing Approach (GPA) applies to applications for connection offers to the transmission and distribution systems for large renewable electricity generators. This approach to the processing and issuance of applications for connections to the grid (both transmission and distribution) was approved by the Commission for Energy Regulation (CER) following public consultation.

3.13. Under the GPA or Gate process, applications for connections are processed in batches rather than sequentially. Within these batches or 'gates', applications are further divided into groups and sub-groups based on the optimal network required to connect them. This approach is considered more efficient than dealing with applications on an individual basis, where projects which are the subject of such applications interact with each other electrically and where large volumes of such applications exist. The GPA allows for a more strategic view of network requirements and serves to put in place efficient connection solutions to cater for large number of applications and to ensure optimum network development, minimising network costs and, where possible, avoiding network bottlenecks.

3.14. To date there have been 3 'gates'. Under Gate 1 and Gate 2, 1,755 MW of connection offers were made and accepted. Under Gate 3, 3,989 MW of offers have been issued to generators. Gate 3 has been designed to facilitate the delivery of Ireland's binding EU renewables target and government policy in that context, by taking generation connected before the introduction of the GPA and also through the take-up of connection offers under Gates 1 and 2.

3.15. In the short term, the delivery of renewable electricity projects to 2020 will be defined by the current Group Processing Approach, particularly Gate 3 which provides for almost 4000MW of new

renewable generation. The Grid25 implementation programmes being developed by EirGrid are being designed around the rollout of the necessary infrastructure to deliver Gate 3. Decisions relating to the grid are a statutory function of the energy regulator (CER). In the medium to longer term, the Programme for Government, for example, makes a commitment that any future Gates will have to consider other criteria such as planning permission and the location of projects in proximity to grid capacity.

3.16. It should be noted that at present the gate process which offers grid connections for wind development is not integrated with the planning process. Grid connections are offered to developers who have not yet secured a site or a grant of planning. Conversely sites with permission for wind development have not secured an offer of a grid connection.

4.0 THE APPROACH TO WIND ENERGY POLICY

Introduction

4.1. Onshore windfarms currently represent a significant contribution to the quantity of renewable energy generated in Ireland. As of August 2012, Ireland has 2053.16 MW of installed windfarms generated from 175 commissioned wind farms in 26 counties. It is envisaged in the National Renewable Energy Action Plan (NREAP) that in the year 2020, wind energy will contribute 90% of Ireland's renewable electricity target of 5,111 MW. (IWEA website).

4.2. Wind energy is the main focus of public policy for achieving the National Target of 20% of electricity consumed from renewable energy sources by the year 2020 and the planning authority recognises that of the many types of renewable energy, onshore wind development is best placed to deliver significant levels of renewably sourced electricity in the short to medium term.

4.3. However, while the county's theoretical wind energy source is considerable there are environmental, social and economic constraints on the development of wind energy. Such constraints include factors such as landscape, ecology and affects on human habitation. These factors determine the practical capacity of the County to accommodate wind energy developments.

4.4. To deliver this energy, significant resources have been directed at increasing the capacity of the transmission network. The capacity of the grid when upgraded, taken in conjunction with the scale of wind development envisaged by the Commission for Energy Regulation, suggests that the potential for electricity generated by wind is considerable. To deliver this level of development in a manner which is consistent with the proper planning and sustainable development of the county presents the planning authority with significant challenges.

Background to the current County Development Plan Policy

4.5. The Altener Study on 'Wind Energy and the Landscape' 2001 carried out by Cork County Council with its partners was used to form the basis of a methodology for identifying appropriate areas for wind farm development at a county-wide level taking account in particular of wind speeds and landscape considerations. The Altener Study outputs were used to inform the policy and objectives in the Wind Energy Strategy in the Cork County Development Plan, 2003 which included a diagram identifying areas in the County as "Strategic Search Areas" and "Strategic Unsuitable Areas". In all other areas of the county wind energy projects were to be considered on their merits subject to normal planning considerations.

4.6. The 2003 CDP Wind Energy Strategy was carried forward unchanged into the 2009 Cork County Development Plan. In December 2009 the CDP Wind Energy Strategy was varied to allow for consideration of wind energy proposals in the areas referred to in ECON 3-2 for large scale industrial development to be considered on their merits, subject to compliance with Article 6 of the EU Habitats Directive.

4.7. Since the original survey work under the Altener Study was carried out in 2001 two important documents have been published; The Wind Atlas of Ireland, 2003 and The Wind Energy Guidelines, 2006 (DoELG) both of which form the basis of this Wind Energy Policy.

4.8. The Wind Atlas for Ireland was developed by SEAI to map Ireland's wind resource. The Wind Atlas produced GIS data files of mean wind speed and power at heights of 50m, 75m, and 100 m above ground. From these individual digital county wind resource maps were produced. The wind atlas provides a basis for informed strategic decision making related to resource distribution and efficient development.

Wind Energy Development, Guidelines for Planning Authorities 2006

4.9. The current 2006 Wind Energy Guidelines supersede the Wind Farm Development Guidelines of 1996 issued by the Department and are the current statement of government policy on wind energy. These guidelines relate solely to land use and environmental issues related to on-shore wind energy. Offshore wind farms are excluded from the provisions of the P&D Act 2000.

4.10. The Guidelines aim to offer advice to Planning Authorities on planning for wind energy through the Development Plan process and in determining planning applications. They also provide a sample methodology for the identification of suitable locations for wind energy development within their boundaries and the treatment of planning applications for wind energy proposal , see Appendix 1.

4.11. The guidelines set out a step-by-step approach to the development of policy so that all the relevant considerations can be given an appropriate weight in the determining policy. The guidelines suggest that aim should be to set out a policy for the whole County that identifies the following areas:

- Areas of strategic importance for wind energy development;
- Areas where wind energy projects are not normally encouraged; and
- Areas where wind energy projects can be considered and assessed in relation to relevant criteria.

Wind Energy Policy in Adjoining Counties.

Introduction

4.12. The existing wind energy strategies of the four adjoining Counties of Waterford, South Tipperary, Limerick and Kerry were analysed in order to examine how these policies would interact with the existing and proposed policy considerations for wind energy in County Cork.

Waterford County Council Wind Energy Strategy

4.13. The County has been categorised into four classes in the Waterford Wind Energy Strategy as identified on the wind energy map. The classes are as follows: Strategic Areas (Yellow); Preferred Areas (Blue); Areas Open for Consideration (green); and No-Go Areas (Red).

4.14. The main areas considered unsuitable in Waterford's strategy adjoining Cork are around the Blackwater Estuary (near Youghal) and Blackwater River Valley near Ballyduff Upper.

4.15. The lands around the Blackwater Valley to the west of county Waterford which are located between Ballyduff and Lismore are deemed No-Go areas for wind energy development.

4.16. The lands either side of the Blackwater Estuary are designated No-Go areas in the Waterford CDP 2011 -2017. A small section of the most south-westerly tip of county Waterford, north-west of Youghal is deemed Open for Consideration for wind energy development.

South Tipperary County Council Wind Energy Strategy

4.17. The County Wind Energy Policy was adopted by South Tipperary County Council in December 2006. The wind energy policy map shows the classification of landscape for wind energy development: (i) Preferred areas (ii) Areas open for consideration and (iii) No-Go Areas.

4.18. The classification of landscape for wind energy development in South Tipperary discourages wind energy projects in the area of the Knockmealdown Mountains, south of Ballyporeen, to the south east of Mitchelstown.

Limerick County Council Wind Energy Strategy

4.19. Three areas are identified in WES for County Limerick and seem to correspond with the Landscape Character Areas for the county; Areas unsuitable for wind energy development; Preferred areas; and Areas open for consideration. Lands to the south-east of County Limerick including the Ballyhoura Mountains, hilly area north west of Mitchelstown and Galty Mountains have been deemed 'areas unsuitable for wind energy development.

Kerry County Council Wind Energy Strategy

4.20. The text of the Kerry County Development Plan 2009-2015 (as varied) identifies four types of wind development zones - Strategic, Preferred, Open-to-Consideration or Unsuitable for Wind Development. However, the maps showing the wind deployment zones of North-West Kerry and South-West Kerry do not identify any Preferred or Strategic Areas.

4.21. Variation No. 5 aligns the text (Preferred and Strategic WDZ removed from text as no such zones identified within the Plan) with the associated maps and makes minor amendments to the text. The current wind deployment zones for the county are shown on Map's 6.1a and 6.1b of the Kerry County Development Plan 2009-2015 as 'areas unsuitable for development' and 'areas open to consideration'.

4.22. Kerry has adopted a policy of discouraging wind energy projects adjoining County Cork in the following areas;

- Derrynasaggart Mountains (northern part), south of Rathmore/ west of Coomacheo and Curracahill
- Derrynasaggart Mountains (near N22) , north of Ballyvourney in Cork/ north of Milleeny and north of Coolea and in Kerry south of Clonkeen ; and
- Sheehy/Caha Mountains, Beara Peninsula; West of Ballingeary to Hungry Hill and Kilgarven to Lauragh in Kerry.

4.23. This policy is currently under review in the 8th Variation of the Kerry County Development Plan 2009-2015 (as varied), see "The Draft Renewable Energy Strategy 2012 (June 2012)". This Variation identifies wind deployment zones / appropriate locations by analysing the key environmental, landscape, technical and economic criteria which must be balanced in order to identify the most suitable locations for wind energy development. Areas are classified as being Strategic, Open-to Consideration or Unsuitable for Wind Development. These geographic areas/Wind Deployment Zones are mapped along with the areas which have been identified as currently lacking adequate grid infrastructure.

Current Wind Energy Development in County Cork

4.24. There have been planning applications for a total of 79 wind farms in County Cork to date; 19 of these wind farms have been commissioned to date producing 269MW of electricity or 13.1% of the national total. There is the potential for a total of 720 MW of wind energy to be produced in County Cork as a result of the existing, permitted and pending wind farm applications should all these be granted. See Table 4.1 below.

Table 4.1 Summary of Onshore Wind Energy Planning Applications in County Cork				
Application Status	**Number of Wind Farm Applications**	**Total Power/ Capacity MW**	**Number of Turbines**	**Number of Turbines**
Commissioned	19	269 MW*	160	
Granted	23	308 MW	117	
Pending	10	143 MW	47	
Refused	27			228
Total	79	720 MW	324	

***Corks wind capacity is now 283.46MW from 20 wind farms which is approximately 13.8% of the Ireland's overall wind energy. (*updated from the IWEA website August 2012).*

4.25. Appendix 2 "Commissioned, Permitted and Pending Wind Energy Developments in County Cork" shows in a series of tables the details of these applications. The commissioned and granted windfarm developments are plotted on Map 1 in Appendix 3, which shows the approximate location of the application sites.

Suggested Aims for the Review of the County Development Plan Policies

4.26. This wind energy study suggests that any future policy considerations for Wind Energy should make provisions to:

- Revise and update the existing wind energy strategy in the Cork County Development Plan 2009(as varied) and develop a Wind Energy Strategy in line with national guidelines '*Planning Guidelines for Wind Farm Development 2006* issued by DoELG (2006).
- Support a plan led approach to wind energy development in County Cork and identify strategic areas for wind energy development of local, County, Regional and National importance.
- Promote economic development through wind energy and other renewables in the County, highlighting the need for energy security, move towards a low carbon economy and the development of a green economy.

- Ensure wind energy production is consistent with and takes account of nature conservation and environmental legislation and targets, including the conservation and protection of the Designated Natura 2000 sites and Natural Heritage Areas.
- Ensure full compliance with the requirements of the EU Habitats Directive, in particular the need for Appropriate Assessment.
- Ensure full compliance with the requirements of the EU SEA Directive and the associated SEA Regulations 2004 as amended.
- Resolve conflict with adjoining counties where possible and practical.

Methodology to identify Policy Considerations for any Future Wind Energy Policy.

Introduction

4.27. This study uses the guidance provided in the Planning Guidelines for Wind Energy Development for Planning Authorities 2006, the SEAI Manual 'A Methodology for Local Authority Renewable Energy Strategies' Draft for Public Consultation June 2012' and in consultation with the Habitats Directive Team set out to identify key policy considerations which would need to be addressed in developing a draft wind energy policy for inclusion in the next draft County Development Plan. The following steps were taken to identify key policy considerations:

Step 1 Approach of other authorities

4.28. The approach taken by other Local Authorities to reviewing their Renewable Energy and Wind Energy Strategy and how the Landscape issue was assessed was examined in the following counties; Kerry, Limerick, Clare, Galway, Mayo and Donegal. The approach taken by different local authorities to renewable energy and in particular wind energy in their respective County Development Plans was considered. A more detailed analysis was undertaken of the current wind farm strategies in the adjoining counties of Kerry, Limerick, South Tipperary and Waterford.

Step 2 Survey of planning applications

4.29. A survey of the spatial distribution/location and details of all planning applications for wind farms in the county was carried out, see Appendix 2 and Map 1 in Appendix 3 of commissioned and granted wind farms in County Cork. All decisions were mapped as Commissioned, granted, pending and refused.

Step 3 Wind Resource Mapping

4.30. The Sustainable Energy Ireland (SEI) Wind Atlas 2003,was utilised to extract data on wind resources in County Cork. The Wind Atlas provided information on wind speeds range, showing areas with extensive wind energy resources and areas with lesser wind resources. The Wind Atlas also included the electricity grid layout.

4.31. Wind speeds relate to height above ground level and wind speed increases with height, e.g. there is 60% more power available at a site with an average wind speed of 7m/s compared to a site with a wind speed of 6m/s. The SEI Wind Atlas provides information on wind speeds modelled at heights 50m, 75m and

100m above ground level. In this study, wind speeds at 75m and 100m turbine heights were utilised and are illustrated on Map 2 (a) and (b), Appendix 3.

Step 4 Evaluation of the landscape and its sensitivity

4.32. The Draft Cork Landscape Strategy 2007 forms part of the current CDP 2009 and the Landscape Character Assessment for County Cork was based on the methodology principles outlined by 'The Landscape and Landscape Assessment Draft Guidelines for Planning Authorities', which was published by the Department of the Environment in 2000.

4.33. The Wind Energy Guidelines state that Landscape and Landscape Sensitivity is the key consideration in evaluating areas suitable for large scale windfarm developments. Therefore, in the preparation of this study, the Council utilised an evaluation of the landscape and its sensitivity for wind energy developments taking account of the Draft Landscape Strategy. Factors that can inform landscape sensitivity to wind energy development, include scenic quality, rarity, uniqueness and natural and cultural heritage considerations.

4.34. The Landscape Character Assessment describes in broad terms the 16 different Landscape Character Types identified for the County. Each of the 16 landscape types include an assessment methodology with three main stages/concepts: Landscape Character, Landscape Value and Landscape Sensitivity, see Maps 3-6 in Appendix 3.

Step 5 Transmission network

4.35. Accessibility to electricity transmission and distribution grids is a key consideration in identifying areas for wind farm development. County Cork is fortunate in that there are a number of 220kV and 110kV transmission lines traversing the county from north-to south and east to west. Future improvements in the transmission network in the County would allow for greater wind penetration into the grid from both the wind and other renewable energy resources. The transmission network in County Cork is shown on Map 2 (a) and (b), Appendix 3.

4.36. The Transmission network in County Cork has recently been upgraded with lines installed in the following areas; Connecting Glenlara to Charleville, Connecting Boggeragh (Wind Generation) to Clashavoon, Connecting Dunmanway to Ballylickey and Improvements in the Cork Harbour area connecting Aghada to Cowscross.

Step 6 Other Policy Considerations

Proximity to Urban Areas, Towns and Metropolitan Green Belts

4.37. The Town and Metropolitan Green Belts are not excluded from consideration as suitable locations for wind farm development. However cities, towns and other smaller settlements with a development boundary as outlined in the Local Areas Plans 2011 are unlikely to be suitable for large scale wind energy projects.

Landscape and Visual Impacts; Scenic Routes and Scenic Landscapes

4.38. Certain parts of the County are designated as Scenic Landscapes and Scenic Routes in the Cork County Development Plan, 2009 as varied. Any wind farm development must have regard to the impact on same.

4.39. The DoEHLG (2006) 'Planning Guidelines for Wind Energy Development for Planning Authorities' (page 15) state that such designations: "...would not automatically preclude an area from future wind

energy development but the inclusion of such objectives in a development plan is a material factor that will be taken into consideration in the assessment of a planning application" .

Ecological designations/ Natural Heritage Designations

4.40. The Natura 2000 sites (SAC and SPA), the NHA and the pNHA are listed in more detail in the Cork County Development Plan 2009 (as varied). All such nature conservation areas were identified as key policy considerations and are shown on Map 7 in Appendix 3.

4.41. Careful consideration should be given to the impacts of wind energy developments on nature conservations sites and in particular Natura 2000 sites given the requirements to comply with EU Guidelines on carrying out Appropriate Assessment, which says that 'you must apply the precautionary principle and the focus of the assessment should be on objectively demonstrating, with supporting evidence, that there will be no adverse effects on the integrity of the Natura 2000 site.' This is supported by ECJ ruling (Waddenzee Judgement) which says that the competent authority must be certain that the plan or project that they are assessing will not adversely affect the integrity of any Natura 2000 site. It also says that where this is not the case, adverse effects must be assumed. There is a checklist of questions that you must be able answer in order to conclude that there will be no adverse effects on integrity. The stages for Appropriate Assessment (AA) are outlined in detail in Appendix 4.

While the development of renewable energy can have social and economic benefits, it must be developed in an environmentally sustainable manner. In this respect, environmental benefits and constraints will be a key consideration in the preparation of the Draft County Development Plan and SEA and HDA shall be carried out in relation to the County Development Plan. The Draft County Development Plan will also be subject to flood risk assessments (FRA).

Architectural Heritage and Archaeological Heritage

4.42. Wind turbines and wind farms should be sited and designed to ensure that they do not unduly dominate or damage architectural and archaeological structures or sites. Adequate assessment and mitigation measures should be included as part of the EIS or as a separate report where appropriate.

4.43. Archaeological impacts associated with wind farm developments are generally site specific. However, there are significant clusters of archaeological sites or archaeological landscapes within the County and the visual impact of wind farms on such sites and archaeological landscapes should be carefully considered.

4.44. Certain proposals may be required to undertake an assessment of the impacts on architectural character, particularly in the vicinity of towns or settlements with a rich architectural heritage, reflected in their designation as ACAs.

Major Employment Zones around the Harbour

4.45. The current County Development Plan was varied in December 2009 to allow for the consideration of wind farm developments in areas identified as suitable locations for large scale industrial development in Objective ECON 3-2 at the major employment centres of Ringaskiddy, Whitegate, Carrigtwohill, Kilbarry and Little Island.

Water Framework Directive / Water Quality/ Freshwater Pearl Mussel Catchments

4.46. E.U Council Directive 2000/60/EC (Water Framework Directive) was adopted in 2000 and encompasses many previous EU Directives aimed at reducing water pollution. The Water Framework Directive (WFD) sets out a framework for the comprehensive management of water resources in the European Community. The main aim is to provide a strengthened system for the protection and improvement of water resources ensuring that all waters achieve at least 'good status' by 2015. Member States are required to manage all waters including rivers, lakes, groundwater, estuaries and coastal waters, inland surface waters and groundwater and to ensure that a co-ordinated approach is adopted for the achievement of the objectives of the WFD and for the implementation of programmes of measures for this purpose. The Directive rationalises and updates existing water legislation and provides for water management on the basis of River Basin Districts (RBDs).

4.47. Irrespective of political boundaries, the river basin is the natural unit for water management; Ireland is divided into eight (8) River Basin Districts with three covering County Cork, the South-Western River Basin District (SWRBD) cover most of the County. The South Western District contains 9 river catchments with 3 sub basin catchments designated as SAC's for the protection of freshwater pearl mussel under the European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations, 2009.

4.48. These are the Munster Blackwater Catchment, the Bandon & Caha Catchment and the Ownagappul Catchment, see Map No.7 in Appendix 3. The Munster Blackwater catchment is the largest pearl mussel catchment encompassing 2333.83km2 in Ireland. The Munster Blackwater catchment also incorporates the Allow pearl mussel catchment.

4.49. Siltation and nutrient loss from potential wind energy developments pose a significant risk to the pearl mussel population. It is suggested that these catchments not be excluded from consideration for on-shore wind, subject to mitigation of potential impacts (Having regard to the River Blackwater Sub Management Plans, 2nd Draft, 2010 and any other sub basin management plans.)

Culmulative effects

4.50. The culmulative effect of wind energy developments is an emergying issue in Ireland particular with regard to landscape and impacts on Natura sites. Other environmental issues such as sea level rises, climate change and increased flood risk can also be taken into account. Traditionally associated with landscape and visual impacts, cumulative effects are also relevant in the context of natural heritage and a range of other social and economic factors.

4.51. The EU Commission's 1999 Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions defined cumulative impacts in the context of EIA as impacts that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the project.

4.52. More recently the EU Commission's 2010 Guidance Document, Wind Energy Developments and Natura 2000,states that cumulative effects may arise when several wind farms and their associated structures are present within an area or along a fly corridor or as a result of the combined impacts of wind farms and other types of activities. The guidance goes on to note cumulative effect is the combined effect of all developments taken together. In this context cumulative effect is not just the sum of the effects of one wind farm plus the effect of a second wind farm. It may be more, it may be less.

4.53. Scottish Natural Heritage has produced a guidance document on assessing the cumulative effect of wind farms. It notes the cumulative effect of a set of developments is the combined effect of all the

developments, taken together. The guidance goes on to recommend that cumulative effects should be considered both at development control and at strategic planning level.

4.54. In the past, the counties of Cork, Kerry and Limerick have considered the Stacks to Mullaghareirk Mountins, West Limerick Hills and Mount Eagle SPA Open to consideration and/ or Strategic areas for wind energy development.

4.55. The following Table 4.2 from the proposed 8th variation to the Kerry County Development Plan 2009-2015 - Draft Renewable Energy Strategy 2012 indicate that over the last decade a total of 358 turbines have been granted in the Stacks to Mullaghareirk Mountains, West Limerick and Mount Eagle SPA (004161) with 125 constructed and operational.

Table 4.2: Windfarm Projects Permitted in the Stacks to Mullaghareirk Mountains, West Limerick and Mount Eagle SPA.

County	**Turbines Granted in the SPA**	**Turbines constructed and operational in the Stack's SPA**
Kerry	225	87
Limerick	76	27
Cork	57	11
Total	358 Turbines	125 Turbines

4.56. Such developments have the potential to have significant effects on Natura 2000 sites and may lead to the requirement for Stage 2 Appropriate Assessment if located in areas considered suitable for wind energy development or strategic wind deployment areas in any future development plans.

Conclusion

4.57. Steps 1 to 6 above have identified the key policy considerations that need to be taken into account in preparing a new Wind Energy Strategy for inclusion in the draft County Development Plan. The County Development Plan needs to provide strategic guidance to indicate which areas of the County have potential for wind energy development and which areas do not.

Areas likely to be most suitable for large scale wind energy projects are:

4.58. River Ilen Basin North of Skibbereen: This shallow basin has good wind speeds and is of only local landscape importance and includes few significant nature conservation designations.

4.59. Area South of Macroom: This is an elevated area of gently rolling hills, with good wind speeds, to the south of the Gearagh nature conservation area. There are no nature conservation designations.

The following areas are unlikely to be suitable for large scale wind energy projects:

4.60. Towns & Villages: The urban areas comprising the towns and villages of the County are the locations where most people live and work. The overall density of human activity here is significantly higher than the more rural parts of the County where the emphasis is on agriculture and other similar land uses less sensitive to wind energy development. Appropriate protection for individual dwellings in rural areas can be provided at the project stage by ensuring that large scale wind energy development is adequately separated

from areas of human habitation.

4.61. Nature Conservation Areas: Areas designated for nature conservation at national level (including SPA's, SAC's & NHA's) will generally be inappropriate for large scale wind energy development because of the likelihood of significant adverse effects on the integrity of those areas particularly in relation to areas designated for the protection of birds but also in other areas where the general effects of construction would be damaging.

4.62. Areas of Landscape or Coastline that are of National Significance: The main areas of the County where landscape and coastal scenery is of National Importance include:

- Cork City and Harbour;
- South Coast West of Cork Harbour;
- West Cork Peninsulas;
- Lee river valley; and
- Gougane Barra.

4.63. While these areas have intrinsic landscape qualities they also are significant destination areas for the County's tourism industry and large scale wind energy projects here could undermine this function.

4.64. Consideration could also be given to the need to protect other areas with the potential for sensitivity to wind energy development. These areas include areas of important landscape and coastal scenery that, although not of national significance, are considered to be significant at a more local level. These areas contribute to the overall attractiveness of the County for tourism and recreation purposes and include the following:

4.65. South Coast East of Cork Harbour: Wind speeds along this coast are appropriate for large scale wind energy projects particularly on south facing stretches of shore area. However, there are also important nature conservation designations and the area is attractive for tourism and recreation.

4.66. North East Cork (including part of the Blackwater Valley): Wind speeds in this area of attractive landscape are generally low and, at best, large scale wind energy development would be marginal from the economic perspective.

Interaction of Policy Considerations with the Wind Energy Strategies of the four adjoining Planning Authorities

4.67. The four planning authorities in adjoining counties have each developed policies for wind energy and there is a requirement, where possible and practical, to secure a good level of alignment in the policy approach between adjoining authorities. Of particular importance to the development of policy for County Cork are the instances where adjoining Counties have adopted a policy discouraging wind energy projects and these areas are shown in Table 4.3 and on Figure 3 below. (A detailed description of the extent of each of these areas is contained in Appendix 5).

Table 4.3: Areas not considered suitable for Wind Energy Projects in Adjoining Counties		
	Areas Not Considered Suitable	**Local Authority**
(1) **(2)**	Blackwater Estuary (near Youghal); and Blackwater Valley near Ballyduff Upper.	**Waterford County Council**
(3)	Knockmealdown Mountains, south east of Mitchelstown	**South Tipperary County Council**
(4)	Ballyhoura Mountains, hilly area north west of Mitchelstown and Galty Mountains	**Limerick County Council**
(5) **(6)** **(7)**	Derrynasaggart Mountains (northern part) Derrynasaggart Mountains (near N22) Sheehy/Caha Mountains, Beara Peninsula	**Kerry County Council***

[* Variation No.8 to the Kerry County Development Plan 2009-2015, Renewable Energy Strategy 2012 was adopted on the 5th November 2012. Figure 3 does not take account of the final adopted variation. However, it is the intention of Cork County Council to take account of the adopted version during the preparation of the Draft Wind Energy Strategy as part of the Draft County Development Plan to be prepared in 2013.]

4.68. The key considerations identified in the step by step process above are represented in Figure 3 'Policy Considerations for Wind Energy" and in Table 1 in Appendix 6.

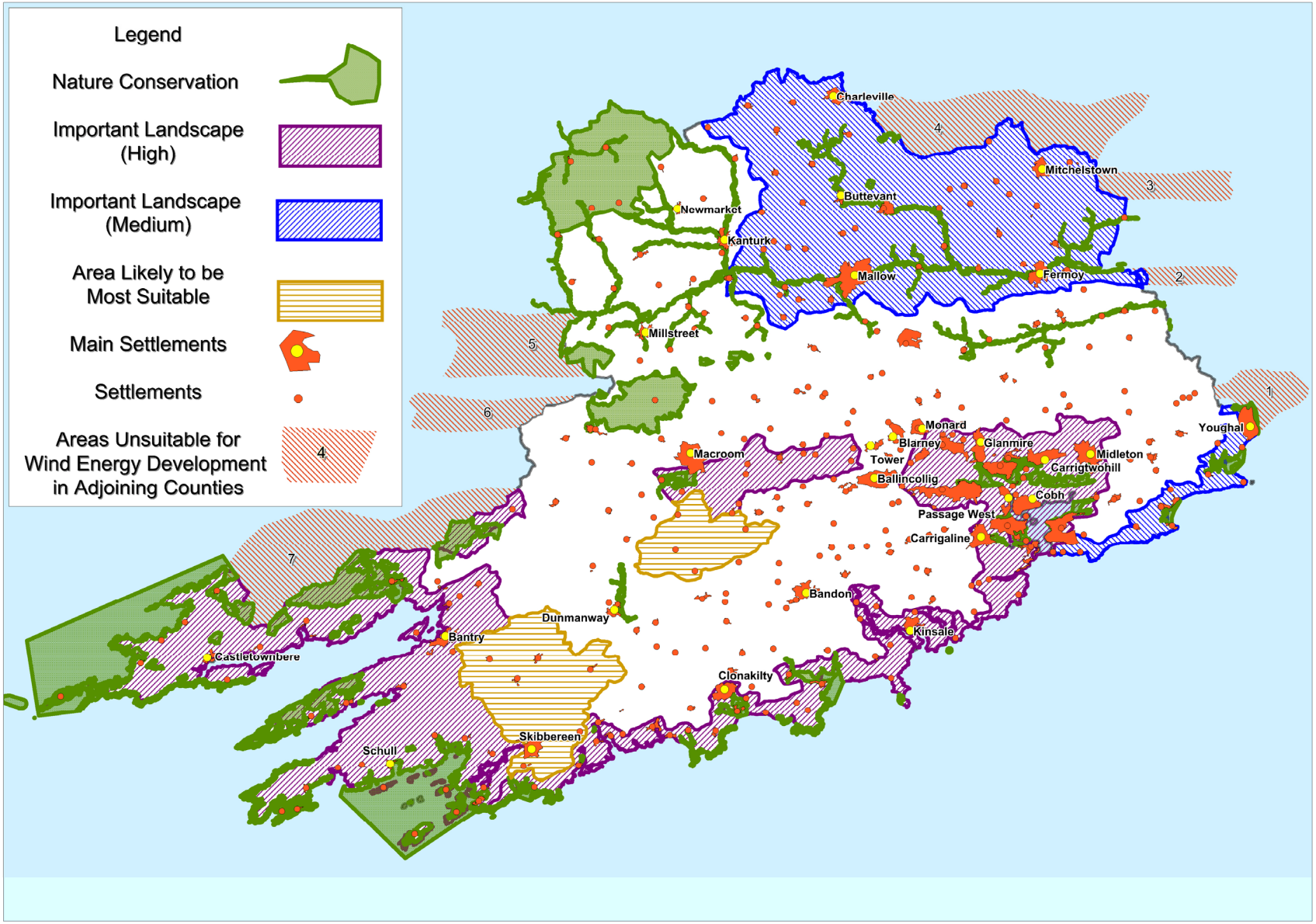


Figure3: Policy Considerations for Wind Energy Projects

5.0 OTHER RENEWABLE ENERGY

Hydro Power

Introduction

5.1. Hydroelectricity is electricity derived from the power harnessed from the flow of falling water, typically from fast-flowing streams and rivers. Historically, hydro-power was used to operate mechanical devices such as water mills, sawmills, grain mills, textile mills etc. In more recent times the terms has become associated with hydro electric power.

5.2. Hydroelectric power provides the means to efficiently convert water power into electricity. Hydro power works by extracting the kinetic energy present in rivers and streams. It relies on the earth's hydrological cycle of evaporation and precipitation and harnesses the energy in the waters movement.

5.3. The Ardnacrusha hydroelectric station is the largest hydropower facility in Ireland. Cork also has a tradition of hydro schemes. Lee Stations comprise two hydro plants at Inniscarra and Carrigadrohid which were built between 1952 and 1957. This development involved the creation of two lakes in the Lee Valley which cover an area of 14km² and have a storage capacity of 45 million cubic meters.

5.4. Inniscarra and Carrigadrohid generating stations have a combined capacity of 27MW and produce almost 80 million units of electricity a year. The table below list the hydroelectric power generators in County Cork.

Table 5.1: List of Hydroelectric Power Generators in County Cork

Name **Associated Node and Voltage**	**Type**	**MEC (MW)**
Lee Carrigadrohid Hydro 1 Carrigadrohid 110KV	Hydro	8
Lee Iniscarra Hydro 1 Iniscarra 110KV	Hydro	15
Lee Iniscarra Hydro 2 Iniscarra 10KV	Hydro	4
Knocknagreenan, Carrigadrohid 110KV Contracted Signed date Oct 2009	Pumped Storage Hydro	70

Source; Eirgrid July 2012

5.5. Other hydro projects (pre-gate) in County Cork include Bandon Weir Coolfadda (0.079) connected to Bandon 100kv station and the Lee Road Hydro (0.265MW) connected at Trabeg 100kv station.

5.6. The NREAP envisages 234 MW of hydroelectricity contributing to our 2020 renewable energy target, mostly from the existing large hydro plants. There are also many smaller hydroelectric plants in operation across the country. A REFIT tariff is available for hydro plants of 5 MW or less, and a number of such plants joined the original scheme.

5.7. There are also a number of ongoing initiatives to examine the possibility of 'pumped storage' schemes to provide reserve and responsive power when required. The pumped-storage scheme at Turlough

Hill, Co Wicklow is an example of this type of project. However, under the RE Directive, pumped storage is not considered a renewable energy technology and is not counted towards our national target.

Three Methods for the generation of Hydroelectricity:

1. Run-of-the-river

5.8. Run-of-the-river hydroelectric stations have small or no reservoir capacity and the water coming from upstream must be used for generation at that moment. Water is usually diverted from the main river body into a pipeline where it passes through a turbine to generate electricity prior to returning to the river. Mountainous locations where there are fast flowing mountain streams are suitable for run-of-the-river schemes and lowland areas with wide rivers can also accommodate run-of-the-river schemes. There are three known examples of hydro schemes in the County generating electricity off the River Lee.

2. Impoundment Schemes

5.9. Impoundment schemes store water in a reservoir and release it as required for reliable and controlled output. The water is channelled through turbines which turn a shaft connected to a generator to produce reliable and low running cost electricity. A large impoundment scheme involves a significant area of land that is submerged following impoundment and environmental impacts need to be carefully considered in any scheme.

3. Pumped Hydroelectric Storage (PHES)

5.10. Pumped hydroelectric storage is the most mature and largest storage technique available. A pumped hydroelectric energy scheme is a mechanical device for storing energy. It consists of two large reservoirs located at different elevations, typically between 200-300m and a number of pump/turbine units. The facility accepts energy from the electricity grid when production exceeds demand; energy is stored in the form of water, it is pumped from the lower elevation reservoir to a higher elevation reservoir. Then it delivers energy back to the grid when demand if high and production is low by releasing the water back into the lower reservoir through a turbine. Until recently, PHES units have always used fresh water as a storage medium, but seawater can also be used. Turlough Hill in County Wicklow is a good example of a PHES scheme. PHES acts to regulate the energy load of the national grid, it can allow extra wind capacity to be added to the grid without sacrificing the reliability of power supplies. It also avoids the wastage of wind energy by utilising this energy when it is produced at off-peak times. Furthermore, it can facilitate instant coverage of peak load demand on account of its large storage capacity.

5.11. Given the scale and characteristics of PHES projects they can significantly affect the quality and integrity of ecological designations such as SACs, SPAs and NHAs and therefore should not be considered in Natura 2000 sites and probably not in NHAs or pNHAs either.

5.12. Other negative effects of Hydro power on the environment include the following;

* the visual impacts on the surrounding landscape;
* geological impacts; impacts on ground water;
* impacts on terrestrial and freshwater ecology, and;
* impacts from noise generated during construction and at the operational stage.

5.13. Therefore, any proposals for hydro power generation sites will be required to address issues such as

fish passage; fish protection / grating; retention of natural watercourse levels; and water quality. The WFD requires that measures are taken to ensure waters currently designated under its provisions as high status remain in that category. The development of hydroelectric schemes can have potentially significant impacts on the relevant water body source for the scheme. Therefore, proposals for the development of hydro power will be required to demonstrate compliance with the WFD, the South Western River Basin Management Plan and other relevant River Basin Plans.

5.14. Water quality management measures will be considered in detail at the planning stage given the amount of works involved in the development of hydro schemes. Applications for hydro schemes shall be accompanied by an appropriate Environmental Management Plan which may be included as part of the EIA.

Small-Scale Hydro Electric Schemes

5.15. In determining applications for Small-Scale Hydro Electric Schemes the planning authority will have regard to the recommendations of Guidelines on the Planning, Design, Construction & Operation of Small-Scale Hydro-Electric Schemes and Fisheries in 2007 (The Central and Regional Fisheries Boards) which set out the possible impacts of small scale hydro developments and best practice in the development and assessment hydro schemes.

5.16. Small scale hydro schemes will be considered in situ or ex situ of a Natura 2000 site and/or a designated or proposed National Heritage Areas where it can be demonstrated that proposals will not significantly affect the conservation objectives and qualifying interests of Natura 2000 sites, the ecological integrity of NHA/pNHAs or protected habitats and/or species as designated under National and European legislation.

Environmental Impact Assessment (EIA) and Habitats Directive Assessment (HDA)

5.17. An application for the installation of a hydro electric plant shall require an Environmental Impact Assessment (EIA) where it meets the thresholds specified in Schedule 5 Part 2(h) of the Planning and Development Regulations 2001. An EIS shall also accompany an application for sub threshold developments where the Planning Authority is of the opinion that the potential environmental impact is such that an EIA is warranted. Applicants are advised to consult the publication Guidelines on the Planning, Design, Construction and Operation of Small Scale Hydro-Electric Schemes and Fisheries, published by the Central and Regional Fisheries Boards, 2007 in relation to establishing best practice in the preparation of the EIS. Where an application for a hydroelectric scheme is proposed in situ or ex situ, of a Natura 2000 site, an assessment under Article 6 of the Habitats Directive will be required.

5.18. Proposals for development of same within freshwater catchments containing rivers designated for nature conservation (i.e. Blackwater Catchment, Bandon Catchment and Owenagappul catchment) would be likely to require Appropriate Assessment as well as EIA. A primary concern would be ensuring that the free passage of fish is not compromised in rivers within these catchments, or in Salmonid rivers, and that the development of such schemes not give rise to significant impacts on freshwater habitats or other species.

Suggested Policy Approach to Hydro Power

5.19. The plan should support the development of large and small hydro power developments in appropriate locations.

Geothermal, Ground Collectors and Heat Pumps

Introduction

5.20. Geothermal energy means energy stored in the form of heat beneath the surface of solid earth in the ground. Geothermal energy is generally classified as either 'deep' or 'shallow' depending on the depths involved. Heat in the ground comes from the earth's core and from solar radiation.

5.21. Ireland has a temperate climate and heat energy is available from the air, the soil, ground water, rivers, streams and lakes. This natural heat energy can heat a building with assistance from a heat pump. Heat pumps do require electricity from another source and Cork with it significant biomass potential will be in a position to develop heat pump schemes using electricity from renewable sources. These energy sources have the potential to make a significant contribution to the reduction of carbon emissions. It is suggested that the Council promote technologies which will contribute towards national heating targets for renewable energy and a reduction in carbon emissions.

5.22. Shallow geothermal (also known as ground source) energy can be harnessed by either 'closed' or 'open' loop systems and is most frequently used for providing heat. Shallow geothermal energy has been successfully harnessed by some homes and other buildings (such as swimming pools) in Ireland for heating purposes. There is currently no deep geothermal electricity generation in Ireland.

5.23. Geothermal energy coming from solar radiation can be extracted with the use of a ground heat pump and is generally used to supply space heating, cooling or hot water to buildings. Heat pumps are similar in operation to refrigerators. The main component of both is an electrical compressor (a device which increases pressure) which powers the cycle (either a refrigerant cycle, or in reverse, a heat pump cycle). In a heat pump, the compressor adds to heat collected from the surroundings so that it can be used in the heating system.

5.24. The collector can be "closed loop" where the same fluid (usually water and antifreeze) always flows through the collector pipes or "open loop" where new water (e.g. from a well) flows through the heat pump. Heat pumps do require electricity from another source to operate but will extract much more energy than is input. For every unit of electricity used, it will generate 3 to 5 units of useful heat (from SEAI website).

5.25. There are occasions when heat pumps are an appropriate carbon saving technology but applications need to be carefully selected. Heat pumps work best where heat can be applied evenly and consistently (e.g. under floor heating systems). Waste heat can also be used. If a house is equipped with a mechanical ventilation system, heat from the exhaust air can also be converted to re-usable heat by means of a heat pump.

5.26. Generally, in Ireland, heat pumps are more suited to the heating of buildings than electricity generation, and can contribute towards meeting national heating targets for renewable energy. They can help reduce home heating bills and reduce the amount of fossil fuels used for heating.

Main types of heat pump systems include Ground Source, Air Source and Water Source

1. Geothermal (Ground Source)

5.27. Geothermal energy refers to heat energy stored in the ground. Heat is supplied to the ground from two sources namely the hot core of the planet and the sun. It can be classified as either 'deep' or 'shallow' depending on the depths involved.

5.28. Deep: For deep geothermal energy extraction, developments drill into the earths crust to reach 'hot rocks', such as granite whose radioactive elements generate heat at great depth. By a process called reservoir stimulation, fractures are created in the rock through which water can be injected, circulated and extracted at a far greater temperature. The steam from the high temperature water can then be used to power turbines and generate electricity or for heating.

5.29. Shallow: The second source of heat in the ground is from radiation from the sun. Solar thermal radiation is absorbed by the surface of the earth each day. This energy can be regarded as stored energy which stays relatively warm throughout the year. This heat can be extracted by using a ground source heat pump. Geothermal energy can be used for the heating and cooling of developments and for electricity production.

5.30. There is currently no deep geothermal electricity generation in Ireland and REFIT (Renewable Energy Feed in Tariff which provides a fixed monetary support to renewable electricity suppliers), is not currently available for geothermal power. Recent tests have indicated that depths of up to 4km might be required in Ireland to harness deep geothermal power.

5.31. The National Renewable Energy Action Plan (REAP 2010) does not envisage deep geothermal sourced electricity contributing to Ireland's 2020 target. However shallow sources of geothermal energy can make a contribution to heat generation. The earth's surface acts as a huge solar collector, absorbing radiation from the sun. In Ireland the ground maintains a constant temperature several metres below the surface. Ground Source Heat Pumps (GSHP) take advantage of this by transferring the heat stored in the earth or in ground water to heat buildings in winter and in summer it is used for cooling. Through compression, heat pumps can 'pump up' heat at low temperature and release it at a higher temperature so that it may be used again.

5.32. There are two principal types of ground source heat pumps (GSHP) –

5.33. Open loop pumps extract water from an underground well and pump it through a heat exchanger and back underground through a second well. Such systems generally generate a larger thermal output than closed loop pump systems.

5.34. Closed loop pumps consist of a closed piping system buried in the ground and filled with water and anti-freeze. When the liquid travels around the pipe loops it absorbs heat from the ground. The most common type of GSHP system currently installed in Ireland is the closed loop collection system. These systems consist of a closed circuit of pipes in shallow soil where it warms to the ambient temperature and then is circulated through a heat pump where heat is extracted. As the temperature of shallow soil and sediment throughout Ireland varies between 9ºC and 11ºC, these systems have proven to be highly suitable to Irish conditions. There is a significant amount of low density housing in both urban and rural areas and the space required for the collector is often readily available. In general terms the ground area required for the collector is approximately equal to that of the foot-print of the house or building to be heated.

2. Air Source

5.35. Air source heat pumps (ASHP) use the surrounding air as a heat source to heat a building. ASHP tend to be much easier and cheaper to install than GSHP (as they do not need external heat collector loops), but are also usually less efficient. They can either be mounted directly on an external wall or on the ground and are similar in appearance to conventional air-conditioning units.

5.36. As well as being used to heat in winter their cycle can be reversed to cool in the summer, when the unit takes heat out of the indoor air and releases it outside.

3. Water Source

5.37. Water source heat pumps (WSHP) extract heat from large bodies of water or rivers (with a reasonably high flow volume in order to minimise any resulting changes in water temperature). As with GSHP, despite the relatively low temperatures of the water source, heat can be extracted from it in a heat exchanger to feed a low temperature central heating system. The use of a water source such as a river or lake may provide lower efficiencies as the temperature of the water source is more affected by the weather. WSHP are relatively cheaper than GSHP systems. A water source heat pump generally refers to an "open-loop" system. A closed loop collector can also be laid in a stream etc. to collect heat. A closed-loop collector scheme has been installed in the Iniscarra Renewable Energy Office in Cork using a collector located in a water tank. WSHP require planning permission and impacts on the source of water will be assessed as part of any planning application.

Planning Exemptions for Heat Pumps

5.38. There are exemptions contained within the Planning & Development Regulations 2001 to 2008 (SI No. 83 of 2007, SI No's. 235 and 256 of 2008). They allow for the installation on or within the curtilage of a house, an industrial building, business premises, light industrial buildings, and agricultural holdings, of a ground heat pump system (horizontal or vertical) or an air source heat pump subject to a number of conditions without the requirement for planning permission. These conditions deal with alteration of ground levels, the area of the heat pump, its location relative to a wall or roof, and noise levels. Water source heat pumps are not exempt.

5.39. The exemptions do not cover schools or public buildings, including hospitals. The Planning Authority will support the installation of the various forms of heat pumps on these types of buildings subject to the proper planning and sustainable development of the area.

Planning Issues associated with Geothermal Energy and Heat Pumps

5.40. There are a number of potential impacts associated with GSHP. These principally relate to the fact that open loop pumps will affect the temperature of the groundwater. This can have implications for the structure and ecology of the aquifer and any dependent surface waters. As the installation of GSHP will require the excavation of trenches or deep boreholes and it is important to consider, in advance, whether archaeological remains exist on the development site.

5.41. ASHP can be located in the roof space or on the side of the building. They are similar in appearance to air conditioning boxes. There is potential for noise from the external fan of the heat pump, therefore careful sitting and possible noise attenuation may be needed. Where ASHP are proposed for listed buildings or in conservation areas, it will be important that they are sensitively designed and sited.

Suggested Policy Approach to Geothermal

5.42. Encourage the installation geothermal energy and heat pumps in buildings.

Ocean Energy

Introduction

5.43. The government published an Ocean Energy Strategy in 2005. The extraction of marine energy is still in the early stages of development. However, in order to take the strategy forward provision was made for the establishment of a dedicated Ocean Energy Development Unit (OEDU) within the Sustainable Energy Authority of Ireland to promote and develop the sector. In addition the 2007 Government White Paper on energy policy 'Delivering a Sustainable Energy Future for Ireland - The Energy Policy Framework 2007-2020' sets out a number of strategic goals to support the development of marine energy .

5.44. The Marine Strategy Framework Directive, which was transposed into Irish law in July 2010, is a major piece of EU legislation that requires Member States to achieve good environmental status (GES) in the marine environment by the year 2020. While the primary purpose of the Directive is to protect and preserve the Marine Environment, marine energy development will be required to comply with the provisions made on foot of this assessment.

5.45. 'Harnessing Our Ocean Wealth – An Integrated Marine Plan for Ireland' Roadmap July 2012 sets out the Government's Vision, High-Level Goals, and Key 'Enabling' Actions the Government will take to put in place the appropriate policy, governance and business climate to enable our marine potential to be realised. It will ensure our natural ocean assets continue to provide the resources and environmental services on which our well-being relies. The Plan sets out 39 actions and an implementation model which includes a number of integrated Government delivery mechanisms aimed at supporting an integrated system of policy and programme planning for our marine affairs. The Plan also sets out a series of early actions that will form the basis of a 2012–2014 Roadmap. Three high-level goals based on the concept of sustainable development have been developed as follows; a thriving maritime economy, achieve healthy ecosystems that provide monetary and non-monetary goods and services (e.g. food, climate, health and well-being) and increase our engagement with the sea.

5.46. The Foreshore Acts require that a lease or license must be obtained from the Minister for the Environment, Community and Local Government for the carrying out of works or placing structures or material on, or for the occupation of or removal of material from, state-owned foreshore which represents the greater part of the foreshore. A development on privately owned foreshore also requires the prior permission of the Minister. The foreshore is the seabed and shore below the line of high water of ordinary or medium tides and extends outwards to the limit of 22.24 kilometres (12 nautical mile).

5.47. In relation to the transmission grid for Ocean Energy in December 2009 The European Energy Council established the North Seas Offshore Grid initiative for the purpose of developing a European System Network for Operators in Electricity. EirGrid as the Irish TSO, actively participates in the development of this network. EirGrid is currently involved in carrying out a preliminary study on how significant offshore wind resources (beyond the 800mw in Gate 3) off the east coast of Ireland could be integrated into the Irish transmission system.

Ocean Energy – Tidal

5.48. Ocean Energy refers to electricity extracted from the waves and tides (tidal current or tidal barrrage). The tidal barrages are usually located across a tidal inlet, trap the water at high tide and then control the release of the water through turbines. Tidal streams works on the premises that the tide flows and turns stationary turbines positioned under the water using inflow and outflows. Turbines can be

positioned parallel or perpendicular to the current flow submerged in water so that they are not seen or heard. Ocean energy has a number of constraints including the following; suitable sites, physical engineering challenges, capital investment, navigation shipping lanes, aquaculture and fishing, designated habitats and ecosystems and access to the grid.

5.49. Due to the nature of tidal streams, tidal energy extraction is reliable and predictable. The two main types of tidal devices are tidal barrage systems and tidal stream flow turbines. Tidal stream flow turbines are located beneath the ocean surface and operate on the same principle as wind turbines but as water is a great deal denser than air, tidal turbines are far more efficient than wind turbines.

Ocean Energy – Wave

5.50. Wave energy refers to the kinetic energy stored in the ocean's surface. Waves are created from the movement of wind over the ocean surface. The kinetic energy contained in waves can be extracted and converted into electricity.

5.51. Ireland has a national target of installing 500MW of ocean energy capacity by 2020. The SEAI/ Marine Institute Wave Energy Atlas indicate that the west coast of Ireland has considerable resources in relation to tidal and wave energy.

5.52. The average wave height off the coast of Ireland is 2.5 to 3 metres and the power generated is a function of the wave height, length, speed and water density. The mean overall power available in deep water (100m) has been estimated at about 25GW, of which 12 GW could be convertible into electricity.

5.53. Wave energy devices are at an early stage of development and there are no wave energy devices supplying electricity to the transmission network in Ireland. A test site was established in Galway Bay in 2006 which is being used to test prototype wave energy devices. Another test site in is currently being developed off Belmullet in Co. Mayo to test both devices and grid connection.

5.54. There are a number of constraints associated with wave energy development which include; commercial viability, physical engineering challenges, high capital investment requirements, navigation shipping lanes, aquaculture and fishing sites, designated protected habitats and ecosystems and access to the grid. The technology required to harness this resource is still being developed in Ireland with a number of different prototype devices for the capture of wave energy developed.

5.55. The forthcoming Offshore Renewable Energy Development Plan and the related Strategic Environmental Assessment and Natura Impact Statement, together with a new fit for purpose planning regime for offshore development will critically support future development set also in the context of the overall national marine Strategy. This has been recognised as a priority area by Government with the inclusion of marine renewable energy research in the report of the Research Prioritisation Steering Group published in 2012.

Suggested Policy Approach to Ocean Energy

5.56. It is suggested that the plan support the development of ocean energies in line with national policy.

Off-Shore Wind

Introduction

5.57. The Draft Offshore Renewable Energy Development Plan (OREDP), November 2010, examines various development scenarios for offshore wind. The plan identifies significant potential for offshore wind development both in shallow and deep water off the coast of the Cork. However it is generally considered that offshore wind is not at present sufficiently cost effective, nor its technology significantly advanced, to deliver sizeable amounts of electricity prior to 2020.

5.58. There is currently only one offshore wind farm at Arklow Bank (25 MW / 7 turbines erected) operating in Irish Waters.

5.59. Under the Gate 3 process approximately 800mw of offshore wind projects received an offer of a grid connection up to mid 2011(although none of these projects are located off the Cork coast). Furthermore there is over 2,160mw of offshore wind projects at various stages of the foreshore lease consent process, with an estimated potential for 5,000 to 6,000mw of offshore wind capacity from Irish waters. Clearly the renewable energy sector is positioning itself to enter the off-shore energy market in anticipation of the development of viable economic and technical advances.

5.60. Offshore wind development may not take place on any significant scale in the short term, but given its potential and rapidly advancing technologies, it must form part of the context for discussions on how much electricity should be generated from onshore renewables in the medium to long term. Offshore wind is not included in the renewable energy scenarios outlined in NEARP, and in the short term wind energy development will take place on shore. Off shore wind energy operates on the same basic premise as on shore wind with turbines located at sea rather than on land. Offshore wind generally has a higher capacity factor than onshore wind and require higher support scheme payments than onshore windfarms.

5.61. Permitting of offshore windfarms falls under the remit of the Department of Environment, Community and Local Government (DECLG) for the foreshore area (out to 12 nautical miles, approx. 23km). At present there is no consenting regime for offshore wind developments beyond 12 nautical miles. Local authorities will be primarily concerned with onshore elements of offshore windfarms such as cable landfall and the onshore grid connection infrastructure to facilitate this type of project. Local authorities may also be consulted during the consenting process for offshore windfarms.

5.62. The DECLG is reforming the foreshore licence process under its remit and is expected to publish the general scheme of a Bill shortly.

5.63. As set out in the NREAP, the offshore RE area, including offshore wind, potentially offers renewable electricity export opportunities for Ireland. Any export regime agreed with another country would fall under articles 6-11 of the Renewable Energy Directive 2009/28/EC and would require a treaty.

5.64. Offshore windfarms are likely to be larger than onshore, both in size of turbine and in extent. This means that the closer that an offshore wind farm is located to land, the cheaper it is. Whether or not an offshore development is commercially viable rests on a range of factors such as the price of electricity, technological advancements capable of reducing construction and operational costs, and the need for security of supply.

5.65. The development of offshore wind energy will present a number of challenges and environmental constraints which will need to be considered. Issues will arise in relation to environmental impacts, shipping

lanes and recreation and water sports.

5.66. A number of issues relating to offshore wind development include Landscape and Visual Impact , effect on soils, marine habitats, flora and fauna, infrastructure capacity at harbours and capacity of local roads to cater for construction and decommissioning.

5.67. In relation to offshore wind developments the colour of turbines and the speed, direction and synchronization of blade rotation is important. The layout and positioning of turbines along the horizon and the positioning and of cables and transformers can decrease visual impacts. The forces of the ocean may affect coastal erosion, flooding and tidal patterns. During the construction and operational process marine habitats, flora and fauna may be adversely affected. Given the size of marine energy devices it is likely that access roads for the construction and decommissioning will be a consideration, and it will be necessary to ensure that the capacity of local roads is not affected. At present Cork Harbour could accommodate the transport and deployment of wind energy devices.

Suggested Policy Approach to Off Shore Wind

5.68. It is suggested that the plan should generally support the facilitation of offshore wind energy developments in appropriate locations and scales and with appropriate onshore support infrastructure, including landing stations for land-sea connections, subject to relevant policy, legislation, environmental, landscape, amenity, seascape and technical considerations.

Solar Energy

Introduction

5.69. There is significant potential to generate heat from solar energies such as Passive Solar Design and Solar Thermal Water Heating. The use of passive solar design will reduce carbon emissions while solar water heating will generate carbon free heat. This form of renewable energy uses the sun as its source. Modern technology can be used to capture and magnify the sun's energy for a variety of energy generation and conservation.

The three main forms of solar energy are;
*Passive Solar Design,
*Solar Thermal (Solar Water Heating) and
*Active Solar (Photovoltaics).

5.70. The technology for Active Solar (Photovoltaics) is not yet fully advanced, however, this technology is rapidly advancing and it is expected that Active Solar will be used to generate electricity post 2020. Solar energy uses the sun's energy for power or heat production. There are two main forms of solar energy extraction: thermal solar energy (passive & active) and photovoltaic.

5.71. A Thermal Solar Energy System can provide both water and space heating, although it is predominantly used for water heating at present. Solar panels transform solar energy into heat to provide space and/or water heating. Solar water heating is currently the most common application of active solar

thermal in Europe. 'Passive' solar heating is a method of building design to maximise solar gains and minimise heat losses. 'Active' solar heating is one of the primary ways for buildings to use solar energy.

Passive Solar Design (PSD)

5.72. The objective in PSD in buildings is to maximise the benefit of free energy and light from the sun by using simple design approaches which intentionally enable buildings to function more effectively and provide a comfortable environment for living or working. PSD has always been a feature of traditional vernacular architecture. Buildings designed to maximise heat and light from the sun allow significant lifetime savings in energy to be made without environmental impacts.

5.73. Design, infrastructure and site layout are key to achieving energy efficient development by optimizing passive solar gain in domestic and non-domestic buildings. The main aspects to consider are the orientation of the buildings and the overall site layout, to avoid overshadowing and exposed locations, and to optimise sunlight penetration.

5.74. PSD is central principle of the Department of the Environment Heritage And Local Government publication Sustainable Residential Development in Urban Areas, 2008, and the Cork Rural Design Guide 2003 (2nd edition 2010).

Solar Thermal (Solar Water Heating)

5.75. The key component in a solar water heating (SWH) system is the collector. The two most common types are: flat plate collectors and evacuated tube collectors. In both types, radiation from the sun is collected by an absorber, and is transferred as heat to a fluid, which may be either water, or a special fluid employed to convey the energy to the domestic system using a heat exchanger.

5.76. Solar water heating systems can be used to heat water for a variety of purposes. The most common are domestic, light industrial, agricultural, and in public buildings such as heated swimming pools. At present, the widest use is in the residential domestic hot water sector. A modern solar water heating system will make a significant contribution to water heating requirements. In a family dwelling a well designed system should provide 50–60% of annual domestic hot water requirements.

Active Solar (Photovoltaic)

5.77. Photovoltaic (PV) is the generation of electricity from light. In essence, photovoltaic systems use daylight (not necessarily direct sunlight) to convert solar radiation into electricity. A number of semi conductor cells are formed into a panel or module. The light which shines on the PV cells creates an electric field, causing electricity to flow. The greater the intensity of the light, the greater the flow of electricity. PV modules should ideally be south facing and installed at approx 35 degrees. They can be roof mounted or free standing from the ground. An example in Cork City is the 0.05MW Photovoltaic at University College Cork which is connected at Cow Cross.

5.78. Energy from the sun can be used to generate electricity through a Photovoltaic (PV) System. Solar PV systems convert the sun's rays directly into electricity through the use of solar cells. The technology can be used for domestic as well as larger industrial or commercial applications. This form of renewable energy will not provide a large electricity generating resource, but it can help domestic and other buildings to become more self-sustaining. At present the connection of such systems to the grid is technically difficult

and does not provide a sufficient return on investment. Connections for large solar developments may be possible with advances in technology.

5.79. PV systems exploit the direct conversion of daylight into electricity in a semiconductor device with a number of semi conductor cells which are interconnected and form a solar panel or module. A number of solar modules are usually connected together in an array, the area of which can vary from a few square metres to several hundred square metres. PV arrays are mounted directly onto broadly south-facing roofs or walls, on a low support structure or on free standing structures. Solar PV is unique among renewable energy technologies in that in addition to generating electricity from daylight, it can also be used as a building material. Such materials can be used in the construction of roofs or in facades through the use of solar shingles, solar slates, solar glass laminates and other solar building design solutions. In urban areas care should be taken to ensure that photovoltaic installations are not overshadowed by neighbouring buildings or other structures.

Planning Exemptions for Solar Energy Development

5.80. There are exemptions contained within the Planning & Development Regulations 2001 to 2008 (SI No. 83 of 2007, SI No's. 235 and 256 of 2008), regarding the placing of solar technology, on domestic structures, and on buildings used/associated with industrial, light industrial, business and agricultural purposes. These exemptions allow for the erection of solar panels (thermal and PV) without the requirement to obtain planning permission subject to complying with the regulations. Public buildings and schools are not included within the Regulations as amended.

Suggested Policy Approach to Solar Energy

5.81. It suggested that the plan support and facilitate the development of solar energy, encourage passive solar design and solar water heating in new buildings and in retrofitting buildings. Also where possible, the installation of solar power in public buildings, including schools should be encouraged.

Bioenergy

Introduction

5.82. Bioenergy is the general term used to denote renewable energy derived from organic matter or biomass. Bioenergy sources include, waste and residues from agriculture (including vegetal and animal substances), forestry and related industries including fisheries and aquaculture, as well as the biodegradable fraction of industrial and municipal waste. Biomass can be used to generate electricity, heat and transport fuels.

5.83. The bioenergy sector will play a key role in the delivery of our renewable heat and renewable transport targets. The RE Directive categorises bioenergy into three sub-groups: biomass, bioliquids and biofuels. The development of this renewable is a key component of the Government's objectives under the Energy Policy Framework 2007 – 2020. The National Bioenergy Action Plan sets out an integrated strategy for the collective delivery of the potential benefits of bioenergy resources across the agriculture, enterprise, transport, environment and energy sectors. The Renewable Energy Feed in Tariff scheme includes a fixed monetary support for both biomass from landfill and biomass from other sources.

5.84. Bioenergy technology is well advanced and the amount of electricity generated from biomass is likely to increase rapidly. In recent years the agricultural industry has been moving into areas such as energy production. It is envisaged that bioenergy as a means of generating electricity, heat and transport fuel will grow significantly over the life of this strategy. This will be supported by the infrastructure being developed for transmission and distribution of wind generated energy. In addition to contributing to national targets it is expected that this energy sector will provide employment in both rural and urban areas.

5.85. Biomass can be derived from two main streams, specifically grown energy crops and organic residues or waste. Cork, as in Ireland as a whole, has a significant bioenergy potential in the form of agricultural land, forestry, recycled waste from municipal and domestic treatment plants, agriculture and industrial sources. All of these sources can be used to generate electricity, refined into fuel for the transport sector, provide heating/cooling for the building sector or as a source for biochemical raw materials for Irish industry.

5.86. Both the Government and the South West Regional Authority have developed Action Plans for the development of the bioenergy sector. These plans set down production targets and proposals for the development of a collaborative multi agency approach supported by fiscal incentives. It is the intention of the Planning Authority to facilitate the development of bioenergy where such developments are in accordance with the proper planning and sustainable development of Cork. It should be noted that the use of certain materials as raw material for the energy generation process may have obligations under legislation other than the planning acts. For example, the use of food waste may require authorisation under both the relevant Waste Management Legislation and under Animal By-Products legislation.

5.87. The South West Bioenergy Plan 2009-2020 published by the South West Regional Authority recommends that the Whitegate area be designated as a National Bioenergy Park, to accommodate research and development as well as production of biofuels and other bioenergy resources. As a country that currently imports over 90% of its energy resources, domestic production of bioenergy could significantly improve the security of energy supply. This plan sees Whitegate as being of strategic importance in the delivery of the national target of 10% biofuel use in transport by 2020 through working closely with the Whitegate refinery to maximise levels of fuels blends and exploiting the established distribution networks.

Biomass

5.88. Biomass is defined in the RE Directive as the biodegradable proportion of products, waste and residues from agriculture (including vegetal and animal substances), forestry and related industries, including fisheries and aquaculture, and the biodegradable fraction of industrial and municipal waste.

5.89. Biomass can be burned to produce heat that is used to create steam to turn turbines to produce electricity and/or heat. Energy from biomass, including organic waste, is referred to as bioenergy.

5.90. Liquid biofuels can be derived from biomass crops such as oilseed rape. Biomass sources can be identified under the headings of energy crops and organic residues.

5.91. When plant material is burned for energy purposes, carbon dioxide is released. However, because new plant growth absorbs the amount of carbon dioxide released on combustion, bioenergy is considered to be 'carbon neutral'. REFIT 3 for biomass technologies was introduced in 2012 following state-aid clearance.

5.92. Biomass can be refined or upgraded to produce either solid bio fuel such as wood pellets and liquid bio fuels which include bio diesel. Biomass can be used directly to generate heat or electricity, domestically in stoves or wood fuel boilers, or at a community/regional level through biomass power plants and Combined Heat and Power (CHP). Biomass materials can also be used on a larger scale through co-firing in existing fossil fuel powered electricity generating stations.

5.93. A considerable amount of land is required to produce the fuel necessary for a bioenergy plant. The actual exploitation of this resource will also be dependent on other factors such as the conservation status of the woodland, accessibility and countryside policies.

5.94. There are considerable forestry plantations in the County and in Cork forestry is viewed as the main source of biomass for the foreseeable future. The location of forestry in the County can be viewed on the SEAI interactive mapping system. An interactive map of soil types can also be viewed. The Bioenergy mapping system also indicates potential and actual bioenergy crops, forestry, biomass and waste locations. There are examples of specific energy crops such as Miscanthus and Winter Oil seed Rape dispersed throughout many parts of the county and a smaller number of locations for Reed Canary Grass, Spring Oil Seed Rape, Switch Grass and Willow SRC but the areas involved are very small and are dispersed throughout the county. Biomass boilers installed under Reheat Greener Homes can also be viewed throughout the county by DED – see tables 5.2 and 5.3 below.

5.95. A significant amount of land is also required for the production of biofuel in the form of Bio-ethanol or Biodiesel. Bio-ethanol is produced by fermenting the sugar components of plant material and can be used as a fuel for vehicles. Biodiesel is made from vegetable oil, animal fats or recycled greases and can also be used as a fuel for vehicles. The main advantage of biofuel is that it can be manufactured from a wide range of materials including crop waste, manure, and other by-products, making it an efficient step in recycling. Under the Energy (Biofuel Obligation and Miscellaneous Provisions) Act 2010, fuel suppliers will be required to supply an average of 4% Biofuels in their annual fuel sales.

Table 5.2: Biomass Demand – Reheat in County Cork				
Area	**Sector**	**Fuel type**	**Boiler size kW**	**Year completed**
West cork	Hotel	Wood chip	100	2007
Bantry	Commercial	Woodpellet	25	2008
Bantry	Residential	WP	100	2007
Skibbereen	Commercial	WC	145	2007
Skibbereen	Industrial	WC	300	2007
Cork	Commercial	WP	110	2008
Cork	Commercial	WP	70	2006
Bandon	Commercial	WC	80	2006
Bandon	Commercial	WC	80	2006
Cork	Commercial	WC	120	2007
Cork	Residential	WP	80	2002
Cork	Residential	WC	250	2008
Cork	Public service offices	WP	240	2007
Glanmire	Commercial	WP	145	2007
Glanmire	Commercial	WP	160	2010
Fermoy Hospital		WC	500	2009
Fermoy	Residential	WC	85	2007
Mitchelstown	Agricultural	WC	500	2008
Mitchelstown	Agricultural	WC & WP	397	2007

Source: SEAI website.

Table 5.3: Industrial Biomass Users in County Cork
Graingers Sawmills, Co. Cork
Palfab Ltd Sawmills, Co. Cork
CHP Biomass Munster Joinery 3MW electrical output & 9MW thermal output

Anaerobic Digestion

5.96. Anaerobic Digestion (AD) uses bacteria to convert organic material such as agricultural, household and industrial residues and sewage sludge into bio-gas with high methane context in the absence of oxygen. The methane can be used to produce heat, electricity, a combination of the two or a transport fuel, thereby contributing to renewable energy targets across the three main sectors and ensuring security of energy supply by reducing reliance on fossil fuels and diversifying the national fuel mix.

5.97. The process of Anaerobic Digestion (AD) involves the breakdown of organic matter by bacteria and enzymes in an oxygen-free environment. This can occur in bogs, landfills, on the bottom of lakes, in stomachs of animals such as cattle or in purpose built vessels. The end product of this process is biogas. Biogas is a mixture of the combustible gas methane (50-75%), carbon dioxide (25-45%) and small amounts of water (2-7%), as well as trace gases such as hydrogen sulphide, oxygen, nitrogen,ammonia and hydrogen.

5.98. An Anaerobic Digestion plants can vary in scale from small schemes treating the waste from an individual farm through medium-sized centralised facilities dealing with wastes from several farms, (potentially supplemented by crops such as maize grown specifically to feed the digester), to sizeable industrial AD plant handling large quantities of municipal solid waste. In the case of small plants it is likely that the plant can be accommodate within the vicinity of existing farm buildings. Some forms of biomass produce digestate and other end products which must be disposed of. Proposals for such uses will be required to specify suitable outlets for these residues e.g. land banks for landspreading, as part of a planning application.

5.99. Anaerobic Digestion WWTP in Cork County are located at Little Island and Mitchelstown.

5.100. Bioliquids may be defined as the “liquid fuel for energy purposes other than for transport, including electricity and heating and cooling, produced from biomass”. Bioliquid sources include vegetable oils (rapeseed, soya and palm), animal fats and used cooking oils. The liquids may be used to produce heating, cooling and electrical energy.

5.101. Biofuels may be defined as the “liquid or gaseous fuel for transport produced from biomass”. A number of conversion techniques are used to produce biodiesel, bioethanol and biomethane. The main means of supporting renewables at a European Union (EU) Level is through the Directive on the promotion of the use of biofuels or other renewable fuels for transport (2003/30/EC), also referred to as the Biofuels Directive.

Landfill Gas/Waste

5.102. Anaerobic digestion of the organic component of waste occurs naturally, and more slowly than in aerobic digestion, releasing landfill gas (which contains methane and carbon dioxide) into the atmosphere. Gas can be collected at landfill sites and then combusted to extract its energy value. Wells are inserted into the waste to collect the gas through a series of perforated pipes. A suction pump collects the gas, which is then cleaned and ready to be used as a source of energy. In addition to electrical power generation, landfill gas can also be used for combined heat and power (CHP), kiln firing and as a heating or vehicle fuel.

Location and Impacts

5.103. The generation of fuel from biomass, including anaerobic digestion, on a commercial scale is an industrial process potentially involving large structures and grid connections. Such plants should be located in brownfield sites, adjacent to industrial areas or co-located with other wood processing industries.

5.104. Traffic considerations arise as biomass fuel must be delivered from the point at which it is produced to the plant itself. There is a need to ensure that the distances involved are not so great that carbon dioxide emissions from transportation significantly reduce any carbon benefit derived from the use of biomass. Issues related to the generation of traffic and the protection of the carrying capacity of roads will be a material consideration in the assessment of an application.

5.105. Noise (engines, boilers, handling equipment and traffic) may in some cases be sufficiently loud to affect the amenity of adjacent users, particularly in residential areas. Biomass plants may also have an adverse impact on visual amenity. Bioenergy installations will not be permitted in areas which may affect residential or visual amenity.

5.106. Some types of biomass installations have the potential to generate odours and emissions to air. Proposals will be required to demonstrate that these factors have been considered and the scheme will not generate emissions and odours. In relation to location, on-site waste water treatment, emissions from burning of biomass fuel, flood risk, water quality and grid/gas connection proposals will be required to comply with the national policies and any development standards.

Suggested Policy Approach to Bioenergy

5.107. It is suggested that the plan encourage the development of commercial bioenergy plants;

On brownfield sites which are adjacent to industrial areas or
On lands which are reserved for industrial uses or
On brownfield sites in rural areas;

5.108. It is suggested that the plan should encourage the location of commercial bioenergy plants close to the energy source and the point of demand, where they can be served by public roads with sufficient capacity to absorb increased traffic flows and adjacent to transport corridors.

Combined Heat and Power

Introduction

5.109. Combined heat and power (CHP) is a technology that uses the energy produced in the combustion of fuel to produce both useful heat energy and electricity. CHP can refer to gas-fired CHP or biomass CHP. Biomass CHP is a form of renewable energy. In many scenarios, CHP increases the total amount of useful energy that is produced from a fuel when it is burned. However, the ratio of production of heat and electricity from a CHP unit is often fixed.

5.110. Following power generation, the waste energy from CHP is used to create heat, which can then be used to heat the spaces in buildings (radiators/under floor heating), or enable a building to be cooled. A CHP scheme typically saves around 25% of the energy that would have been required to produce electricity in a conventional power station and heat in separate heat-only boilers with commensurate savings of

emissions including carbon dioxide (CO2), Nitrogen Oxides (NOX) and Sulphur Dioxide (SO2). CHP plants burn gas, petroleum based fuels, solid fuels including peat and coal, waste streams, and renewable biomass fuels. The vast majority of the CHPs in Ireland burn gas. To be classed as a renewable energy CHP plants must be fuelled by renewable sources.

5.111. Combined Heat and Power pre-gate projects connected in County Cork include Grainger's sawmills CHP , Dairygold mitchelstown (2), Charleville Goldenvale and Carbery milk products.

Table 5.4 List of CHP in County Cork

Project	Type	MEC MW	110kv station	Status	Offer type
Grainger's sawmills CHP	CHP	2.7	Bandon	Connected	Pre-gate
Dairygold Mitchelstown (2)	CHP	0	Barrymore	Connected	Pre-gate
Carbery milk products	CHP	6	Dunmanway	Connected	Pre-gate
Golden vale	CHP	4.465	Charleville	Connected	Pre-gate

Source: ESB tables

CHP Directive (2004/8/EC)

5.112. The main means of supporting combined heat and power (CHP) at an EU level is through the Directive on the promotion of cogeneration based on a useful heat demand in the internal energy market (2004/8/EC), also referred to as the CHP Directive. The purpose of the Directive is to increase energy efficiency and improve security of supply within the EU, by creating a framework for promotion and development of high-efficiency CHP based on useful heat demand and primary energy savings in the internal energy market.The Directive includes the following main provisions: Adopt the EU definition for high-efficiency CHP; Introduce a mechanism to guarantee the origin of electricity from high-efficiency CHP; Ensure support schemes for CHP are compliant;Ensure electricity tariffs and conditions for grid access are fair; Commit to analyse national potentials for CHP, identify the barriers which may prevent the realisation of the national potential and report progress towards achieving that potential.

Suggested Policy Approach to CHP

5.113. It is suggested that the plan encourage the increased use of CHP plants around the county.

6.0 RENEWABLE ENERGY IN TRANSPORT

Introduction

6.1. The transport sector is the largest fuel consumer and is responsible for more CO2 emissions than any other sector in the economy. EU and National targets have been set to ensure renewable energy penetration in this sector. By 2020, 10% of energy used in road transport should come from renewable energy sources.

6.2. The NREAP specifies a two-pronged strategy that combines increased use of biofuels with the accelerated development and use of electric vehicles (EV) in Ireland. Electric Vehicles (EV) refer to both Battery Electric Vehicles (BEV) and Plug-in Hybrid Electric Vehicles (PHEV).

6.3. The national Biofuel Obligation Scheme 2010 obliges all road transport fuel suppliers to use biofuel in the fuel mix. The initial penetration rate is 4% per annum, to be increased over time. The biofuel obligation will ensure that Irish consumers have access to appropriately priced, sustainable and reliable sources of biofuel over the coming years, and thus incentivise domestic biofuel production.

6.4. Electric Vehicles also have an important role in the development of a 'Smart Grid' in Ireland as they act to regulate the energy load of the national grid utilising energy produced off peak for charging. The Government has also set a target of 10% penetration of electric vehicles (Evs) in our national vehicle fleet by 2020 which is equivalent to having 230,000 vehicles on the road. The Government, SEAI and the ESB/Electric Ireland are taking a broad-ranging series of initiatives around EVs, including signing memoranda of understanding with a number of motor manufacturers, committing to a large-scale national rollout of Electric Vehicle Infrastructure and supports for customers.

6.5. The Government is providing a grant towards the purchase of the first 6,000 EVs in order to encourage Irish Consumers to consider switching to an electric vehicle. The grant is provided to the Dealer and the benefit is passed on to the Consumer as a price reduction on the vehicle. ESB Networks has announced detailed plans for the rollout of EV charging points across the country. ESB Networks has set itself a target of installing 30 'fast charge' points, 1,500 public charge points and 2,000 home charge points, in line with EV sales. These are expected to be completed by mid-2012.

6.6. To date over 550 electric vehicle charge-points have been installed nationally with an additional 358 domestic/commercial installations in place. Nineteen charage points have been installed throughout Cork including public charge points, fast charge points and legacy 3 pin charge points as outlined in the following tables;

Table 6.1: Electric Vehicle Charge Points Installed throughout Cork		
14 X Public Charge Points Installed	**Location**	**Type**
Bantry	Cork Harbour View Car Park, Tone Square	Operational Type 2 (2 Places)
Skibereen	Norton House Car Park	Operational Type 2 (2 Places)
Clonakilty	Deasy's Car Park	Operational Type 2 (2 Places)
Dunmanway	Tanyard Car Park	Operational Type 2 (2 Places)
Kinsale	Fire Brigade	Operational Type 2 (2 Places)
Macroom	Macroom Council Car Park	Operational Type 2 (2 Places)
Mallow	Tesco Mallow	Operational Type 2 (2 Places)
Fermoy	Supervalue Courthouse	Operational Type 2 (2 Places)
Youghal	Dolphins Place	Operational Type 2 (2 Places)
Crosshaven	Carrrigaline Road	Operational Type 2 (2 Places)
Cork	Musgraves Group head office	Operational Type 2
Cork	Musgraves Group head office	Operational Type 2
Cork (Commons road)	Deasys service station	DC & AC operational 24 hr access
Cork	Centra Rochestown	Operational Type 2 (2 Places)

2 X Fast Charge Points installed Cork County	**Location**	**Type**
Deasys service station	Commons Road	Operational AC & DC 24 Hour access
Cork CIT	Bishopstown	Operational 3 pin (domestic socket)

3 X Legacy 3 Pin Charge Points installed Cork County	**Location**	**Type**
Cork	51 South Mall	Operational 3 pin (domestic socket only)
Cork	51 South Mall	Operational 3 pin (domestic socket only)
Cork	Windsor Motors Carrigrohane Road	Operational DC Business Hrs only

Suggested Policy Approach to Renewable Energy in Transport

6.7. It is suggested that the plan should support the provision of suitable infrastructure to encourage an increase in the use of electric vehicles.

7.0 SUPPORTING INFRASTRUCTURE

Ports, Harbours/ Piers

7.1. Development of ocean energy (wave and tidal), off shore wind energy and on shore wind energy and the associated servicing greatly depend on capacity of our port infrastructure. Water depths of up to 37m are required to accommodate large vessels.

7.2. The port's activities are located in several areas of the harbour, including traditional open wharves within the city and container facilities at Tivoli and a modern deep-water facility with freight and passenger 'Ro-Ro' facilities at Ringaskiddy. There are a number of specialised facilities for oil and petroleum at Whitegate, general cargo at Passage-West and a specialised facility constructed to serve the former IFI plant at Marino Point (disused). In addition, there are important tourist related facilities for passenger liners and cruise ships at Cobh.

7.3. Integral to both the expansion of the Port of Cork and the planned redevelopment of the City Docklands is the relocation of port activities and related uses from the City Docklands and Tivoli to new sustainable locations in the harbour. In the recent past, there have been conflicting views on the provision of transport infrastructure to serve the new port facilities particularly with regard to road capacity issues and the future role of rail freight.

7.4. Cork has potential competitive advantage in production or servicing of marine energy devices, and substantial investment in the research infrastructure is talking place. The oil refinery, gas pipeline, generation capacity and converging trunk electricity lines at Whitegate, with associted skills, provide a critical mass of facilities which help attract further activity (eg the recently completed Bord Gais power station).

7.5. The Department of Transport has identified four major ports and harbours in the region for particular attention: Kinsale, Bantry, Youghal and Baltimore.

District Heating

7.6. District Heating is a system for distributing heating comprising of a boiler which generates hot water and a network of connected underground pipes to distribute the hot water. The central boiler can be fired by fossil fuels, biomass, geothermal or nuclear sources. Co-firing occurs where boiler can fire a mixture of fuel sources. District heating plants can provide higher efficiencies when the boiler provides both heat and electricity – this system is know as Combined Heat and Power (CHP). For reasons of economies of scale they are particularly suited to urban areas and zoned industrial lands in larger settlements.

Energy Storage

7.7. Renewable energy sources have vast potential to reduce dependency on fossil fuels and greenhouse gas emissions. Despite this many of the resources have intermittent or variable output, therefore if they are not harnessed the energy goes to waste. As a result there is an increasing need for energy storage when demand is low to be utilised when demand is high. There are a number of storage systems including hydroelectric energy storage (PHES), battery storage and thermal storage:

1. Pumped hydroelectric energy storage

7.8. (PHES) See “Hydro Power” section above.

2. Battery Storage

7.9. Battery Energy Storage can be integrated with renewable energy generation systems in either grid connected or stand alone applications. For grid connection systems batteries add value to intermittent renewable sources by facilitating a better match between supply and demand. There are a number of different types of battery technologies. There are no emissions, solid wastes or effluent produced from these battery storage systems.

3. Thermal storage

7.10. Thermal energy storage comprises a number of technologies that store thermal energy in energy storage reservoirs for later use. They can be employed to balance energy demand between day and night. Its applications include; the production of hot water which is used to cool or heat buildings.

8.0 ENERGY CONSERVATION AND EFFICIENCY

Introduction

8.1. The EU Directive (EPBD) 2002 and EU Directive 2010/31/EU (recast) on the Energy Performance of Buildings (EPBD) contains a range of provisions aimed at improving energy performance of residential and non residential buildings, both new build and existing. The Directive 2010/31/EU on the Energy Performance of buildings (recast) must be brought into Irish law by 2012 to reduce dependence on imported fossil fuels and reduce green house gas emissions by the use of nearly zero energy buildings and the use of renewables.

8.2. The EU Directive, 2006-32 -EC 'Energy End Use Efficiency and Energy Services' sets out targets for energy reduction in the member countries. Ireland has introduced a Statutory Instrument SI No. 542, which requires public bodies to show leadership in energy efficiency and achieve a 33% reduction in energy and CO2 emissions by 2020.

8.3. The EU Directive, 2009-28-EC 'Promotion of Renewable Energy & Mandatory Targets' established an obligation for all member states to identify its own renewable energy potential and an ability to contribute to the European target of a 20% increase in the use of renewable energy by 2020. In response to the European Directives, Ireland has produced the following; National Energy Efficiency Action Plan for Ireland 2007 – 2020 & National Renewable Energy Action Plan for Ireland.

8.4. In order to provide future generations with a secure clean energy resource it is essential that we increase out energy efficiency and use indigenous low carbon energy resources to meet the reduced quantity required.

Cork Energy Agency Office

8.5. In 1995, Cork County Council established the Energy Agency Office under European Commission's Regional and Urban Energy Planning Programme. The office has secured over 38 EU co-funded energy projects and accumulated over 70 partners in 13 European countries since 1995. The main goal of the Energy Office is to educate the general public about energy conservation and renewable energy. This is achieved through the following measures: the dissemination of literature; the provision of a reference library and the provision of advice to the public.

Lifetime Lab Information Centre

8.6. This is home to Cork City's Energy Agency which advises the public on greater management of energy e.g planning applications, how that can be improved from a carbon footprint point of view. The Lifetime Lab is a working example of the use of energy conservation with 80% of its required energy provided from renewable resources available on site.

Draft Cork County Council 'Sustainable Energy Action Plan 2010 – 2020'

8.7. Cork County Council signed up to the Covenant of Mayors in March 2011. The covenant of mayors is an initative of the European Commission that will being together mayors from across Europe in a network to commit to go beyond the EU Objective of a 20% reduction in GHG emissions by 2020. The covenant requires members to draft and submit a sustainable energy action plan (SEAP), produce an evaluation

report on a yearly basis and share and disseminate knowledge and best practice on energy with other territories. A Steering Committee Members oversee the Draft Cork County Council 'Sustainable Energy Action Plan 2010 – 2020' and is drawn from all sectors of the organisation. The SEAP is being developed in conjunction with an organisation wide energy action plan with the aim of developing a roadmap to achieve 33% reduction in energy saving by 2020 in accordance with national legislation indicated in the National Energy Efficiency Action Plan 2009 – 2020, and a minimum 21% reduction in emissions as per our Covenant of Mayors target.

Exemptions in relation to renewable energy.

8.8. The Planning and Development Regulations 2007 (S.I. No. 83 2007) These Regulations set out planning exemptions for micro-renewable energy technologies for domestic houses and came into effect from 28 February, 2007 including part of heating systems, wind turbine, solar panels and ground heat pump system or air source heat pump.

8.9. The Planning and Development Regulations 2008 (S.I. No. 235 of 2008) give effect to new exempted development provisions in respect of renewable technologies for industrial buildings, business premises and agricultural holdings. The Regulations provide exemptions for wind turbines, met masts, combined heat and power (CHP) plants, solar panels and biomass boiler units, subject to certain conditions, across each of the sectors. The Regulations came into effect from 2 July 2008.

Suggest Policy Approach

8.10. The plan should encourage the highest standards of energy effficiency and energy conservation in existing and new builds.

9.0 COMMUNITY BENEFIT

9.1. Section 37G(7) (d) of the Planning and Development (Strategic Infrastructure) Act 2006 (No.27 of 2006) provides for An Bord Pleanala to attach a condition requiring the construction or financing of facilities or services for the local community in the area of the proposed development. Where appropriate, the provision of community gain initiatives should be incorporated into wind farm developments.

9.2. International experiences demonstrate alternative approaches to community gain, which enable a degree of direct benefits to people in the locality of significant energy and renewable energy projects. While the Cork Energy Background Paper and any subsequent development objectives of the Draft Cork Development Plan are required to comply with the restriction of the Irish Planning Acts, it may be possible for an energy and renewable energy business to enter agreements with communities to deliver particular and agreed benefits to a community. A number of wind energy projects in County Cork have been developed in a co-operative manner within and on behalf of local communities. This can empower communities to have direct benefit from renewable energy projects while also contributing to a low carbon economy.

10.0 MICRO RENEWABLES

Introduction

10.1. Micro renewable generation for domestic, agricultural and light industrial activities are now exempted development subject to criteria detailed in Statutory Instrument No.83 of 2007, No.235 of 2008 and No.256 of 2008. Further information on these exempted developments is available by downloading the above statutory instruments or by contacting Cork County Council or the Department of Environment, Heritage and Local Government.

Autoproduction

10.2. This refers to the generation and consumption of electricity in a single premises by a person, company or community. Whilst the primary purpose of autoproduction is the generation and consumption of energy on site, a limited amount of surplus energy may be distributed back into the grid in some cases where possible. Wind energy development serving a local community or autoproduction may be considered, where the proposed turbines are small in size and where environmental, landscape and amenity considerations can be adequately addressed at project level. Pre -planning discussions with the Planning Authority are advised at early stages in the process.

Suggest Policy Approach

10.3. It is suggested that the plan support and encourage the development of micro-renewables subject to normal planning considerations.

APPENDICES

The following appendices are included with the Energy Background Paper:

- **Appendix 1:** Wind Energy Development, Guidelines for Planning Authorities 2006; Summary
- **Appendix 2:** Tables of Installed, Permitted and Pending Wind Energy Developments in Cork
- **Appendix 3:** Maps of Wind Energy Policy Considerations
- **Appendix 4:** Stages for Appropriate Assessment (AA)
- **Appendix 5**: Interaction with Wind Energy Policies of the four Adjoining Authorities
- **Appendix 6:** Policy Considerations for Wind Energy Table 1
- **Appendix 7:** Strategic Environmental Assessment (SEA), Habitats Directive Assessment (HDA) and Flood Risk Assessment
- **Appendix 8:** Terms and Definitions
- **Appendix 9:** List of Acronyms
- **Appendix 10:** List of References and Documents

Appendix 1

Extracts Wind Energy Development, Guidelines for Planning Authorities 2006

The current 2006 Wind Energy Guidelines supersede the Wind Farm Development Guidelines of 1996 issued by the Department and are the current statement of government policy on wind energy. These guidelines relate solely to land use and environmental issues related to **on-shore wind energy**. Offshore wind farms are excluded from the provisions of the P&D Act 2000.

The Guidelines aim to offer advice to Planning Authorities on planning for wind energy through the Development Plan process and in determining planning applications. They also provide a sample methodology for the identification of suitable locations for wind energy development within their boundaries and the treatment of planning applications for wind energy proposals.

Chapter Three of these guidelines recommend that **the development plan** should set out the following policies and objectives;

* A positive and supportive statement of the importance of wind energy as a renewable energy source which can play a vital role in achieving national targets in relation to the reductions in fossil fuel dependency and therefore greenhouse gas emissions, together with an objective to ensure the security of energy supply.

* Objectives to secure the maximum potential from the wind energy resources of the planning authority's area.

* The identification on development plan maps of the key areas within the planning authority's functional area where there is significant wind energy potential and where, subject to criteria such as design and landscape planning, natural heritage, environmental and amenity considerations, wind energy development will be acceptable in principle;

***** The specific criteria for wind energy development that the planning authority will take into account when considering any wind energy or related proposals in the key areas identified, based on the recommended siting and design criteria referred to in these guidelines.

***** The investigation of the potential for relatively small-scale wind energy developments within urban and industrial areas, and for small community-based proposals outside the key areas that are identified as being appropriate for wind energy development.

Step-by-Step Guide to the Analysis of Suitable areas for Wind Energy by the Planning Authority; In order to assist planning authorities to identify, on development plan maps, key areas where there are good wind energy resources capable of exploitation in a manner consistent with proper planning and sustainable development, a step-by-step approach is proposed in Chapter Three of the guidelines. This ordered approach involves a sieve mapping analysis of the key environmental, landscape, technical and economic criteria which must be balanced in order to identify the most suitable location for wind energy development.

Step 1 Assess the areas of wind potential ranging from areas with extensive wind energy resources to lesser wind resources using Sustainable Energy Ireland's Wind Atlas for Ireland. The Wind Atlas for Ireland displays wind speeds at 50 metres, 75 metres and 100 metres above ground level. The three heights represent the hub height of current and near future wind turbine technology.
Step 2 Prepare or utilise an evaluation of the landscape and its sensitivity for wind energy developments. Factors that can inform landscape sensitivity to wind energy development, include scenic quality, rarity, uniqueness and natural and cultural heritage considerations.(Some local authorities have prepared landscape characterisation maps, which could support this process).
Step 3 Prepare an overlay of the landscape evaluation and sensitivity analysis, and sensitivity and wind energy mapping, together with information regarding built and natural heritage, archaeological and amenity designations in the Development Plan. This will identify those areas affected by statutory obligations and will facilitate optimising visual integration into the landscape while at the same time maximising the utilisation of wind energy resources. The process of overlaying wind energy mapping and landscape assessment with the development plan designations will produce a basis for identifying broadly, the areas where wind energy developments would be '**acceptable in principle'**, where they would be '**open for consideration'**, and where they would be '**not normally permissible'.**
Step 4 Integrate the areas identified in step 3 with information regarding accessibility to electricity transmission and distribution grids. Details of the electricity transmission and distribution network are provided in Sustainable Energy Ireland's Wind Atlas for Ireland. The guidelines also encourage Planning authorities, to utilise Geographical Information Systems and to develop Geographical Information Systems expertise, viz.: Identification of Areas ; Assessment of Wind Energy Proposals and The Monitoring of Wind Energy Development. The designation of an area for protection of natural or built heritage or as an amenity area does not automatically preclude wind energy development. However, consideration of any wind energy development in or near these areas must be subject to Ireland's obligation under the Habitats Directive (92/43/EEC), the EU (Birds) Directive (79/409/EEC) and the Environmental Impact Assessment Directive. The guidelines state that clear guidance on policy and objectives should be available in development plans on the natural and built heritage, and the information contained therein on location and status should be accurate and up-to-date. Guidance is also given in relation to amenity designations. The visibility of a proposed wind energy development from designated views and prospects would not automatically preclude an area from future wind energy development but the inclusion of such objectives in a development plan is a material factor that will be taken into consideration in the assessment of a planning application. Guidance is also given on the assessment of wind energy development on tourism and recreational activities. In many areas in Ireland, tourism and recreation underpin the local economy and can depend on varying degrees on the quality of the environment.

The information in Chapter 6 of the Wind Energy Guidelines provides guidance in assessing the impacts of wind farms in areas identified as suitable/open for consideration for wind farm development in the step-by-step process. However, it is important to note that this guidance does not apply to areas that have been identified in the step-by-step process as not suitable for wind farm developments.

Chapter 6 'Aesthetic Considerations in Siting and Design'; provides guidance to planning authorities on decision making in relation to the siting and design of wind energy developments in the landscape when assessing applications for planning permission.

It comprises a series of line diagrams that are conceptually illustrative of typical problems and solutions as viewed from a fixed idealized location.

The guidance is indicative and general. It typifies 'best fit' solutions to likely situations and is thus, proactive. It does not suggest that wind energy developments are appropriate in any given situation.

The highest standards of siting and design for a wind energy development should be expected where the sensitivity of the landscape is high and the locations from where it is viewed are critical.

Particular landscapes of very high sensitivity may not be appropriate for wind energy development.

These questions can be informed and/ or qualified by the values people attach to landscape and by evaluating their sensitivity through **sieve analysis** described in Chapter 3 (as outlined above) on the development plan process, or otherwise at a strategic and/or project specific level.

Appendix 2

Installed/Commissioned, Permitted, Pending Wind Energy Developments in County Cork

Table 1 Commissioned wind energy development in County Cork

Table 2 Granted wind energy development in County Cork

Table 3 Pending wind energy development in County Cork

Table 1: Installed / Commissioned Wind Energy Capacity in Cork.

Number	Windfarm Name	No. of Turbines	Total Power (MW)	Planning Application	Applicant/ Operator	Gate/ Offer Type	Connection Node	Connection Year
1c	Currabwee	7	4.60	98/680	Kingston Patrick	Pre-Gate	110 KV Dunmanway	01/11/1999
2c	Milane Hill	9	5.94	98/1482, 04.108950	B9 Energy Services Ltd.	Pre-Gate	110 KV Dunmanway	01/09/2000
3c	Gneeves	13	9.35	03/6585, 04/0188	SWS Nat. Resources Ltd.	Pre-Gate	110 KV Knockearagh	04/10/2005
4c	Coomatallin	7	5.95	06/960, 00/6380	Airtricity	Pre-Gate	110 KV Dunmanway	01/01/2005
5c	Cappaghboy Beg	9	8.50	03/6910, 04.209745	Gaoithe Glas Teo	Pre-Gate	110 KV Ballylickey	22/08/2006
6c	Kilvinane	4	4.85	01/980, 04.127137	Draper Leonard	Pre-Gate	110 KV Bandon	02/08/2006
7c	Lahanaght	3	4.25	00/805	O'Regan & Collins	PMOD	110 KV Dunmanway	08/06/2006
8c	Taurbeg	14	25.30	02/3608	B9 Energy Services Ltd.	PMOD	110 KV Glenlara	01/03/2006
9c	Coomacheo	15	42.5	03/1997	Airtricity	Gate 1	110 KV Garrow	June 2008
10c	Coomacheo (Ext Curragh)	8	18	07/10105	Curragh Mountain WF	Gate 2	110 KV Garrow	July 2009
11c	Carigcannon Banteer	10	23	03/4181	Carrigcannon WF Ltd	PMOD	110 KV Boggeragh	01/09/2011
12c	Boggeraghs	19	57	08/5944	Green Energy Ltd			

Number	Windfarm Name	No. of Turbines	Total Power (MW)	Planning Application	Applicant/ Operator	Gate/ Offer Type	Connection Node	Connection Year
13c	WEDcross	2	4.5	06/12483, 06/7844	Munster Joinery	Gate 2	110 KV Knockearagh	01/11/2009
14c	Reenascreena	5	4.5	03/4740, 08/2037	Reenascreena WF Ltd	Gate 2	110 KV Dunmanway	10/02/2010
15c	Ballybane (Glanta 1)	13	20	02/2381, 05/9586	Ballybane WF	Pre-Gate	110 KV Ballylickey	14/07/2008
16c	Ballybane (Glanta 2)	6	8.4	09/849, 88.235028	Ballybane WF	Gate 2	110 KV Ballylickey	01/11/2009
17c	Crocane	2	1.6	02/4699	Michael Quirke	Gate 2	Middleton	13/04/2011
18c	Bawnmore; Burren	8	9	08/8770, 04.232274	Michael Murrane	Gate 2	110 KV Macroom	14/10/2011
18c	Bawnmore; Carriganimmy (Total for Bawnmore 18c = 21MW commissioned IWEA)	6	15 **Total 21MW**	07/4102, 02/4596	Carriganimmy Community	Gate 2	110 KV Macroom	14/10/2011
	Total Jan. 2012		**269 MW**					
19c	Clydraghroe WF Ltd		5					2012
20c	Energia Renewables Caherdowney		9.20					2012
	Updated Total		**283.46MW**					

Table 2: Permitted Wind Energy Capacity in County Cork.

Number	Windfarm	No. of Turbines	Total Power(MW)	Planning Application	Applicant/ Operator	Gate/ Offer Type	Connection Node	Connection Year
1g	Garranereagh, Lissardagh	4	8.75	10/5771, 09/4708, 08/9783	Sigatoka Ltd	Gate 2	Macroom	23/12/12
2g	Pluckanes, Kilbarry	1	1.0	09/4399, 07/5514	O'Leary	Gate 2	Kilbarry	Stalled
3g	Bantry Bay Mussels Ltd.		2.0	97/885, 04/5266	Bantry Bay Seafoods Ltd.	Gate 2	Ballylickey	Stalled
4g	Foiladaun WF Cordal	5	11.5	06/4439, 11/4361	Kemar Ltd & Four Seasons Energy	Gate 2	Cordal	30/12/2013
5g	Glentanemacelligot WF			06/4077, 11/4361		Gate 2	Cordal	30/12/2013
6g	Knockacummer (1)	29	87	11/5246, 04/8354	SWS Knockacummer WF Ltd	Gate 2	Knockacummer	30/10/2012
7g	Boggeragh Phase 2	16	57	10/8067	Greenway Renewables Energy Ltd.			
8g	Barnadivane	14	60	11/06605, 05/5907	Barna Wind Energy			
9g	Coolea	1	3	11/06225, 06/8273			Coolea	
10g	Caherdowney	4	9.2	03/3079, 10/8508, 08/9493	Steven Lang & Mc Donnell David			**Now commissioned**
11g	Barraboy, Goulacullin	5	6.5	08/2119, 02/5124, 08/1899	G.O'Mahoney/ DP Energy Ireland			
12g	Dromleena	11	9.9	09/1963	Organic Power Limited			
13g	Killaveenoge/ Knockeenboy	8	18.4	11/1950	Environ Renewables			

Number	Windfarm	No. of Turbines	Total Power(MW)	Planning Application	Applicant/ Operator	Gate/ Offer Type	Connection Node	Connection Year
14g	Youghal, Knocknagappagh	2	2	08/9956 & 02/4288	Browne Thomas			
15g	Kilberrihert, Freemount	3	5.4	10/5791	Metro Energy Ltd			
16g	Charleville Foods	1	2	10/6157	Charleville Foods			
17g	Aeerie Renewables Ltd	2	5	09/6555, 12/04446	Aerie Renewables Rathcally			
18g	Newtownshandrum	2	5	11/4974	Aerie Renewables			
19g	Teddy Creedon, Milleeny	2	2	02/2552				
20g	Cape Clear	2	0.25	96/3019				
21g	Hartgrange Enterprises Ltd	2		05/3811	Hartgrange Enterprises Ltd.			
22g	MPFI Schools, Sheskin	2		09/2165, 99.236134				
23g	Bere Island Project Group	1	1	97/520	Martello Tower at Ardagh			
	Total Permitted		**308 MW**					

Table 3: Pending Wind Energy Capacity in Cork.

The pending wind energy capacity in Cork refers to those wind energy developments that are the subject of current planning applications were a decision is still pending (i.e excluding installed and permitted wind energy capacity).

Number	Windfarm Name	No. of Turbines	Total Power (MW)	Planning Application Details	Applicant/ Operator	Gate/ Offer Type
1p	Clenrath, Macroom	11	23.5	11/5245	Macroom Windfarm Ltd Enerco Energy	Appealed to ABP 5.7.12; 04.240801.
2p	Knockeenboy/ Clashloura Dunmanway	6	49	11/00059, 88.240070	James O'Regan (5 landowners)	
3p	Ballyhoura	14	30	03/2263, 11/04947	ESB Wind Developments	
4p	Esk Wind Farm	8	24	11/5276, 08/6037, 02/2553	Boggeragh, Lyre	Gate2
5p	Derreenacrinnig West,	7	5.95	88.239767, 10/857	Drimoleague	
6p	Cork Harbour	2	Reduce energy bill by approx. 30%	11/04944	DePuy (Ireland) Ringaskiddy	
7p	Cork Harbour	1	Reduce energy bill by approx. 30%	11/04945	Janssen Biologics (Ireland) Ringaskiddy	
8p	Cork Harbour	2	Reduce energy bill by approx. 30%	11/04946	Novartis Ringaskiddy	
9p	Cork Harbour	1	Reduce energy bill by approx. 30%	11/04969	GlaxoSmithKlin, Currabinny	
10p	Moneygorm Nagles Mts Glenville	1		11/6168	Calboura Ltd Moneygorm	
11p	Ardrah, Bantry	5	11.5	11/318	Ardra Windfarm	
	Total Pending		**143.95 MW**			

Appendix 3

Maps of Wind Energy Policy Considerations (1 to 7)

Map 1 Map showing location of Commissioned and Granted Wind Farms.

Map 2 **(a)** Map showing wind speeds at 75m hub height including transmission network.

(b) Map showing wind speeds at 100m hub height including transmission network.

Map 3 Map showing Landscape Character and Types (Cork County Development Plan 2009 Volume 3 Maps).

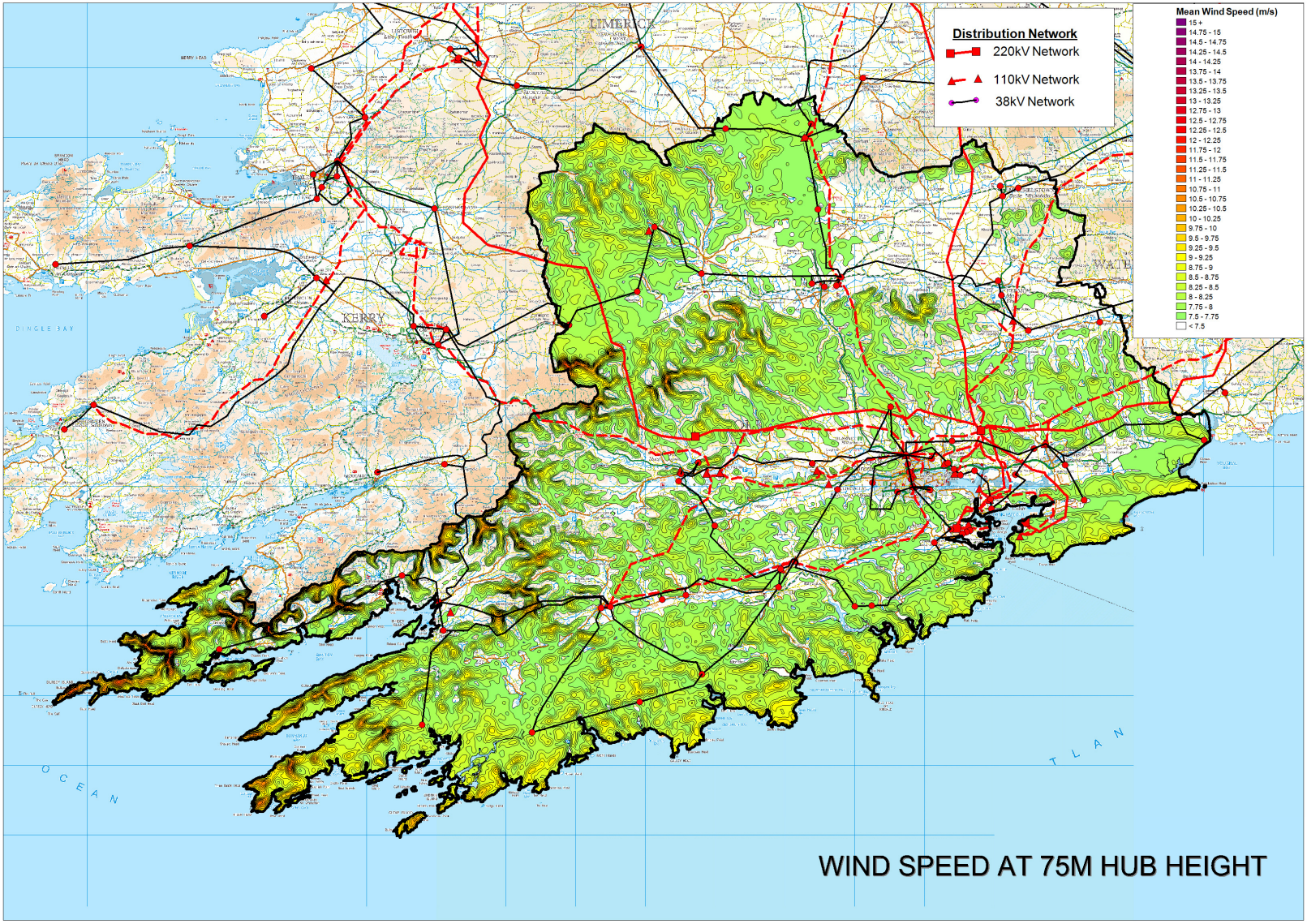
Map 4 Landscape Character Types Value (Cork County Draft Landscape Strategy 2007).

Map 5 Landscape Character Types Sensitivity (Cork County Draft Landscape Strategy 2007).

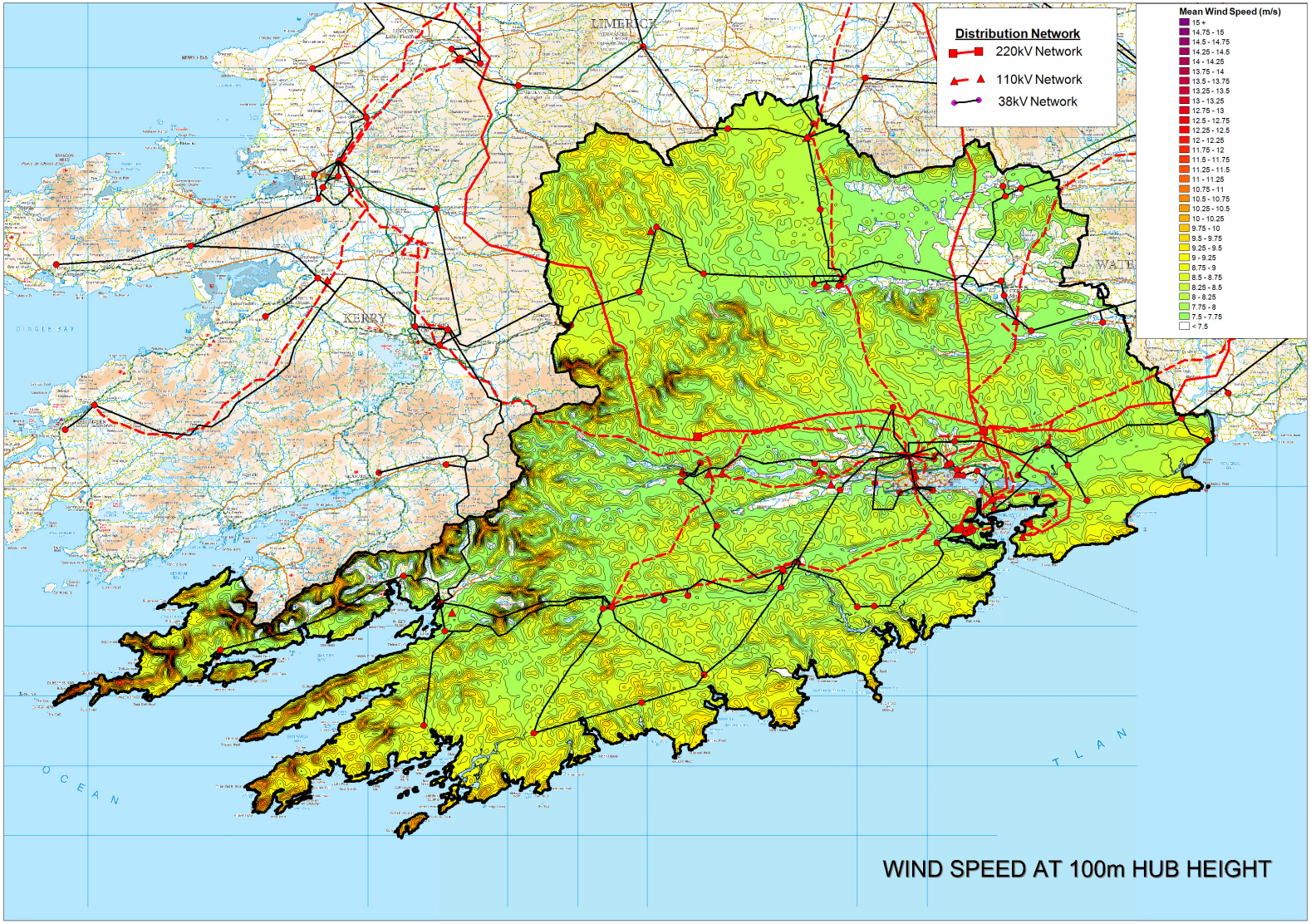
Map 6 Landscape Character Types Importance (from Cork County Draft Landscape Strategy 2007).

Map 7 Map showing all Natura 2000 Sites (SPA and SAC) and Natural Heritage Areas (NHA) and the three FWPMC Areas.

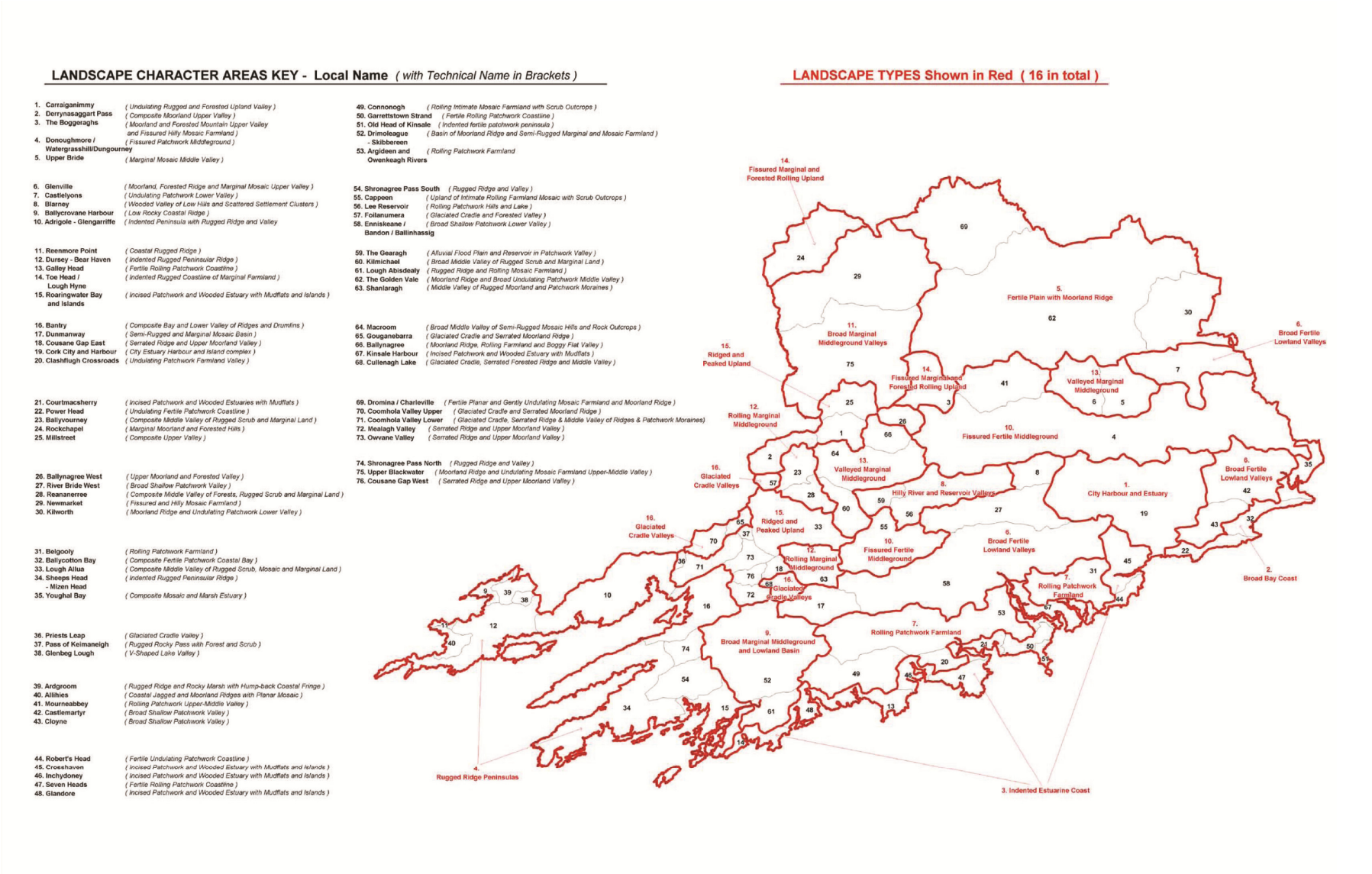
Map 1 Map showing location of Commissioned and Granted Wind Farms.



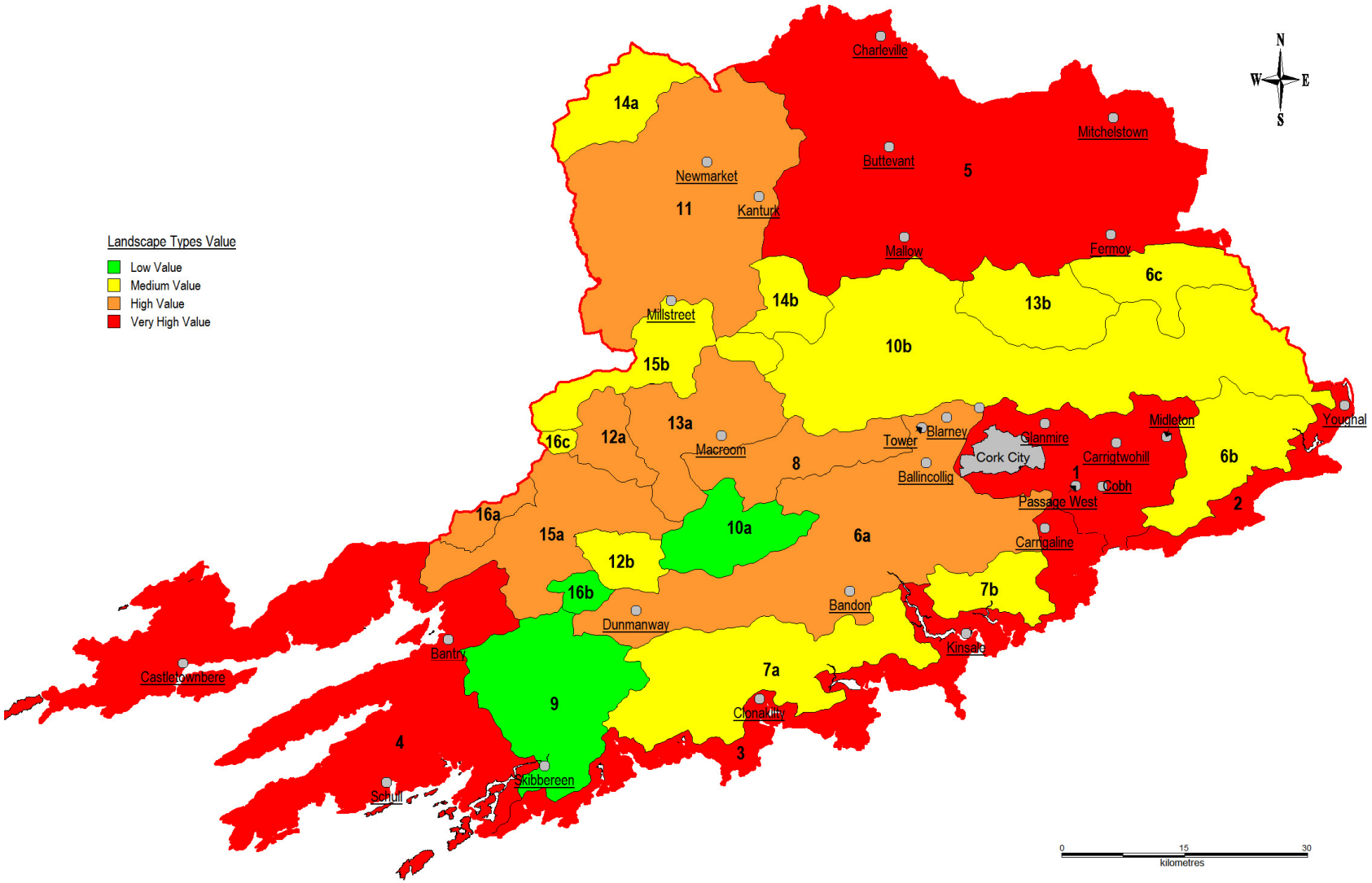
Map 2 (a) Map showing wind speeds at 75m hub height including transmission network.



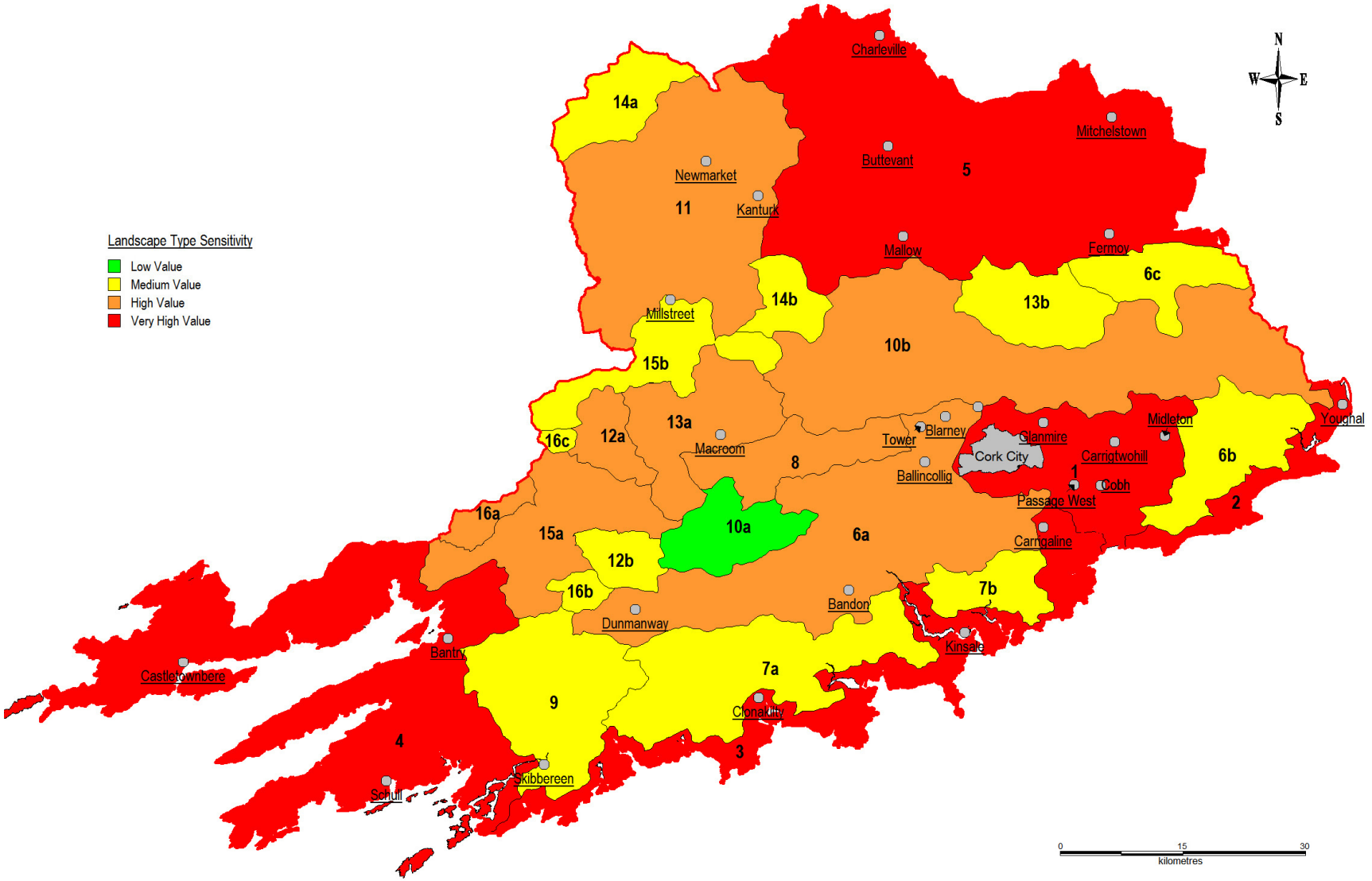
Map 2 (b) Map showing wind speeds at 100m hub height including transmission network.



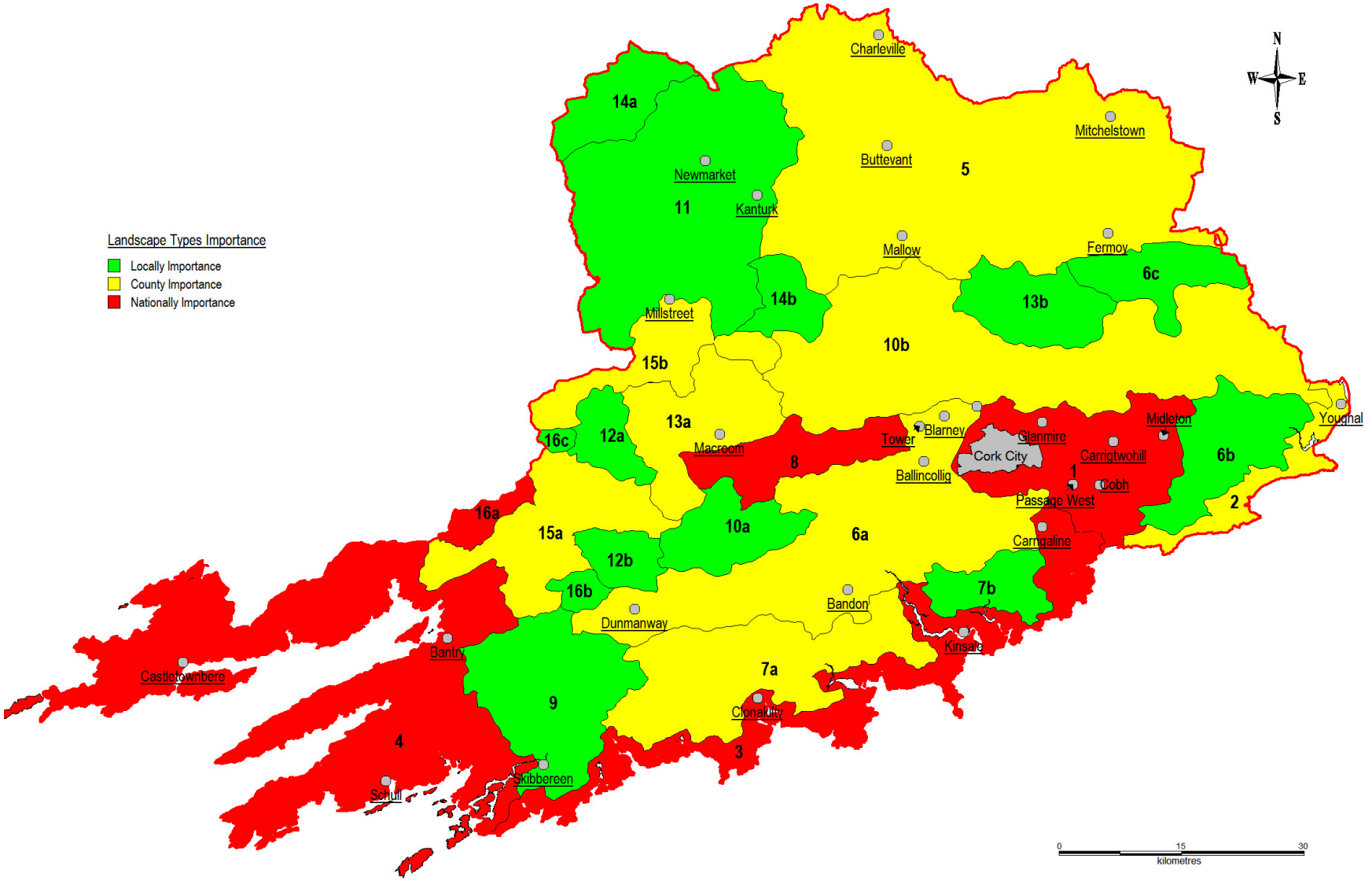
Map 3 Map showing Landscape Character and Types (Cork County Development Plan 2009 Volume 3 Maps).



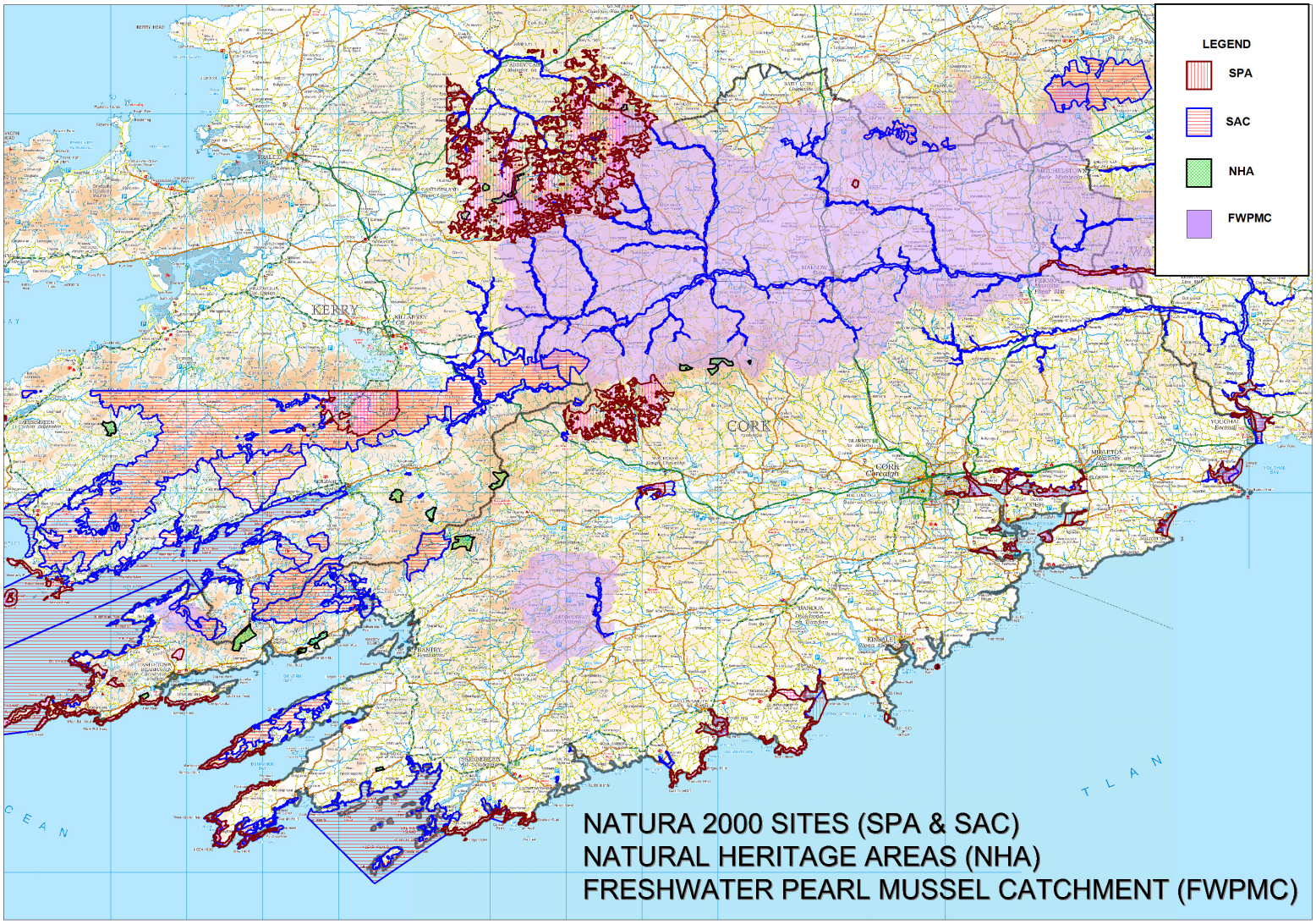
Map 4 Landscape Character Types Value (Cork County Draft Landscape Strategy 2007).



Map 5 Landscape Character Types Sensitivity (Cork County Draft Landscape Strategy 2007).



Map 6 Landscape Character Types Importance (from Cork County Draft Landscape Strategy 2007).



Map 7 Map showing all Natura 2000 Sites (SPA and SAC) and Natural Heritage Areas (NHA) and the three FWPMC Areas.

Appendix 4

Stages for Appropriate Assessment

Stages for Appropriate Assessment (AA)
Stage One: Screening The process which identifies what might be likely impacts arising from a plan on Natura 2000 sites, either alone or in combination with other projects or plans, and considers whether these impacts are likely to be significant. If the effects are deemed to be significant, potentially significant, or uncertain, then the process must proceed to Stage Two.
Stage Two: Appropriate assessment Where the possibility of significant impacts has not been discounted by the screening process, a more detailed assessment is required. This is called an appropriate assessment and involves the consideration of the impact of the plan on the integrity of the Natura 2000 site, either alone or in combination with other projects or plans, having regard to the site's ecological structure and function, and its conservation objectives. Additionally, where there are adverse impacts, it involves an assessment of the potential mitigation of those impacts.
Stage Three: Assessment of alternative solutions Should the conclusion of the appropriate assessment be that there are likely to be impacts which will affect the overall integrity of Natura 2000 site, then it is required to examine alternative ways of achieving the objectives of the plan that avoids such adverse impacts. Stage three of a Habitats Directive Assessment involves the assessment of alternative solutions or options that could enable the plan or project to proceed without adverse effects on the integrity of a Natura 2000 sites. The process must return to stage two as alternatives will require appropriate assessment in order to proceed. Demonstrating that all reasonable alternatives have been considered and assessed, and that the least damaging option has been selected, is necessary to progress to Stage four. Alternatives must be compared with respect to the significance of their likely effects on the integrity of the site/sites. Other assessment criteria, such as economic criteria cannot be seen as overruling ecological criteria.
Stage Four: Assessment where no alternative solutions exist and where adverse impacts remain. This is the main derogation process of Article 6(4) which examines whether there are imperative reasons of overriding public interest (IROPI) for allowing a plan that will have adverse effects on the integrity of a Natura 2000 site to proceed in cases where it has been established that no less damaging alternative solution exists. Such a plan may only proceed if compensatory measures have been put in place to offset the impacts to be incurred and these compensatory measures must be assessed as part of the AA process. The EU Commission must be informed of the compensatory measures and these must be approved by the Minister. Compensatory measures are a last resort attempt to maintain the integrity of the Natura 2000 network and they must be practical, implementable, likely to succeed, proportionate and enforceable.

Appendix 5

Interaction with Wind Energy Policies of the four adjoining Planning Authorities.

Of particular importance to the development of policy for County Cork are the instances where adjoining Counties have adopted a policy discouraging wind energy projects and the main instances are:

Area 1 and 2; Waterford Wind Energy Strategy
The main areas of conflict between Waterford's strategy and Corks policy considerations for wind energy are around the Blackwater Estuary (near Youghal) and the Blackwater Valley near Ballyduff Upper.

The lands either side of the Blackwater Estuary are designated No-Go areas in the Waterford CDP 2011 - 2017 and the adjacent coastal area in Co. Cork at the mouth of the Blackwater is designated 'Important Landscape (Medium) in the 'Policy considerations for Wind Energy Map – Area 1'. A small section of the most south-westerly tip of county Waterford, north-west of Youghal is deemed Open for Consideration for wind energy development.

The lands around the Blackwater Valley to the west of county Waterford which are located between Ballyduff and Lismore are deemed No-Go areas for wind energy development with adjacent lands in County Cork (east of Fermoy around the Blackwater Valley) classified as 'Important Landscape (Medium) in the 'Policy considerations for Wind Energy Map – Area 2'.

Area 3; South Tipperary Wind Energy Strategy
The classification of landscape for wind energy development in South Tipperary discourages wind energy projects in the area of the Knockmealdown Mountains, south east of Mitchelstown and south of Ballyporeen with adjacent lands around Mitchelstown in Cork classified as 'Important Landscape (Medium) – in the 'Policy considerations for Wind Energy Map – Area 3'.

Area 4; Limerick Wind Energy Strategy
Lands to the south-east of County Limerick including the Ballyhoura Mountains, hilly area north west of Mitchelstown and Galty Mountains have been deemed 'areas unsuitable for wind energy development' with adjacent lands (including the Ballyhoura mountains) in Cork shown as Important landscapes(Medium) in the 'Policy considerations for Wind Energy Map – Area 4'.

Areas 5, 6 and 7; Kerry Wind Energy Strategy*(Currently under review)

Kerry has adopted a policy of discouraging wind energy projects in the following areas ;

Derrynasaggart Mountains (northern part) - south of Rathmore/ west of Coomacheo and Curracahill with adjacent lands to the east over the border in County Cork shown as Nature Conservation Areas in the 'Policy considerations for Wind Energy Map – see Map Area 5'.

Derrynasaggart Mountains (near N22) – north of Ballyvourney in Cork/ north of Milleeny and north of Coolea and in Kerry south of Clonkeen with lands to the east over the border in County Cork shown as Nature Conservation Areas in the 'Policy considerations for Wind Energy Map – see Map Area 6.

Sheehy/Caha Mountains, Beara Peninsula; West of Ballingeary to Hungary Hill and Kilgarven to Lauragh in Kerry - with lands to the south and east over the border in County Cork shown as Nature Conservation Areas and Important Landscapes in the 'Policy considerations for Wind Energy Map – see Map Area 7.
It is of particular importance to the development of policy for County Cork to take account of the instances where adjoining Counties have adopted a policy discouraging wind energy projects and the main instances are detailed in the ' Policy considerations for Wind Energy Map – see p27 '.

Appendix 6 Policy Considerations for Wind Energy : Table 1

Landscape	Landscape Value	Landscape Sensitivity	Landscape Importance	Landscape Strategy Recommendation	Scenic Routes	Wind Speeds 75m hub height	Wind Speeds 100m hub height	Proximity to Grid	Natura 2000 SPA	Natura 2000 SAC	NHA	FWP MC
1	V. High	V. High	National	No specific reference	12	Generally No	Generally Yes	Yes	Yes	Yes	Yes	No
2	V. High	V. High	County	Unsuitable	5	Yes	Yes	Yes	Yes	Yes	Yes	No
3	V. High	V. High	National	Unsuitable	26	Yes	Yes	No	Yes	Yes	Yes	No
4	V. High	V. High	National	Great Landscape Sensitivity	35	Generally Yes	Generally Yes	No	Yes	Yes	Yes	Yes
5	V. High	V. High	County	No specific reference	14	Generally No	Generally Yes	Yes	Yes	Yes	Yes	Yes
6a	High	High	County	Suitable	11	Generally Yes	Generally Yes	Yes	No	Yes	Yes	Yes
6b	Medium	Medium	Local	Landscape generally would not lend itself to WF dev	3	Generally Yes	Yes	Yes	No	No	Yes	No
6c	Medium	Medium	Local	Landscape would not lend itself to WF dev	2	Generally No	Generally Yes	Yes	No	Yes	No	No
7a	Medium	Medium	County	Landscape would not lend itself to WF dev	7	Yes	Yes	Yes	No	No	Yes	No
7b	Medium	Medium	Local	Landscape would not lend itself to WF dev	3	Yes	Yes	Yes	No	No	No	No
8	High	High	National	Landscape would not lend itself to WF dev	2	No	Generally Yes	Yes	Yes	Yes	Yes	No
9	Low	Medium	Local	Suitable concerns about cumulative effect	5	Generally Yes	Yes	Parts	No	No	No	Yes
10a	Low	Low	Local	Suitable	1	Yes	Yes	Yes	No	No	No	No
10b	Medium	High	County	Suitable	8	Generally Yes	Generally Yes	Yes	No	Yes	No	Yes

Landscape	Landscape Value	Landscape Sensitivity	Landscape Importance	Landscape Strategy Recommendation	Scenic Routes	Wind Speeds 75m hub height	Wind Speeds 100m hub height	Proximity to Grid	Natura 2000 SPA	Natura 2000 SAC	NHA	FWP MC
11	High	High	Local	Suitable concern over cumulative visual impacts	7	Yes	Yes	Yes	Yes	Yes	Yes	Yes
12a	High	High	Local	Landscape would not lend itself to WF dev	4	Yes/No	Generally Yes	Yes	Yes	Yes	Yes	No
12b	Medium	Medium	Local	Landscape would not lend itself to WF dev	1	Generally Yes	Generally Yes	Parts	No	Yes	No	Yes
13a	High	High	County	Suitable	6	Generally Yes	Generally Yes	Yes	Yes	No	Yes	No
13b	Medium	Medium	Local	No specific reference	1	Generally No	Generally Yes	Yes	No	Yes	Yes	No
14a	Medium	Medium	Local	Suitable concerns about cumulative effect	3	Yes	Yes	Yes	Yes	Yes	Yes	Yes
14b	Medium	Medium	Local	Visual impacts may become more prominent	2	Yes	Yes	Yes	No	Yes	No	Yes
15a	High	High	Local	Suitable concerns about cumulative effect	9	Yes/No	Generally Yes	Parts	No	Yes	Yes	Yes
15b	Medium	Medium	County	Suitable concerns about cumulative effect	5	Generally Yes	Generally Yes	Yes	Yes	Yes	Yes	Yes
16a	High	High	National	Great Landscape Sensitivity	2	Generally No	Yes/No	Parts	No	Yes	Yes	No
16b	Low	Medium	Local	No specific reference	1	Generally No	Generally Yes	Yes	No	No	No	Yes
16c	Medium	Medium	Local	No specific reference	2	Yes/No	Generally Yes	Yes	No	No	No	No

Appendix 7
Strategic Environmental Assessment (SEA), Habitats Directive Assessment (HDA) and Flood Risk Assessment

Strategic Environmental Assessment (SEA)

Strategic Environmental Assessment (SEA) is the process by which environmental considerations are required to be fully integrated into the preparation and adoption of certain plans and programmes. This background paper is *not* a statutory requirement and thus an SEA is not automatically required. This background paper will not set out the framework for the future development consent of renewable energy projects. It is intended this background paper will make suggestions that could inform the development of a Draft Renewable Energy Strategy (RES) that will form part of the draft county development plan. The Draft Renewable Energy Strategy will be subject to full SEA process as part of the assessment of the draft county development plan. However, environmental issues have been taken into account throughout the preparation of this study as a best-practice exercise and measures taken to avoid any significant impacts.

The legislation relating to SEA in the Irish context may be found in SI 435 of 2004, European Communities (Environmental Assessment of Certain Plans and Programmes) Regulations 2004 and SI 436 of 2004Planning and Development (Strategic Environmental Assessment) Regulations 2004, as amended by S.I. No. 200 of 2011, European Communities (Environmental Assessment of Certain Plans and Programmes) Amendment Regulations 2011, and S.I. No. 201 of 2011, Planning and Development (Strategic Environmental Assessment) Amendment Regulations 2011. During the SEA process the local authority must consult with a range of designated statutory bodies. The DECLG has published guidance on the SEA Directive.

Where the SEA process is being applied to the development of a RES, the RES should provide information on how the SEA informed the RES vis-a-vis options/alternatives and also how areas were identified or excluded for the purposes of renewable energy.

Habitats Directive Assessment (HDA)

The Habitats Directive (Council Directive 92/43/EEC as amended) and the Birds Directive (Council Directive 79/409/EEC as amended) form the cornerstone of Europe's nature conservation policy.
Appropriate Assessment is a process that requires the competent authority to assess the possible nature conservation implications of any plan or project, alone and in combination with other plans or projects that might affect any Natura 2000 site. The requirement to undertake an Appropriate Assessment is derived from Articles 6(3) and 6(4) of the Habitats Directive and Section 5 of SI No. 477 of 2011, European Communities (Birds and Natural Habitats) Regulations 2011. 'Plan' and 'project' are not defined in the Habitats Directive but European Court of Justice (ECJ) case law indicates that both should be given a very broad interpretation. 'Plans' include all statutory and non-statutory land use and framework and sectoral plans and strategies to the extent that they have the potential to have significant effects on a Natura 2000 site.

Article 6(3) requires that any plan or project that is not directly connected with or necessary to the management of the Natura 2000 site concerned but is likely to have a significant effect on it, on its own or in combination with other plans and projects, is to be authorised only if it will not adversely affect the integrity of that site. With regard to the delivery of a RES, the Appropriate Assessment (AA) process must be completed by the competent authority, *prior to the adoption of the strategy*.

This begins with screening for AA, which should determine if significant impacts on Natura sites may occur

as a result of implementation of the RES, either on its own or in combination with other plans or projects. If screening cannot exclude, on the basis of scientific information, such significant effects, a full appropriate assessment, informed by the production of a Natura Impact Statement, must be carried out. Both the assessment and its conclusions should be recorded to ensure that existing and future plans or projects are not authorised if they are likely to adversely affect the integrity of a Natura site. To assist planning authorities, the Department of the Environment, Heritage and Local Government (DECLG) published *Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities* (2009). The European Commission also provides guidance on this topic.

The process of applying the methodology to identify possible locations where windfarm projects may be acceptable has been carried out in close consultation with the Appropriate Assessment Team of Cork County Council and their recommendations have been included throughout the study to ensure that any policy considerations will not give rise to adverse effects on Natura 2000 sites. The Draft Renewable Energy Strategy prepared as part of the draft county development will be subject to Appropriate Assessment at that stage.

Flood Risk Assessment

Any Draft Renewable Energy Strategy prepared should incorporate into the strategy guidelines on flood risk assessments for renewable energy developments. Renewable energy projects must be carried out in accordance with flood risk management guidelines. Reference should be made to *The Planning System and Flood Risk Management: Guidelines for Planning Authorities, 2009* as set out by the DECLG and the Office of Public Works (OPW).

Developments should avoid flood risk areas, but where exploitable resources are present in a high-risk flood zone, e.g. on a floodplain, mitigation measures and testing should be carried out according to the flood-risk guidelines to reduce flooding potential and influence. Reference should be made to the Preliminary Flood Risk Assessments (PFRA) of each area as compiled by the OPW, the Environmental Protection Agency (EPA) and local authorities. The Council must be certain that the benefits from the development are justified. RE developments should only be carried out where risk can be managed and where there will not be subsequent flood risk for other areas, either upstream or downstream of the development. Activities and requirements relating to Areas for Further Assessment (AFAs) and the outputs and activities relating to Catchment Flood Risk Assessment and Management Studies (CFRAMS) should also be given due consideration during the production of the RES.

The Council will provide guidance regarding surface water drainage and storm-water management systems. It may be beneficial to consider the approaches and techniques of a sustainable urban drainage system (SUDS), to prevent runoff and pollution, whether on site or within the drainage network. Cork County Council recognises that while the development of renewable energy can have social and economic benefits, it must be developed in an environmentally sustainable manner. In this respect, environmental benefits and constraints will also be a key consideration in the preparation of the Cork Renewable Energy Strategy.

Appendix 8

Terms and Definitions

A glossary of terms is presented below so that all terms and definitions used throughout are understood and communicated clearly.

Anaerobic Digestion: is the process whereby bacteria break down organic material in the absence of oxygen yielding a biogas containing methane.

Appropriate Assessment (AA): Under EU Habitats Directive (92/43 EEC), an assessment of the effects of a plan or project on the Natura 2000 network. The Natura 2000 network comprises Special Protection Areas under the EU Birds Directive, Special Areas of Conservation under the EU Habitats Directive and Ramsar sites designated under the Ramsar Convention (collectively referred to as European Sites). Also referred to as Habitats Directive Assessment (HDA).

Bio-fuels: Fuels derived from Biomass.

Biomass: is biological material derived from living or recently living organisms which can be converted into fuel for electricity, heating and transport.

Built Environment: Refers to both architectural heritage and archaeological heritage.

Combined Heat and Power (CHP): Combined heat and power is the simultaneous production of heat and electricity.

Commissioning: The making fully operational of a project.

Cumulative Effects: Effects on the environment that result from incremental changes caused by the strategic action together with other past, present, and reasonably foreseeable future actions. These effects can result from individually minor but collectively significant actions taking place over time or space.

Decommissioning: The final closing down of a development or project when it has reached the end of its operational/ useful life.

District Heating (DH): District heating is a local heating network facilitated through underground pipes and a centralised heat source.

Environmental Impact Assessment (EIA): An ordered exercise designed to enable the environmental impacts of a proposed development/ project to be anticipated before the project is carried out.

Electric Vehicle (EV): Electric vehicles refer to battery electric vehicles and plug-in hybrid electric vehicles.

Fossil Fuels: fuels that arise from organic matter over geological timescales.

Gate 3: Since December 2004 large scale commercial renewable generators (i.e. > 0.5 MW) wishing to connect to the transmission or distribution systems have been subject to group processing of connection applications through a series of successive “Gates”. Renewable generator applications are processed in a “Gate” system whereby all applications that have met the defined criteria are processed in one batch (source: Irish Wind Energy Association).

Generation: Electricity generation is the process of creating electricity from other forms of energy. For the purposes of this strategy, the term “generation” is defined as *generation for storage and transmission of electricity*.

Geographical Information System (GIS): is a computer system that collects, stores, views and analyses geographical information and commonly creates maps as an output.

Greenhouse Gases (GHG): the gases that are responsible for trapping the solar radiation in the Earth's atmosphere. The most significant impact comes from carbon dioxide and methane.

Grid Capacity: the technical/ physical ability of the electricity transmission or distribution network to accommodate new electricity generation or usage.

Hub Height: Height of wind turbine tower from the ground to the centre-line of the turbine rotor.

Installed Capacity: the theoretical instantaneous output or electrical power if all generators are working at full capacity.

MEC: Maximum Export Capacity (MEC) is by definition the contracted maximum export value (in MW) of the entire generation station in accordance with the generator's connection agreement.

NM: Nautical miles.

Pumped Hydroelectric Energy Storage (PHES): a facility designed to generate electricity during peak periods with a hydroelectric plant utilising water pumped into a storage reservoir during off-peak periods.

Renewable Energy: Energy from renewable non-fossil sources.

SEA - Strategic Environmental Assessment: The objective of the SEA Directive 2001/42/EC is to provide a high level of protection of the environment and to contribute to the integration of environmental considerations into the preparation and adoption of plans and programmes with a view to promoting sustainable development, by ensuring that, in accordance with this Directive, an environmental assessment is carried out of certain plans and programmes which are likely to have significant effects on the environment

Smart Grid: is an evolution of the existing electricity grid with added monitoring, analysis, control and communication capability that maximises the efficiency of the electricity system.

Shadow Flicker: Term used to describe the short-lived effect of shadows cast by rotating blades of wind turbines when the sun passes behind them, which occurs under certain combinations of geographical positions and time of day.

Substation: Connects the local electricity network to the electrical system of the wind energy project through a series of automatic safety switches.

Appendix 9

List of Acronyms

AA	Appropriate Assessment
ACA	Architectural Conservation Area
CER	Commission for Energy Regulation
DoCENR	Department of Communications, Energy and Natural Resources
DoECLG	Department of Environment, Community and Local Government
DSO	Distribution System Operator
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESB	Electricity Supply Board
EU	European Union
CCDP	Cork County Development Plan
GIS	Geographical Information System
HDA	Habitats Directive Assessment
IAA	Irish Aviation Authority
IWEA	Irish Wind Energy Association
LCA	Landscape Character Area
LCS	Landscape Character Sensitivity
LCT	Landscape Character Type
MW	Megawatt (1,000kW)
NHA	Natural Heritage Area
NIS	Natura Impact Statement
NPWS	National Parks and Wildlife Service
pNHA	Proposed Natural Heritage Area
RBD	River Basin District
RBMP	River Basin Management Plan
RE	Renewable Energy
REFIT	Renewable Energy Feed -In Tariff
SAC	Special Area of Conservation
SEAI	Sustainable Energy Authority of Ireland
SWMP	Surface Water Management Plan

Appendix 10

List of References and Documents

Cork County Council will require compliance with the DoELG (2006) ***Wind Energy Development Guidelines: Guidelines for Planning Authorities*** in preparing planning applications for wind energy developments.

Other guidelines of relevant include:

Best Practice Guidelines for Wind Farm Development (IWEA 2012 and SEI, 2008).

A Methodology for Local Authority Renewable Energy Strategies. Draft for Public Consultation. June 2012.

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SEAI. Energy in Ireland, 1990-2010, Dublin 2011.

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SEAI. Energy Security in *Ireland: A Statistical Overview*.2011 Report.

SEAI *Energy in Ireland 1990-2008: 2009 Report.* Energy Policy Statistical Support Unit.

SEAI Introduction to Anaerobic Digestion.

***The National Climate Change Strategy* 2007-2012.**

The Planning System and Flood Risk Management & Technical Appendices - Guidelines for Planning Authorities (DoEHLG, Nov '09).

The Southwest Regional Planning Guidelines 2010-2022.

The Water Framework Directive, 2000.

The Kerry County Development Plan 2009-2015 and the Proposed 8th Variation to the Kerry County development Plan 2009-2015 Draft Renewable Energy Strategy 2012. May 2012.

Renewable Energy Strategy for County Mayo 2011-2020. 2011.

County Galway Wind Energy Strategy 2011-2016. September 2011.

Clare County Development Plan 2011-2017. Wind Energy Strategy.

Waterford Development Plan 2011 – 2017.

South Tipperary County Development Plan 2009-2015.

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