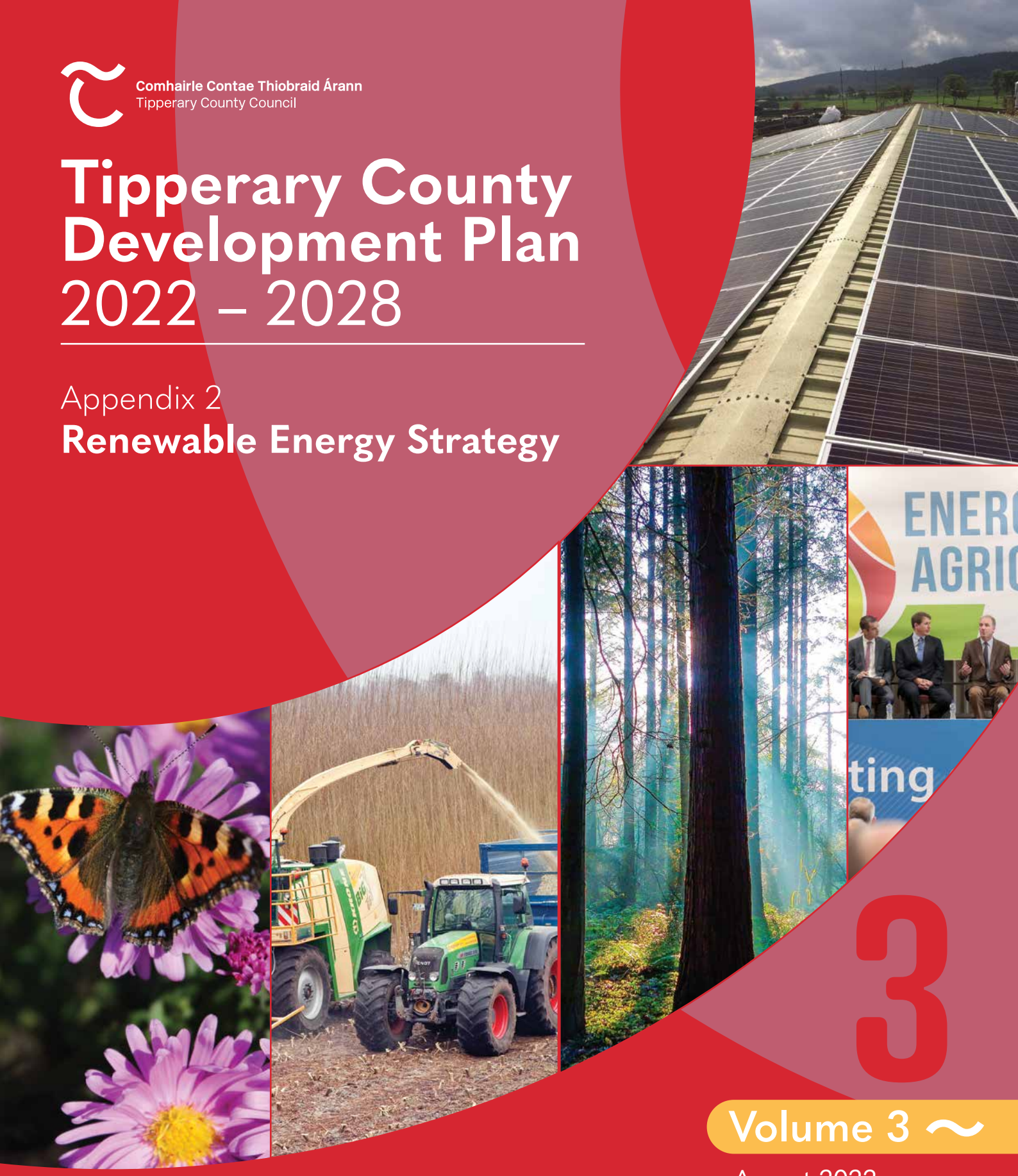
Comhairle Contae Thiobraid Árann
Tipperary County Council

Tipperary County Development Plan 2022 – 2028

Appendix 2

Renewable Energy Strategy



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Volume 3

August 2022

Shaping *Our* Future

Comhairle Contae Thiobraid Árann
Tipperary County Council

TIPPERARY energy AGENCY

Tipperary Renewable Energy Strategy 2016

September 2016

Contents




GLOSSARY OF TERMS

AA
Appropriate Assessment (AA) - An assessment carried out under Article 6(3) of the Habitats Directive of the implications of a plan or project, either individually or in combination with other plans and projects, on a Natura 2000 site in view of the site's conservation objectives.

Anaerobic Digestion
Anaerobic Digestion (AD) is a biological process in which microorganisms break down biodegradable material in the absence of oxygen. One of the end products is biogas, can be combusted to generate electricity and heat, or can be processed into renewable natural gas and transportation fuels.

Auto production
The production of electricity for a consumer's own use on the premises/site where the energy is to be consumed.

Biomass
Biological Material produced from organic materials, either directly from plants or indirectly from industrial, commercial, domestic or agricultural products, may be used as a source of fuel.

CHP
Combined Heat and Power (CHP) is the simultaneous on-site generation of usable heat and electricity.

District-Heating
District Heating (DH) is a system for distributing heat generated in a centralised location for residential and commercial heating requirements, and be operated in conjunction with CHP.

EirGrid
EirGrid is the independent electricity Transmission System Operator in Ireland and the Market Operator of the wholesale electricity trading system.

Fossil Fuels
Fuel in form of hydrocarbons, primarily coal, fuel oil or natural gas, formed from the remains of dead plants and animals.

Geothermal Energy
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.

Greenhouse Gas
Greenhouse gases are gases that trap heat in the atmosphere, the four most important are -carbon dioxide, methane, nitrous oxide, and fluorinated gases.

GRIDLINK
A new 400 kV overhead power line linking Leinster and Munster to be constructed by Eirgrid. The power line will link will connect Knockraha in Cork with Great Island in Wexford to Dunstown near Naas, Kildare.

GRID25
EirGrid's plan to develop and upgrade the electricity transmission network up to 2025. It involves extensive work throughout the country which includes building 800km of new power lines and upgrading 2,000 km of existing lines which will double the size the electricity Grid.

Gate process
Term used to describe the process whereby a group processing approach is applied to applications for connection to the national electricity grid for large renewable energy generators.

Head height
Hydropower potential is a function of the hydraulic head height and the rate of fluid flow. The head is the energy per unit weight (or unit mass) of water, the higher the head height the more power may be generated.

Micro-Generation
The small-scale generation of heat and electricity by individuals, small businesses and communities to meet their own needs, as an alternative to or to supplement grid-connected power.

Natura 2000 sites
A network of European sites comprising Special Areas of Conservation and Special Protection Areas (including candidate and proposed sites), selected for the conservation of Habitats in line with the Birds and Habitats Directives.

Photovoltaic
Photovoltaic systems (PV system) use solar panels to convert sunlight into electricity.

PHES
Pumped Hydro Energy Storage is a method of storing electrical energy as potential energy by pumping water from a reservoir or lake to another reservoir at a higher elevation and storing it for use in generating electricity when required.

REFIT
REFIT stands for 'Renewable Energy Feed in Tariff' and is the primary means through which electricity from renewable sources is supported in Ireland.

RES
Renewable Energy Strategy

Run-of-the-river
A type of hydro-electric generation whereby little or no water storage is provided, energy is harnessed by diverting river flow through turbines before returning water back to the river.

SEA
The process as set out by the SEA Directive by which environmental considerations are systematically assessed and fully integrated into the preparation of Plans and Programmes and prior to their final adoption.

SEAP
Sustainable Energy Action Plan is the key document in which the Covenant if Mayors signatory outlines how it intends to reach its CO2 reduction target by 2020.

Shadow Flicker
The blades of a wind turbine may cast a shadow and the rotation of the blades causes the shadow to flick on and off. This effect lasts only for a short period and happens only in certain specific combined circumstances.

SEAI
The Sustainable Energy Authority of Ireland (SEAI), formerly the Irish Energy Centre was set up by the government in 2002 as Ireland's national energy authority.

TEA
Not for profit consultancy established as a partnership between the Tipperary Local Authorities and the Tipperary Institute. The aim of the TEA is to promote renewable energy, energy efficiency and the rational use of energy, to improve the quality of the environment and to contribute to sustainable development.

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1.0 Introduction

Access to secure, clean and affordable energy is essential for the future economic and social development of Ireland. In order to meet this challenge, the national vision is to transform Ireland's reliance on a fossil fuel-based energy sector into a clean, low carbon system, where energy is harnessed by renewable resources.

This transformation is currently underway; however Ireland remains heavily dependent on fossil fuels and there is currently a need to import almost all of the country's energy needs at a significant financial cost to the economy and the environment. To put this in context, the importation of fossil fuels costs the Irish economy up to €5.7billion[1] every year due to the need to import 85%[2] of the fuel consumed in this country.

Renewable energy resources are indigenous resources and are abundant in Tipperary. By tapping into renewable energy resources Tipperary could reduce this national reliance on fossil fuel imports, achieve a more secure and stable energy supply for the long term, help reduce the impacts of climate change and generate employment and economic growth for the citizens of Tipperary. Tipperary County Council (hereafter referred to as 'the Council') with the support of the Tipperary Energy Agency (TEA) is committed to supporting investment in renewable energy and to developing an agreed Renewable Energy Strategy.

1.1 Covenant of Mayors

In 2015, the Council became a member of the Covenant of Mayors. This is a European movement involving local and regional authorities, voluntarily committing to increasing energy efficiency and the use of renewable energy resources in their territories. By their commitment, Covenant signatories aim to meet and exceed the European Union 20% CO_2 reduction objective by 2020.

It is a key commitment of the Council under the Covenant of Mayors to go beyond the objectives set by the EU for 2020 in reducing CO2 emissions in Tipperary by at least 20%, through the preparation and implementation of a Sustainable Energy Action Plan (SEAP) and the development of this Strategy for Renewable Energy.

1.2 Vision for Renewable Energy

This Renewable Energy Strategy has been developed as a planning framework to support and underpin the Core Strategy and policies and objectives of the North Tipperary County Development Plan 2010 (as varied) and the South Tipperary County Development Plan 2009 (as varied)[3]. Its Core Aim is to to ensure that the County continues to be a leader in addressing climate change through the facilitation of appropriately located renewable energy developments and through supporting energy efficiency in all sectors of the economy.

This Renewable Energy Strategy forms Appendix 6 of the County Development Plan (as varied) and is underpinned by the agreed vision as follows:

VISION

The Council will seek to support and facilitate the development of the renewable energy sector in line with the strategic goals set out by the Department of Communications, Climate Action and the Environment whilst balancing the need for new development with the protection of the environmental, cultural and heritage assets of the county.

1 Down from €6.5 billion (revised) in 2013 due mainly to falling oil and, to a lesser extent, gas import prices.
2 All national energy figures are from the SEAI 2015 Report 'Energy in Ireland 1990 – 2014'
3 The Development Plans hereafter will be referred to as the 'Development Plan (as varied)'

1.3 Strategic Aims

1.3.1 A low Carbon Future for Tipperary

The White Paper 'Ireland's Transition to a Low Carbon Energy Future 2015-2030[4] sets out a national objective for a low carbon economy with reduced green house gas (GHG) emissions and greater investment in renewable energy technologies. This Renewable Energy Strategy recognises that Ireland (and Tipperary) is a long way off meeting its own energy demands from renewable resources, and it is recognised that significant and immediate commitment to energy (and better energy efficiency) is now required. Continued support for investment in energy production in Tipperary will confer economic advantages in the form of jobs and investment. In addition to meeting its own energy needs, Tipperary will benefit through its contribution to national renewable targets, in a renewable energy framework that will also ensure the protection of local environmental assets.

It is strategic aim of this Renewable Energy Strategy to facilitate a low-carbon future in Tipperary by supporting the sustainable development of the renewable energy sector in Tipperary.

1.3.2 Achieving Climate Change Adaptation

There are two main policy responses to climate change: mitigation and adaptation. Mitigation addresses the root causes of climate change, by reducing GHG emissions, while adaptation seeks to lower the risks posed by the consequences of climatic changes. This Renewable Energy Strategy will facilitate the mitigation of climate change by supporting renewable energy sources as an alternative to fossil fuels thereby reducing GHG emissions.

1.3.3 Low-Carbon Economy and job Creation

The Council is committed to employment creation as a direct result of a policy to secure better investment in renewable energy and energy efficiency in Tipperary. This commitment is also reflected in the Council's Local Economic and Community Plan (LECP) with a key objective to improve the sustainability of the county's energy use to enable sustainable economic development. This Renewable Energy Strategy supports the objectives of the LECP as they relate to a green economy and it is expected that the development of a sustainable energy base along with investment in efficiency will confer an economic advantage to the county in the form of jobs and investment.

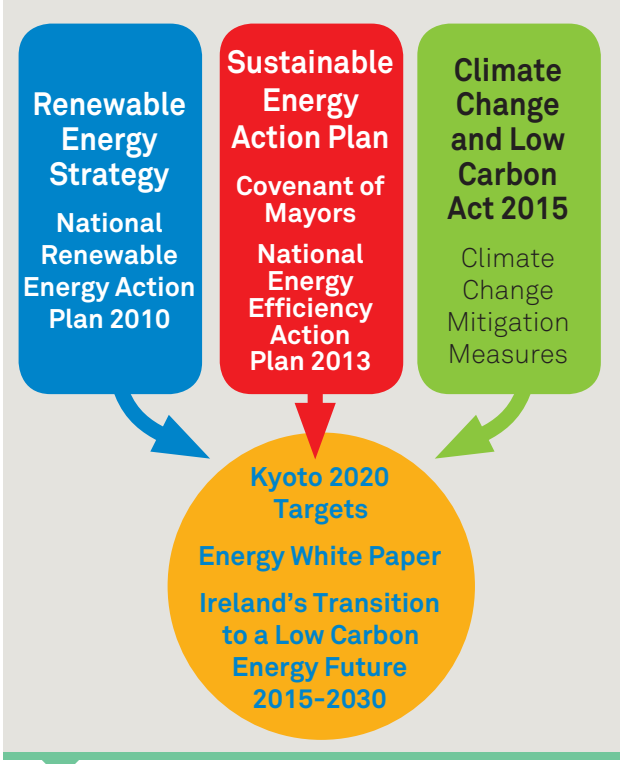

Figure 1: Renewable Energy, Energy Efficiency and Climate Change Adaptation

1.3.4 A Strategic Planning Framework for Renewable Energy

It is intended to put in place a planning and regulatory framework for renewable energy development in Tipperary to provide certainty and clarity to both investors and communities alike and to ensure consistency in planning decisions. In order to achieve this objective, the Council is mindful that renewable energy resources, catchments, infrastructure and in many cases, new developments, may extend across county boundaries. In this respect, this Strategy was prepared having consideration to the energy and environmental polices of adjoining counties.

[4] Hereafter referred to as the White Paper for Energy 2015

1.4 What is Renewable Energy?

Renewable energy is energy that comes from resources that are continuously replenished through the cycles of nature. Unlike fossil fuels, their supply will never become exhausted. The main sources of renewable energy are:

- the sun (solar energy),
- the wind,
- moving water (hydropower, wave and tidal energy)
- heat below the surface of the earth (geothermal energy)
- biomass (wood, waste, energy crops)

Producers of renewable energy may be generally categorised[5] by their electrical energy output as follows:

1.4.1 Commercial or large-scale generation

Commercial or large-scale renewable energy projects that produce energy for sale to the national electricity grid. Such projects are connected to the national electricity grid and must apply directly to Eirgird or to ESB Networks for approval for a grid connection.

1.4.2 Auto-generation

Auto-generation is the production of electricity for a consumer's own use on the premises/site where the energy is to be consumed. This arises where an electricity consumer has an on-site renewable energy generator to provide a portion of their electricity needs. This onsite generator is not operated as a backup generator at times of grid outage – rather it displaces imports from the grid on a day to day basis. There is no upper limit in energy output to the definition of an auto-producer.

1.4.3 Micro-Generation

In Ireland, micro-generation is classified by ESB Networks as small-scale, grid connected electricity generation where customers produce their own electricity and export the surplus onto the ESB Networks Low Voltage (LV) System. Note that such generators cannot be used to sell electricity to the electricity grid and a return is via a feed-in tariff[6] only. This is subject to a rated maximum output of:

- 6 kilo Watts (kV) when the connection is single phase.
- 11kW when the connection is three phase.

A micro-generator might use any one of the following technologies to generate electricity, wind turbine, solar photovoltaic or thermal panels, micro-hydro energy installation and micro-combined heat and power installation

1.5 Format of this Renewable Energy Strategy

The steps involved in the preparation of the Renewable Energy Strategy are set out below.

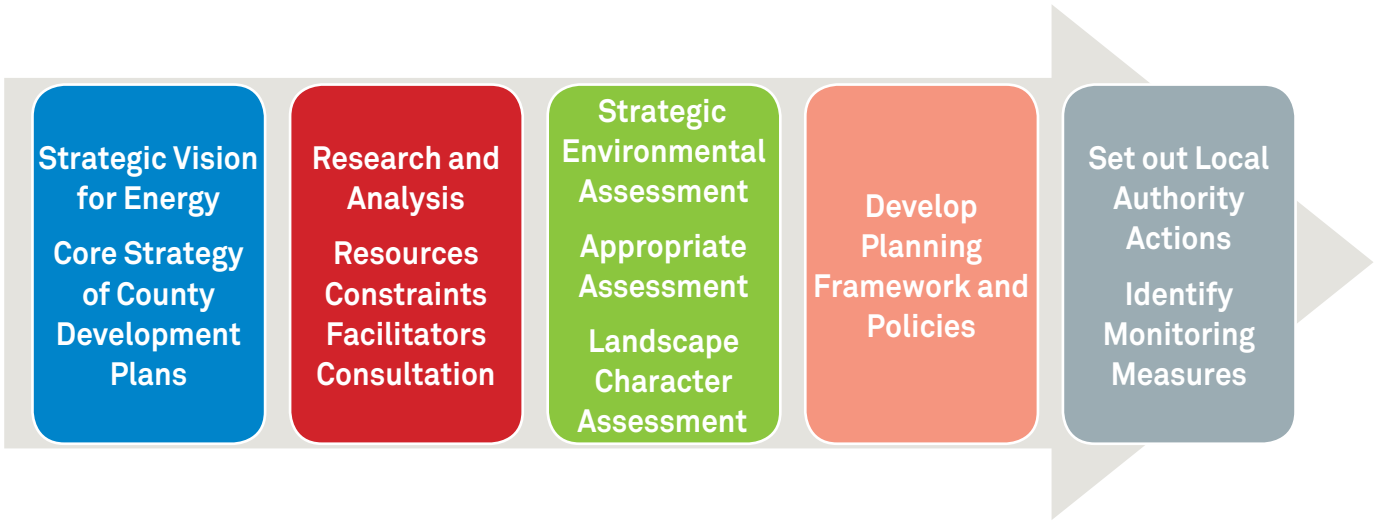

Figure 2: Steps in the preparation of the Renewalbe Energy Strategy

5 As of November 2015, such definitions may be subject to change

6 Electric Ireland was the only supplier offering offering payment for electricity produced from micro-generation technologies; this is now ceased for new installations (August 2015).

Photo 1: Officials and Elected Members visit wind farm at Lisheen (Source-TEA)

The Renewable Energy Strategy was prepared by the Council with the expertise, advice and input of the TEA. The consultancy services of CAAS Ltd[7] were employed to carry out an assessment of the wind capacity of the county and to prepare a new county-wide wind energy strategy. A new countywide Landscape Character Assessment (LCA) for Tipperary was also carried out to inform this Renewable Energy Strategy.

The Renewable Energy Strategy was incorporated into the County Development Plan (as varied) as Variation No. 3 in accordance with Section 13 of the Planning and Development Acts, 2000 (as amended). Variation No. 3 was adopted by the Elected Members of Tipperary County Council on 12th September 2016.

1.6 Strategic Environmental Assessment & Appropriate Assessment

This Renewable Energy Strategy has been subject to Strategic Environmental Assessment (SEA) and Appropriate Assessment (AA). A separate SEA and AA prepared for the review of the Wind Energy Strategy informed the SEA and AA prepared for the Renewable Energy Strategy.

[7] With the support of Fehily Timoney and Associates

It was found that impacts could arise on Biodiversity, Water Quality, Landscape/Visual Amenity and Material Assets as a result of renewable energy development in the county; however, it was also found that there will be long term positive benefits to the environment as a result of a reduced reliance on imported fossil fuels. Mitigation measures were incorporated into the Renewable Energy Strategy as part of the formulation of polices and having consideration to consultation with environmental authorities. These will mitigate impacts on the environment during the implementation of the Renewable Energy Strategy; as a result no significant adverse impacts on the environment will occur as a result of the implementation of the Strategy.

1.7 Consultation

Consultation with stakeholders formed a key part of the preparation of this Renewable Energy Strategy and to ensure that public participation was as broad as possible, a stakeholder engagement programme was developed and implemented. Pre-draft consultation took place in May/June 2015 with the key stakeholders associated with energy and the general public. Written submissions were invited and all submissions were summarised and considered during the preparation of this Renewable Energy Strategy.

A second phase of consultation was carried out as part of proposed Variation No. 3 of the County Development Plan (as varied), and facilitated public consideration of the draft Renewable Energy Strategy during April and May 2016. A third period of public consultation was held in respect to proposed Material Alterations to the proposed Variation during July and August 2016. All submissions were summarised in the Chief Executive's Reports and considered as part of the preparation of the final Renewable Energy Strategy.

In order to facilitate stakeholder participation the following processes were used;

- Newspaper notices in 4 local newspapers
- On-line dedicated webpage and submission form
- Hard Copy display of documents and maps in Civic offices in Clonmel and Nenagh.
- Planning section twitter account

Consultation Stage	Number submissions received	Key areas of comment
Pre-Draft	144	5 comments from Prescribed Bodies 4 comments from renewable energy industry Comments expressing concern over wind energy development, with particular reference to Ahenny area
Draft Stage	900	9 Prescribed Bodies 8 Elected Representatives 859 Wind Energy: Ahenny & surrounding areas 10 Wind Energy: Hollyford Hills/Slieve Feilms & surrounding area 2 Wind Energy: Slieveardagh and Grange 3 Wind Energy: Equine 5 Wind energy (not specific to any location 4 General Renewable Energy
Material Amendments	15	6 Prescribed Bodies 1 Elected Representative 8 industry

Table 1.1: Consultation Process

- Direct notification of key stakeholders
- Notification of the public participation network.

Consultation with the statutory environmental authorities was carried out during the scoping phase for SEA. It was decided that SEA and AA were required for the Renewable Energy Strategy and consequently consultation was carried out with the environmental authorities at both pre-draft and draft stage. A summary of submissions made by the environmental authorities and the Environmental Reports and Natura Impact Reports may be viewed in Volume 2.

The Council is satisfied that a good level of engagement was achieved throughout the process and that stakeholders who engaged with the process were varied, with input ranging from prescribed bodies, the renewable energy industry, local persons involved in the industry and local persons with no involvement. There was a strong input from persons with concerns regarding wind energy development, particularly at pre-draft stage and draft stage, this engagement decreased noticeably at material amendment stage. There was also strong support from local persons and particularly landowners engaged in wind energy development. The input from renewable energy developers was particularly useful to help frame a proactive and tailored planning policy for renewable energy.

Photo 2: Trade stands at the Energy In Agriculture Conference at Gurteen (Source-TEA)

2.0 POLICY OVERVIEW AND LEGISLATIVE CONTEXT

2.1 Policy Context for Renewable Energy

The Renewable Energy Strategy is set in a hierarchy of international and national legislation which provides the statutory basis for planning policy for the development and use of renewable energy resources and for the protection of the environment.

International/European	
EU Renewable Energy Directive 2009/28/EC on the promotion of the use of energy from renewable resources	Kyoto Protocol & EU 2030 Framework for Climate and Energy policies

National		
Strategy for Renewable Energy 2012-2020, Department of Communications, Energy and Natural Resources	National Renewable Energy Action Plan 2010	White Paper 'Ireland's Transition to a Low Carbon Energy Future 2015-2030

Local		
North Tipperary and South Tipperary County Development Plans (as varied) Tipperary Local Economic and Community Plan	Tipperary Renewable Energy Strategy 2016	Covenant of Mayors

2.2 International Context

The United Nations Framework Convention on Climate Change (UNFCCC) (January 2014) is the international legal framework for addressing climate change at a global level. The ultimate objective of the Convention is to stabilise global greenhouse gas (GHG) concentrations. Ireland's target is part of the pledged EU target of at least 40% reduction in domestic GHG emissions by 2030 compared to 1990.

The 2015 Paris Agreement, (12 December 2015), marks the latest step in the evolution of the UN climate change regime and builds on the work undertaken under the Convention. The Paris Agreement seeks to accelerate and intensify the actions and investment needed for a sustainable low carbon future, while individual member state targets have yet to be agreed.

2.3 European Context

The European Union (EU) has put in place a framework for energy for all member states called the '2020 Climate and Energy Package'. This is legally binding legislation for all member states so that the EU as a whole will achieve 20% GHG emission reductions, 20% energy produced by renewable resources, and 20% increase in energy efficiency by 2020. From this overarching EU climate and energy package, the EU Energy Efficiency Directive 2012/27/EU, and Renewable Energy Directive 2009/28/EC have resulted in national level energy action plans in Ireland.

Under the Renewable Energy Directive, Ireland has been set a target of 16% of all non-Emission Trading Scheme (ETS) energy consumption to come from renewable energy sources by 2020, the sectoral split being 40% electricity, 12% heat and 10% transport energy.

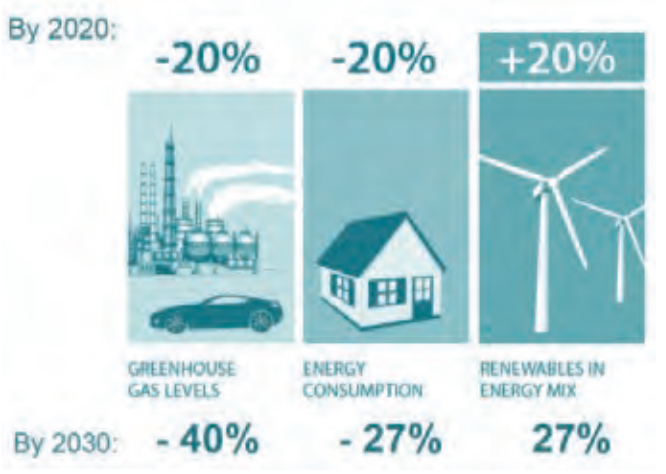

Figure 3: EU 2020 and 2030 targets for GHG, Energy consumption and renewable energy (SEAI)

In October 2014, in light of there being no clear framework post-2020 targets, the EU put in place a new '2030 Framework for Climate and Energy policies' which has set a 40% GHG reduction on 1990 GHG levels, and an EU-wide target of 27% for renewable energy and energy savings by 2030.

2.4 National and Regional level policy

2.4.1 Strategy for renewable energy 2012-2020, Department of Communications, Energy and Natural Resources

This sets out the Government's strategic goals for renewable energy and the key actions underway and planned in the short and medium term for each of the sectors. Strategic goals are designed to address challenges and support delivery of renewable electricity, heat and transport.

Strategic Goal 1: **Progressively more renewable electricity from onshore and offshore wind power for the domestic and export markets.**

Strategic Goal 2: **A sustainable bioenergy sector supporting renewable heat, transport and power generation.**

Strategic Goal 3: **Green growth through research and development of renewable technologies including the preparation for market of ocean technologies.**

Strategic Goal 4: **Increase sustainable energy use in the Transport sector through biofuels and electrification.**

Strategic Goal 5: **An intelligent, robust and cost efficient energy networks system.**

2.4.2 The National Renewable Energy Action Plan 2010

Ireland's National Renewable Energy Action Plan (NREAP) to 2020 is the framework within which Ireland has set out the measures underway and planned to deliver energy growth from renewable sources in line with EU targets. Ireland is obliged to report to the EU Commission on progress (as well as obstacles to progress). The NREAP requires that all sectors, including local authorities, consider the actions and targets of the NREAP and identify how it is intended to contribute to the achievement of these targets.

2.4.3 White Paper for Energy 2015

The White Paper 'Ireland's Transition to a Low Carbon Energy Future 2015-2030' is a framework to guide policy and the actions that Government intends to take in the energy sector up to 2030.

The "new" themes introduced in the White Paper for Energy 2015 are around;

(i) The importance of the citizen in having an input to energy related developments in their areas and as well as an input into wider energy policy,

(ii) Continuing to work towards a largely decarbonised energy system by 2050,

(iii) Continuing to provide certainty for investors as well as positioning Ireland to be at the heart of innovation for the high-tech solutions that will enable a move away from dependence on fossil fuels.

The White Paper for Energy 2015 also acknowledges the opportunity for waste to be used as an indigenous energy source.

The vision for a low carbon energy system as set out in the White Paper for Energy 2015 means that GHG emissions from the energy sector will be reduced by between 80% and 95%, compared to 1990 levels, by 2050, and will fall to zero or below by 2100.

2.4.4 National Climate Change Strategy

The Climate Action and Low Carbon Development Act 2015 sets out a statutory basis for the transition to a low carbon, climate resilient and environmentally friendly sustainable economy by 2050 and provides for the institutional arrangements necessary to achieve this.

Key actions will be the preparation of a National Mitigation Plan (to lower Ireland's levels of GHG emissions) and a National Adaptation Framework (to provide for responses to changes caused by climate change).

2.4.5 National Spatial Strategy 2002 (NSS)

The NSS was first produced in 2002 by the Department of Environment and Local Government and is the 20-year framework for the spatial development of Ireland. The NSS is currently under review and a new National Planning Framework will be published in due course. However, the requirement for balanced spatial growth is still of fundamental importance in achieving sustainable development and efficient energy consumption.

2.4.6 Regional Planning Frameworks

The Mid West Regional Planning Guidelines 2010-2022 (MWRPGs) and the South East Regional Planning Guidelines 2010-2022 (SERPGs) each set out a strategy for the implementation of the NSS at a regional level. These regional planning frameworks are currently in a transitional stage and a new Regional Spatial and Economic Strategy for the Southern Region is currently being prepared.

Both the MWRPGs and the SERPGS explicitly address energy and renewable sources in the development of the County. The SERPGs state in SE PPO 6.3;

'It is an objective of the Regional Authority that local authorities, the private sector and energy production and supply companies are encouraged to formulate sustainable energy policies and practices which seek to:

- *Ensure security of energy supply in order to support economic and social development;*
- *Source energy at a price that does not adversely affect competitiveness;*
- *Develop variable and alternative sources of energy generation;*
- *Maximise the use of renewable energy technologies;*
- *Promote a culture of energy conservation by all users;*
- *Assist the development of indigenous sustainable energy enterprises;*
- *Support and promote sustainable indigenous Bio-energy industries including the Bio-ethanol industry'.*

The MWRPGs state in Paragraph 6.6.1 Renewable Energy that;

'The Region has a substantial renewable energy resource potential. This includes wave power, wind power, anaerobic digestion and biofuel based systems. The development of wind power requires that a consistent approach be taken to the management of such provision at a regional and inter-regional level'.

2.4.7 Wind Energy Guidelines and update

In 2006, the Minister of the Environment, Heritage and Local Government issued Wind Energy Guidelines. The Department of Housing, Planning, Community and Local Government in conjunction with the Department of Communications, Climate Action and the Environment is currently undertaking a technical update of the guidelines with respect to the areas of noise and shadow flicker. This update

Figure 4: Regional Assemblies - note the location of Tipperary

is intended to ensure that the Wind Energy Guidelines are supported by a robust and up to date evidence base on these issues to support wind energy development in a manner which safeguards residential amenity consistent with EU and National Policy.

2.5 Local Context

2.5.1 County Development Plan (As Varied)

There are two County Development Plans in place in Tipperary:

- The South Tipperary County Development Plan 2009 (as varied)
- The North Tipperary County Development Plan 2010 (as varied)

The County Development Plans (as varied) provide a strategic, cohesive and consistent planning framework for the full county in all areas including energy and energy efficiency. The Renewable Energy Strategy has been incorporated into the County Development Plans by way of Variations number 3 and will supplement and inform the current county planning framework as set out and will go forward to underpin and support any review of the County Development Plans.

2.5.2 Sustainable Energy Action Plan for Tipperary

In line with the commitment to the Covenant of Mayors, the Council, with the support of the TEA will prepare a Sustainable Energy Action Plan (SEAP) for the county. It is expected to be completed in 2016 and will set out a ranges of actions aimed at reducing CO2 emissions in the county. The preparation of a SEAP is a key action of this Strategy.

2.5.3 Local Economic and Community Plan

The LECP 2015 was developed by the Tipperary Local Community Development Committee (LCDC) and Tipperary County Council's Economic Development and Enterprise Strategic Policy Committee. It contains high level goals and actions to drive economic, social and community development in the county over the next six years and was developed in consultation with key stakeholders, the broader community and business interests.

It is a high level economic objective of the LECP to:

To improve the sustainability of the County's energy use by supporting enterprises in energy, efficiency reduction/improvements and by growing the renewable energy enterprise sector.

Strategic Actions are set out below:

- Maximise competitiveness of businesses through best practice energy management by increasing awareness of supports available,
- Provision of energy management training across all sectors e.g. manufacturing, tourism, retail, agriculture, etc. as appropriate,
- Piloting of energy programmes, sustainable transport programme etc,
- Support and encourage public sector bodies to achieve current ISO Energy Standard, and,
- Support research, education & training on sustainable energy technologies.

Section 2.5.4 Adjoining Counties

Tipperary shares common boundaries with the following counties; Cork, Limerick, Clare, Galway, Offaly, Laois, Kilkenny and Waterford. Each of these counties share a common purpose to facilitate renewable energy developments, whilst protecting environmental assets. The Council will endeavour to manage and support renewable energy development in consultation with adjoining local authorities.

3.0 Renewable Energy and County Tipperary

3.1 Introduction

This section considers the role of Tipperary in delivering national renewable energy targets, local energy consumption trends in Tipperary and also how the local economy of Tipperary can benefit from the sustainable production of indigenous energy through jobs and investment.

3.2 National Targets

It is positive that total renewable energy use nationally increased by 13.3% during 2014, with most forms of renewable energy sectors experiencing some growth, with hydro-energy and energy from wind and biomass growing by 18.2%, 13.2% and 13.9% respectively. However, notwithstanding growth, the contribution of renewables to gross final consumption (GFC) was only 8.6% in 2014. This was broken down as follows;

- energy from hydro sources 0.5%,
- energy from wind 3.3%,
- energy from biomass 2.3%,
- energy from other renewables 0.5%,
- energy from waste 0.5%

Ireland's target is to achieve a 16% renewable energy penetration by 2020. Figures for 2014 illustrate that Ireland is approximately halfway towards meeting these targets:

Energy Sector	% Contribution 2014	2020 Target %
Renewable Electrical Energy (RES–E)	22.7	40
Renewable Transport Energy (RES-T)	10.0	5.2
Renewable Heat Energy (RES-H)	6.6	12

Table 3.1: Renewable Energy Consultation 2014 (Source SEAI)

As these are legally binding targets, Ireland will face steep challenges and monetary fines if these targets are not met post-2020. In view of this, the White Paper for Energy 2015 has set out a suite of further polices, measures and incentives in support of energy consumption reduction and renewable energy investment for implementation commencing in 2016.

3.2.1 Meeting National Targets

Ireland remains heavily reliant on imported fossil fuels, particularly oil and gas, to meet its energy needs, as illustrated by figure 5 across;

It is possible to set out two growth scenarios[9] for renewable energy having consideration to the nationally binding targets to 2020;

Baseline Scenario – 'Business as usual', where all policy measures currently legislated for up to the end of 2014 are maintained. This could be a future in which no further policy actions or measures are taken and where renewable energy strategies are not prepared. This would result in a slow increase in the production of renewable energy however, would fail to meet national 2020 renewable energy targets.

NREAP Scenario - This scenario is to occur in line with the implementation of the baseline measures described above and in addition to these, the implementation of the NREAP and White Paper for Energy 2015 targets and objectives. In addition, the implementation of the National Energy Efficiency Action Plan 2022 (NEEAP) will achieve lower energy consumption overall due to energy efficiency measures.

Achievement of the strategic goals and delivery of the key actions for renewable energy will require an integrated and cohesive approach across many Departments and Agencies, including the Commission for Energy Regulation, EirGrid, ESB Networks, the energy sector and its representative organisations, the enterprise community, the research community, local authorities, consumers and local communities. Renewable energy and climate change policy also influences other policy areas including Agriculture, Transport, Environment and Climate Change, Local Government and Enterprise.

[9] Source: TEA

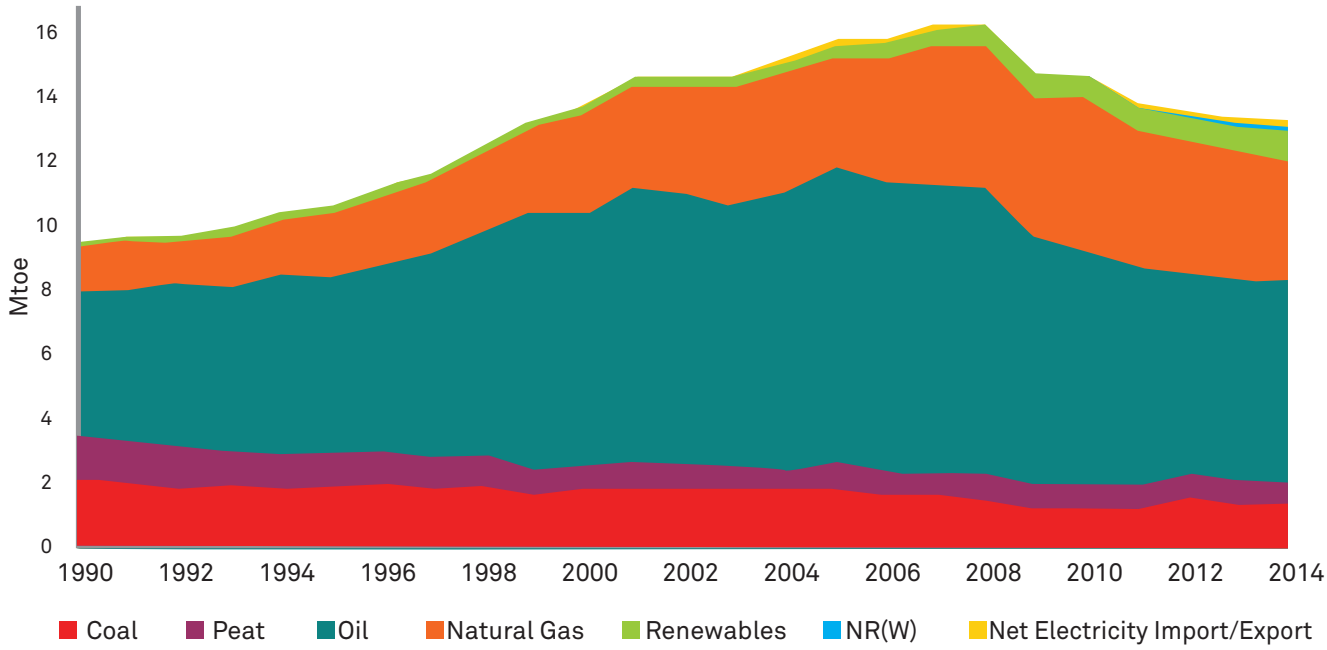

Figure 5: Total Consumption by Fuel 1990 – 2014 (Source SEAI Energy in Ireland 2015)

3.3 Consumption of energy in Tipperary

The TEA has carried out a review of renewable energy resources and development to date in each resource area. Figure 6 below illustrates energy consumption across the key sectors of transport, residential, industry, commercial and agriculture.

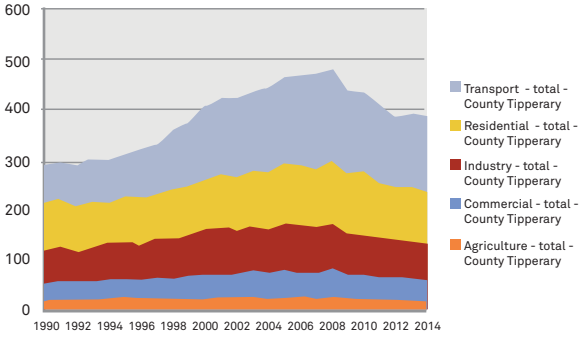

Figure 6: Energy use (kToe) per annum in Tipperary by Sector

The energy use of Tipperary is approximately 3.6%[10] of the national total and is broadly in line with national averages. It can be seen that energy use in all sectors increased from 1990 to 2008. From 2008 onwards, the economic recession coupled with the greater focus on costs and energy savings investments has reduced energy use in the county. However the reduced energy consumption, particularly in transport energy use, is likely to grow again with increased economic activity. Commercial, agricultural and industrial energy consumption contributed to a third of energy use in the county.

3.4 Energy use in Tipperary

3.4.1 Energy Use in the Residential Sector

Energy use in the residential sector can be characterised by a number of key findings:

- The average dwelling in Tipperary uses 19,400 kWh per annum which equates to an average spend in 2014 of approximately €2,000. Collectively this amounts to €119 million to heat and light Tipperary homes.
- The use of coal and peat to heat homes has declined from 35% in 1990 to 17% in 2014. This positive trend will continue as carbon taxes, air quality standards and availability of increased efficiency stoves continues to incentivise the reduction in use of these fuels.
- The residential sector in Tipperary is

[10] Source: TEA

dominated by the use of heating oil. The improvement in energy efficiency of the residential sector and the replacement of oil based home heating systems to systems based on heat pumps will result in a large energy cost saving in addition to a substantial reduction in energy related CO2 emissions.

The following key actions for energy efficiency and renewable energy will have a large part to play in the residential sector in the short term;

- Continued installation and retrofitting of energy efficient stoves.
- Increase in home energy retrofit schemes through local (Energy communities Tipperary, TEA and Local authority programs) and national programs (SEAI Warmer Homes Schemes and Better Energy Homes Schemes).
- Increased national support schemes and investment in the replacement of oil/gas with heat pumps and wood based heating systems, with fuels to be supplied increasingly from local renewable sources.
- Establishment of a streamlined process for the development of the micro-generation sector, in particular roof mounted solar PV energy systems.
- Investment in improved energy rating for homes from D1 average to A3 by 2040.

kToe Energy Use / Annum: Residential Sector

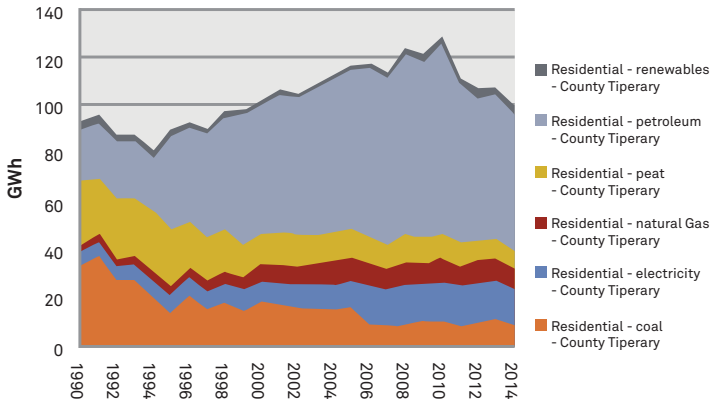

Figure 7: Energy sources in the residential sector

3.4.2 Energy Use in the Agricultural, Industrial and commercial Sector

Energy use in the industrial, commercial and agricultural sectors is largely dominated by heat production using large fixed boilers, transport energy and electrical energy use. The conversion of transport to more efficient and renewable fuels will be difficult to achieve both at a national and county level.

kToe Energy Use per Annum in Tipperary by Sector

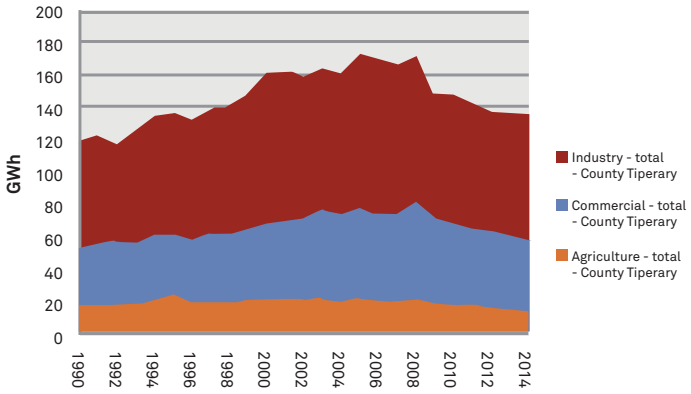

Figure 8: Percentage share of energy use in Industry, Commercial and Agriculture

However, the displacement of large oil and gas boilers for heat to more efficient boilers using locally derived biomass fuels has already started and is achievable, and as the expected Renewable Heat Incentive is established and the EU Emissions Trading Scheme is reformed, it is likely that these investments will be significant and rapid in the transition from fossil energy to renewables. Heat pumps for smaller facilities will also feature in the energy transition.

3.4.3 Energy Use in Transport

Energy use in the transport sector is predominantly oil based with about 5.2% renewable derived fuels used in 2014.

Opportunities

The key sectors including residential, agriculture, industry and commercial and transport have a high dependency on fossil fuels. 2020 is very close in terms of making the changes and investments required to reduce energy consumption and increase investment in renewable energy. This Renewable Energy Strategy will support these sectors in making the transition to suitable energy by ensuring that the planning frameworks are in place to provide for new renewable energy development i.e. local wood processing facilities for woodchip, solar farms for electricity etc. that will supply the alternative energy sources required. It is also

Photo 3: Upperchurch/Drumbane Energy Community (Source -TEA)

acknowledged that investment in the renewable energy sector will deliver employment as direct jobs in generation of renewable electricity and heat, indirect jobs in the servicing and in support of the industry and the resultant investment of the energy cost savings and salaries in the local economy.

3.5 Leading the Way: Tipperary Energy Case Studies

Tipperary has been a leader in the area and there have been a number of local and community-led renewable energy and energy efficiency schemes in the county that demonstrate the benefits of investment in the area and that will be used as examples for further investment. The following are examples of:

- Direct Community investment in energy
- Direct Community investment in energy efficiency
- Local Authority investment in energy
- Community Gain Scheme

3.5.1 Direct Community Investment in energy - Templederry Wind Farm

In 2001, the local community in Templederry sought to investigate ways to increase employment and investment in their area. Renewable energy was examined as an investment opportunity and 'Templederry Energy Resources' was set up and 30 shares in the company were allocated.

The TEA and the North Tipperary LEADER assisted in the planning and development phase of a new wind farm consisting of two wind turbines. This entailed assessment of the wind resource in the area, acquiring finance, a connection to the national grid and securing planning permission. The group is now producing enough electricity to power 3,500 houses per annum.

3.5.2 Community Investment in Energy Efficiency - Drumbane/Upperchurch

Upperchurch/Drombane is a community of around 1,200 people and 400 houses.

A community team called the Drombane Upperchurch Energy Team (DUET) surveyed the areas energy spend in 2011 and found that the community was spending €1 million per annum on domestic energy (heating and electricity).

Over two years with the help of the TEA, Limerick Institute of Technology and North Tipperary LEADER Partnership, retrofit works were carried out on 50 homes and two community halls by local contractors, and retrofitting work continues. Householders have lower energy bills, and the local economy has benefited from the project.

3.5.3 Local Authority investment in energy - Council Photovoltaic scheme

In 2014, in conjunction with the TEA the Council installed solar photovoltaic (PV) panels on 9 local authority buildings to provide renewable electricity and reduce demand by 171,000 kWh annually. The buildings include 3 Civic Offices, 2 Fire Stations, 2 Libraries, a Machinery Yard and a Leisure Centre.

All photovoltaic arrays began generating power in early November 2014 and have an expected life in excess of 25 years. The power produced equates to an average annual reduction in electricity demand of approximately 11% and the Council is saving over €27,000 per annum on its electricity bills with a payback of 7 years.

3.5.4 Community Fund - Lisheen Wind Farm, Co Tipperary

A number of wind energy projects in Tipperary have entered into agreements with communities to deliver particular and agreed financial benefits to the local community. Such community funds can empower communities to have direct benefit from renewable energy projects while also contributing to a low carbon economy.

Lisheen Wind Farm is operated by Brookfield Renewable Ireland and is located 15km north of Thurles, Co. Tipperary and is located within the grounds of a zinc mine. During the design process and after discussion with the local community it was agreed to set up a Community Fund known as the Moyne/Templetouhy Community Trust Fund. This was established in 2009 on commissioning of the windfarm. Whilst this is not an example of direct community investment, it is an example a partnership with the local community who has, through this trust fund been able to invest in a number of community projects.

In this respect, the Irish Wind energy Association (IWEA) supports the provision of financial contributions by wind farm operators to local communities and have prepared 'Best Practice Principles in Community Engagement & Community Commitment' 2013 for delivering extended benefits to local communities for wind farm developments of 5 Megawatts (MW) or above.

4.0 Renewable Energy Resources & Potential in Tipperary

4.1 Introduction

This section examines each of the renewable energy resources, considers current levels of investment and how these resources may be further developed in Tipperary.

Photo 4: Paul Kenny CEO speaking at the Energy In Agriculture Conference Gurteen (Source-TEA)

4.2 Technologies, Research and Development

Research and development in the area of renewable energy technologies is occurring at a fast pace and it is a challenge for the Council, developers and local communities to keep abreast of the changing nature of planning proposals for renewable energy related development. The White Paper for Energy 2015 states that the achievement of a low carbon future will require the adoption of new technologies as they emerge.

4.2.1 Commercial and Operational Technologies

The renewable energy technologies set out below are already commercially available and in some cases operational in Tipperary.

- Hydropower – Large scale energy storage and small scale, micro-hydro energy facilities.
- Wind Energy – Onshore commercial wind farms and individual turbines, micro-renewable scale turbines.
- Solar Energy – Solar Thermal, Solar Photovoltaic (PV).
- Geothermal Energy – Heat and Electricity for commercial and domestic use.
- Heat Pumps – Air, Ground & Water Source.
- Bio-Energy – Combustion, anaerobic digestion and Liquid Biofuel, see below:

Combustion: Biomass (e.g. wood chips or wood pellets) can be burned to provide heating. This process can take place in small domestic stoves or boilers and can also be used to raise steam to drive engines/turbines to produce electricity. This process is then called Biomass-Combined Heat and Power (Biomass-CHP).

Anaerobic Digestion (AD): Biomass (e.g. animal manure) is transformed to biogas by AD and the biogas can be used to fuel a gas engine or gas turbine, or burned in a boiler to provide heat or to raise steam.

Liquid Bio-fuel Production: Oils / fats can be converted to biodiesel and bio-ethanol can be produced from the fermentation of organic materials.

4.2.2 Early Deployment Technologies & Emerging Renewable Energy Technologies

Some of the emerging and early deployment technologies for renewable energy generation are set out below. Many of these technologies are not yet firmly established and often do not have any price or commercial supports. These may or not yet be proven to be commercially viable in Tipperary, however, over the short to medium term it should be expected that new technologies such as these may be proposed in the county.

Photo 5: Jim Gannon CEO of SEAI and Joe McGrath CEO of the Council (Source-SEAI)

- Biofuel Development - Cellulosic Bio-Ethanol, Algae Fuels, Gasification based biofuel development, pyrolysis based biofuels etc
- Geothermal – Hot Dry Rock, Engineered Geothermal Systems etc
- Solar – Concentrated Solar PV, Artificial Photosynthesis, Solar fuels etc
- Wind – Floating Offshore, Kite Power etc

4.2.3 Energy Storage

The storage of energy generated is a significant consideration for producers of energy in cases where there is no grid connection. Future energy storage on a national and regional scale is an integral aspect of the industry and therefore must be considered in the overall context of planning frameworks for energy. Typical energy storage technologies include:

- **Pumped hydroelectric energy storage (PHES)** consists of two large reservoirs located at different elevations and a number of pump/turbine units. During off-peak electrical demand, water is pumped from the lower reservoir to the higher reservoir where it is stored until it is needed. Once required (i.e. during peak electrical production) the water in the upper reservoir is released through the turbines, which are connected to generators that produce electricity.
- **Battery Energy Storage (BES)**, there are three important types of large-scale BES. These are Lead-Acid (LA), Nickel-Cadmium (NiCd), Sodium-Sulphur (NaS). These operate in the same way as conventional batteries, except on a larger scale.
- **Heat/Thermal Energy Storage (TES)** involves storing energy in a thermal reservoir so that it can be recovered at a later time. This is a common means to store domestic hot water for later use.
- **Electrical Storage heaters** – can store electrical energy at night when electricity is available at lower cost, and release the heat during the day as required.
- **Heat pumps** - Pump heat from a low temperature source and release it at a higher temperature.

The following positive objectives of the White Paper for Energy 2015 are noted in respect to energy storage:

- Administrative, market or regulatory barriers to the implementation of energy storage projects will be addressed.
- The case for designating large-scale storage projects as strategic energy infrastructure under planning, regulatory and policy criteria will be examined.

This Renewable Energy Strategy supports the objectives of the White Paper for Energy 2015 as they relate to energy storage as an important element of renewable energy systems in the county.

4.2.4 Combined Heat and Power (CHP)

CHP is the generation of usable heat and power (usually electricity) in a single process and uses the heat produced in electricity generation rather than releasing it into the atmosphere. CHP can provide a secure and efficient method of generating electricity and heat at the point of use. Conventionally CHP applications have been divided into two broad categories, based on design output:

- Large scale (greater than or equal to 1MW), and,
- Small scale (less than 1MW).

Small Scale CHP is particularly suitable for applications such as hotels, hospitals and leisure centres, where there is a steady demand for heat and power throughout the year. Large Scale CHP Systems are suitable for use in larger industrial and commercial processes such as chemical/pharmaceutical plants, breweries, third level educational institutes and food processing plants. The White Paper for Energy 2015 is supportive of CHP and it is stated that the Department of Communications, Climate Action and the Environment will develop a policy framework to encourage the development of CHP.

4.2.5 District Heating

District heating (DH) is heat distributed from a central boiler or CHP plant often using heated water. DH has had low uptake in Ireland due to the relatively mild climate and low density housing that make it impractical to pump warm water over long distances.

DH systems are most suited to areas of high heat demand and are cheaper to integrate into new-build scenarios as opposed to retro-fit. It is thus more likely that successful DH schemes in Tipperary would be proposed in areas of higher-density population and high heat demand from industry or commercial enterprises.

It is noted that as an action under White Paper for Energy 2015, it is intended to prepare a national strategy and policy framework for district heating, which will seek to encourage and support the development of the sector. The Council will seek to implement this national policy framework when adopted.

The Council, pending national guidance, will consider and support DH infrastructure serving commercial and industrial premises, and in multi-unit apartment developments where it can be demonstrated that maintenance arrangements are in place.

4.3 Bioenergy

Renewable bioenergy is the energy derived from biomass from renewable resources and this has a key role to play, particularly in the achievement of renewable heat (RES-H) and transport targets (RES-T). Biomass feedstocks (including sources classified as waste) can be categorised as either dry or wet depending on their moisture content.

The combustion of biomass for heat energy is used widely in the form of stoves and biomass boilers in the residential and commercial sectors and depending on the scale of installation proposed may be outside of the planning frameworks. At present, forestry, agricultural and municipal residues and wastes are the main feedstocks for the generation of electricity and heat from biomass. With respect to municipal waste, the Landfill Directive 1999/31/EC has set targets for the reduction of the amount of biodegradable matter that is sent to landfill. The majority of this material must be composted, digested, rendered or incinerated. The recovery of bioenergy using waste as a feedstock is dealt with in section 4.3 below.

The most recent assessment of bio-energy in Tipperary took place during the preparation of the South East Bio-Energy Implementation Plan 2013 – 2020 and the Bioenergy Strategy and Action Plan for the Mid West Region 2009. It was found that the following primary biomass resources were available;

4.3.1 Bioenergy Resource

Tipperary has significant capacity for the production of biomass from the resources set out above. It is envisaged that there is capacity for significantly increased bioenergy production in Tipperary across the sectors of forestry, agricultural by-products, energy crops and municipal waste energy recovery. The SEAI provide a bioenergy mapping service for Ireland and details of the county's bio-energy resources can at www.seai.ie.

[11] May benefit from planning exemptions as per the provisions of the Planning and Development Regulations 2001 (as amended).

Resource	Description	End use category
Forest Thinning	By-product of forest management and harvesting	Direct Combustion to provide heat, power or combined Heat & Power (CHP).
Waste Wood	Recycled wood and waste from construction and demolition	
Sawmill Residues	By product of processing timber	
Straw	By product of cereal production	
Woody Crops i.e. miscanthus, willow	Purpose grown energy crops including short rotation forestry, miscanthus, willow etc.	
Biodegradable Municipal Solid Waste (BMW)	Recycled BMW means the biodegradable component of municipal waste, not including bio-stablised residual waste. Biodegradable municipal waste (Brownbin Waste) is typically composed of food and garden waste, wood, paper, cardboard and textiles.	
Pig and Poultry manure	Animal Waste	Biogas and heat (anaerobic digestion (AD), fermentation and composting)
Cattle manure	Animal Waste	
Food and Garden waste	Municipal Waste	
Wheat	Arable Crop	Biofuel
Oilseed Rape (OSR)	Arable Crop	
Tallow	Meat processing by-product	
Recycled vegetable oil (RVO)	Used cooking oil	

Table 4.1: Bioenergy Resources and Use (Source: SEAI)

In general, forestry is concentrated in upland areas and is broadly scattered across the county. The South East Bio-Energy Implementation Plan 2013 – 2020, states that the demand for wood fuel for bioenergy purposes has been established in the region and will continue to grow. It is likely that biomass supply from timber will increase as private forest plantations in the country are now approaching thinning stage.

Agriculture has a key role in economic growth in the county with greater emphasis on the role of agricultural wastes, such as slurries to energy processes along with the growth of energy crops in a developing bioenergy sector. The Department of Agriculture, Food and the Marine currently administers a Bioenergy Scheme that provides establishment grants to farmers to grow willow for the production of biomass suitable for use as a renewable source of energy. There is a role for the co-treatment of agricultural and biodegradable municipal waste in waste to energy processes. Tipperary is well placed to contribute strongly to the sustainable production of energy crops and from the recovery of energy from agricultural slurries.

A National Bioenergy Plan is currently being prepared by the Department of Communications, Climate Action and the Environment. It is recognised that meeting the demand for biomass from indigenous sources could deliver significant economic and employment benefits and it is expected that biomass will make a more significant contribution to the heat and transport sectors.

4.3.2 Bioenergy Potential

Investment in technologies dedicated to the extraction of energy from biomass have been varied in nature in Tipperary, however, limited in scale, and focused on the production of heat. A summary of permitted biomass users is set out below;

- Golden Mushrooms, Cloughleigh, Golden, Cashel: waste compost is burned with Combined Heat and Power (CHP) to provide for heating needs.
- Williamette Plant, Redmondstown, Clonmel: wood-burning furnace at medium density fibreboard facility using wood wastes from the process to meet the heat requirements of the plant.
- Nenagh Vocational school biomass boiler to provide for heat needs of school.
- Tipperary Institute, Thurles wood fueled CHP with gasification technology
- Sustainable Projects Ireland wood CHP Boiler at the Cloughjordan Ecovillage.

In addition, the Council has invested in biomass CHP facilities in a number of its municipal buildings and AD facilities at the municipal waste water treatment facilities at Clonmel and Roscrea. Furthermore, the SEAI Reheat programme grant aided a number of smaller biomass boilers in the county

There is one commercial scale anaerobic digester with CHP facility in the county; this is operated by H and L Environmental Services at their Energy Park, in Moyne. The outputs from this plant are heat, electricity and biofertiliser and its feedstock's are municipal waste, cattle slurry, dairy waste and belly grass. The plant exports its excess electricity to the national electricity grid.

There has been little investment in AD facilities at a farm level in Tipperary and in facilities for the recovery of energy from suitable AD feed stocks such as slurries, municipal sludge's, brown bin waste etc, with much of this material landspread directly or composted in the county. However, there has been a number of farm based anaerobic digestion facilities permitted and as yet undeveloped using pig slurry as a feedstock.

Wood Biomass processing

The Council recognises the need to support the development of biomass processing facilities to cater for demand for biomass fuel for heat users in the county. At present processing is limited to small-scale wood-chipping in the county.

Case Study:
Local Wood Biomass Processing

Coillte have developed a model for biomass fuel supply hubs to cater for an identified demand for biomass fuel i.e. a large heat user or a cluster of heat users, and five processing hubs have already been developed with the closest located at Dungarvan, Co. Waterford

[12] Grant support from SEAI for eligible projects with guaranteed price under REFIT of €0.15/kWh for farm based anaerobic digesters.

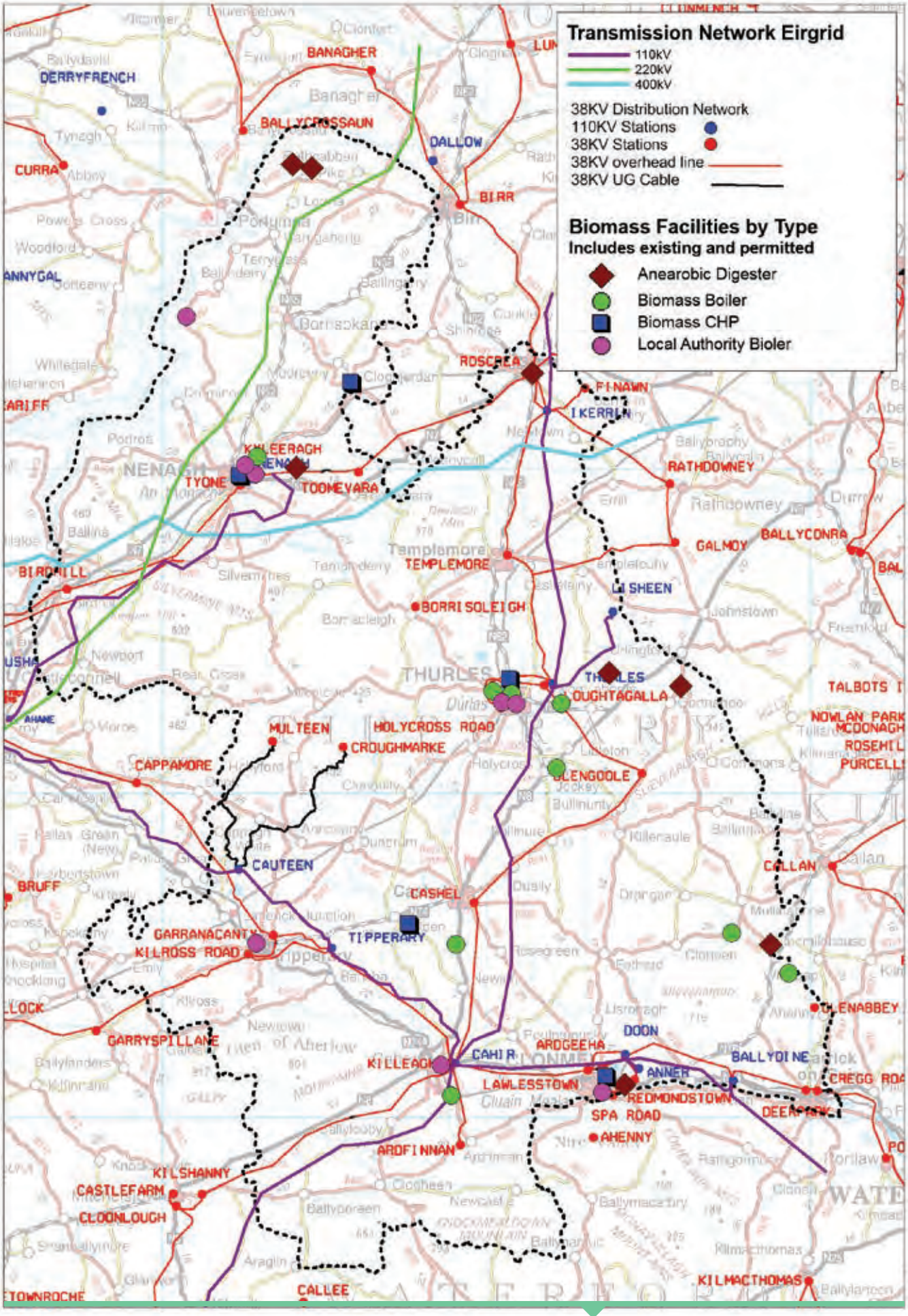

Figure 9: Permitted users of biomass

These depots stockpile and dry thousands of tonnes of biomass annually. Coillte routinely establish new depots as new client contracts arise and demand for wood chip increases. Through these regional hubs, wood chip is supplied to clients in the pharmaceutical, textile, industrial and hotel sectors. Each fuel supply hub comprises of a large secure log storage yard with high quality wood chip storage sheds, weighbridge and quality testing facilities. Coillte operates its fuel supply hubs in conjunction with local contractors who provide a full operations and logistics service including chipping and haulage of wood chip.

This positive approach matches renewable energy requirements with local biomass supply and all feed stock is sourced locally from both Coillte and private forestry resources thus reducing transport needs.

Agricultural Biomass processing

Tipperary has a readily available feedstock for processes that recover energy in the form of agricultural residues and energy crops e.g. animal slurry and manure, chicken litter, spent mushroom compost and straw. However, to date investment in energy recovery processes such as AD have been poor. The lack of a Renewable Heat Incentive and high start up costs are constraining factors. It is considered that there is potential for the development of farm based facilities, particularly AD, to recover energy from agricultural waste in Tipperary.

Case Study:
Agricultural Anaerobic and CHP Facility

An example of a successful farm based biomass facility is McDonnell Farms Biogas Limited located at Shanagolden, Co. Limerick. The AD plant processes 10,000 tonnes per annual of dairy and poultry manure and imported feedstock such as hatchery waste and dairy sludge. The biogas produced in the anaerobic digestion process is used as fuel in a CHP unit with resultant electricity sold to the national grid and the heat generated recycled for heating use in the on-farm poultry enterprise. The processed digestate is used on the farm land as a high quality eco fertiliser.

This positive approach to agricultural investment achieves on-farm energy recovery from agricultural wastes and allows for reuse of waste heat along with increased income for the farmer.

Mixed Biomass processing (including Waste)

This category refers to the processing of biomass outside of wood processing hubs and farm-based facilities. This category covers a wide range of processing types (including AD, gasification, pyrolysis, production of alcohols and production of biodiesels), and may include for the recovery of energy from waste (addressed in greater detail below). It has already been identified that there is one such facility in operation in Tipperary.

Case Study:
AD Facility at Moyne

H & L Environmental Services Ltd at their energy park in Moyne, Thurles, import a variety of feedstocks in their AD facility including Municipal Waste, Cattle Slurry, Dairy Waste and Belly Grass. Electricity produced is exported to the national grid and Bio-Fertiliser from the digester is used for energy crop production.

Facilities may be proposed at a range of scales. Mixed biomass processing could be considered large industrial processing facilities at the regional or national scale incorporating industrial processes and very specific locational requirements.

Facilities that process only imported feedstocks and utilise complex industrial processes (including those that process waste) will require careful consideration to ensure that impacts on the environment and on infrastructure can be minimised and to ensure that such facilities accord with regional level plans for large scale infrastructure.

Photo 6: Inspecting wood chip at the Energy in Agriculture Conference 2016 (Source-TEA)

4.3.3 Location of Biomass Renewable Energy facilities

It is envisaged that a planning framework will be required for the following key types of facilities in Tipperary:

1. On-Farm AD/fermentation plants using slurries both produced on site and feedstock's imported from the surrounding area (mixed).
2. Imported mixed biomass processing (using a range of technologies) using feedstock (mixed) imported from the surrounding areas.
3. Wood biomass processing facilities to cater for local heat energy markets.

The Council recognises the need to support the development of biomass processing facilities to cater for demand for biomass fuel for heat users in the county. At present processing is limited to small-scale wood-chipping in the county. The support of the White Paper for Energy 2015 is evident in this area and the support for the Bio-energy sector is illustrated through the following stated actions:

- Complete an economic assessment of the potential for the development of biogas.
- Develop a policy framework to encourage the development of district heating.
- Develop a policy framework to encourage the development of Combined Heat and Power (CHP).

Figure 10 (opposite), illustrates the gas and electrical networks in the county along with forestry resources, in addition the key towns are identified. Outside of on-farm AD facilities, it is likely that the most viable locations for mixed biomass facilities and facilities that produce biomass products for local heat markets will be proximate to heat demand centres at locations where infrastructure, including transport infrastructure is capable of accommodating such development.

4.4 Waste to Energy

The Southern Region Waste Management Plan 2015 - 2021 outlines policy for the management of waste arising in the region.

- Grow the biological treatment sector, in particular composting and anaerobic digestion, by supporting the development of new facilities; and,
- Support the development of thermal recovery in the region which meets the need of the region and the State in reducing the export of residential wastes for treatment abroad.

4.4.1 Waste to energy resource

There are two main pathways for conversion of organic waste material to energy, these being combustion/thermochemical, and biological.

Combustion

This includes incineration, co-incineration, pyrolysis and gasification, and is best suited for lower moisture feedstock. It is stated in the Southern Regional Waste Management Plan 2015 that future thermal treatment capacity for the recovery of municipal wastes and hazardous wastes will be viewed as a national facilities, will not be defined by regional or local markets alone and will be based on a collaborative approach involving the Southern Waste Regional Authority and the Southern Regional Assembly.

Biological

AD and fermentation, are preferred for wastes having high percentage of organic biodegradable (putrescible) matter and high moisture content. H & L Environmental Services Ltd at their energy park in Moyne, Thurles utilise a variety of feedstocks in their AD facility. There are also composting facilities located at Kilsheelan and Miltown. The Council acknowledges the requirement for organic waste processing facilities in the county to reduce the export of waste material.

[13] Buffered to 10km

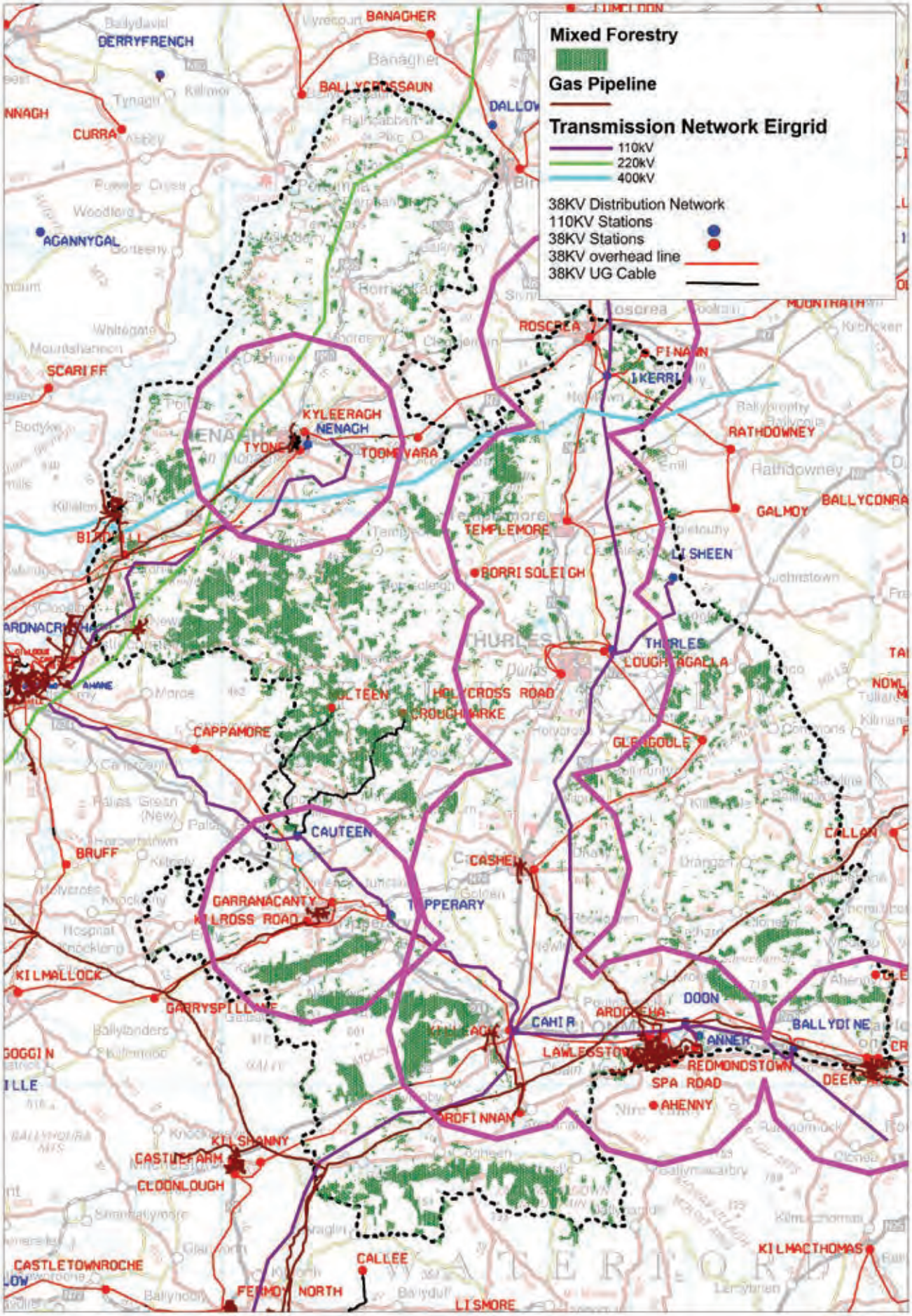

Figure 10: infrastructure and heat demand centres

The Southern Region Waste Management Plan 2015 supports the development of at least 40,000 tonnes of additional biological treatment capacity in the region for the treatment of bio-wastes and the co-treatment of agricultural wastes along with bio-wastes and other organic wastes.

Currently, wastewater sludge can be treated and reused as a fertiliser, soil conditioner and also to generate renewable energy. In this regard, Irish Water is currently developing a National Wastewater Sludge Management Plan (NWSMP) which will set out Irish Water's strategies for wastewater sludge management over the next 25 years.

4.4.2 Waste to Energy Potential

The Southern Region Waste Management Plan 2015 recognises the potential for energy related land uses to be located at authorised inactive landfills in the region, and supports the consideration alternative future land uses at authorised inactive landfills – subject to amendments of existing approvals and to receipt of planning permission where appropriate.

It is also stated that there is a need for small-scale thermal recovery capacity for industrial process wastes, including sludges, at the location of generation by producers or manufacturers to reduce the need to export industrial process wastes.

In line with the approach for biomass outlined in section 4.3.2 above, biological waste products have a role to play as feedstock for biomass facilities and form a useful feedstock for mixed biomass processing.

4.5 Wind Energy

The county has significant wind resources due to its upland areas as identified by ESB Ireland (ESBi) Wind Energy Resource Mapping. The Wind Energy Development Guidelines (DEHLG 2006) are the main statement of government policy on on-shore wind. The Council has prepared a Wind Energy Strategy in accordance with the national guidelines; this provides a framework for the development of Wind Energy. The Tipperary Wind Energy Strategy 2016 is set out in Appendix 1.

4.6 Solar Energy

Solar energy development in Tipperary in general has been limited to domestic installations for solar thermal energy. This is influenced by the fact that solar energy is the only major renewable energy technology that does not qualify for a REFIT in Ireland. However, it is anticipated that there will be significant growth in ground mounted solar installations over the coming years. Approximately 18 applications for connections to the national grid have been made in respect of sites in Tipperary. According to the SEAI, solar energy is set to play an ever-increasing role in the form, appearance and construction of buildings, and it is apparent that ground mounted large scale solar projects will be proposed and developed in Tipperary. The principal reason for this is that solar PV systems which produce electricity directly from solar radiation are becoming more widespread as their advantages become apparent and as costs fall.

4.6.1 Solar Energy Resource in Tipperary

The solar resource of Tipperary is illustrated on Figure 11 below. Tipperary normally typically

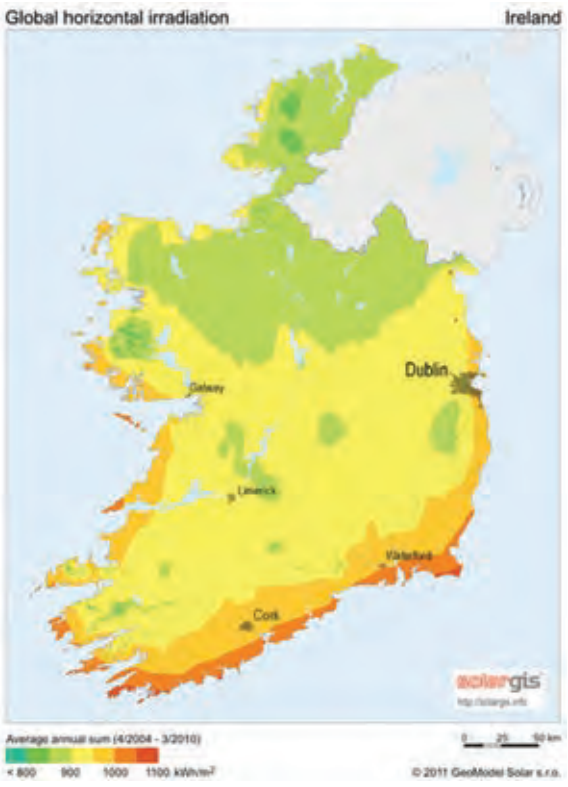

Figure 11: Solar Radiation Map of Ireland (Source Solargis)

[14] Including pre-treatment, thermal recovery, biological treatment, reprocessing and preparing for re-use

[15] Note the Wind Energy Guidelines are currently subject to a targeted review by the DECLG

[16] Eirgrid's 'Offer Process Application Information' applications for connections to the Transmission and Distribution system up to 31 November 2015.

receives 1000 kWh/m2/year. The sunniest months are May and June. During these months, sunshine duration averages between 5 and 6.5 hours per day over most of the county. Due to its long hours of daylight, particularly in the summer, Ireland has good potential to capture energy from the sun. For optimally located PV systems, each installed kW can be expected to produce in the order of 850kWh (units) of electricity per year in Ireland. A 4kW system would thus produce approximately 3,400kWh / year for consumption.

Solar Thermal

Wherever there is a demand for heat, solar thermal systems can be used. At present, the most common application of solar thermal energy is for domestic solar water heating. Solar panels, generally located on a south-facing roof, transform solar radiation into heat. The heat produced during the day is stored in a large hot water cylinder, so that it can be used at any time. The greater the demand for hot water, the more beneficial solar thermal will be, and the shorter the return on investment. A solar combi-system can contribute to total heating requirement of the house (space and water heating). The SEAI Better Energy Homes Scheme grant aid of domestic solar installations has resulted in interest in solar thermal installations at the domestic level in Tipperary.

The same technology can be applied cost-effectively for larger applications where there is a significant demand for heat. This is especially the case where the heat demand is high during the summer when the solar output is at its highest i.e. in hotels, swimming pools and sports centres. Buildings or other applications where there is a consistently high hot water demand all year round are also good cases for solar thermal e.g. nursing homes, spas, milking parlours, etc.

Solar Photovoltaic (PV)

There are two main types of PV system; grid-connected solar PV systems and stand-alone PV systems. These are detailed below:

A grid-connected PV system is one which connects to the electricity grid and "exports" to the grid. The main advantage of using a grid-connected PV system is that the grid can be used as what is effectively an electricity storage system, where the electricity is "stored" and then "re-purchased". A grid-tied system of this type is of interest when a payment is available for the electricity being exported to the grid, to offset the cost of re-purchasing of electricity exported to the grid. Grid-connected PV systems do not need physical storage systems (batteries) and so the investment cost is reduced.

If the PV system is not supplying sufficient electricity to power the loads in the building (e.g. at night, when there is no solar energy available), then the electricity from the grid is used. When the electricity supplied by the PV system is greater than the loads in the building, then the electricity can be exported to the electricity grid.

Stand alone PV systems are not connected to the grid. Stand alone systems are set up so that the electricity produced by the PV system is used directly. In order to take full advantage of the electricity produced, it needs to be stored. For this reason, a standalone system will commonly include battery storage. Stand-alone PV systems are very useful where there is no electrical grid connection available and for applications such as street lighting, traffic signs etc. The Council has been proactive in the use of off-grid solar PV technology in road signage, parking meters etc.

The Council is supportive of the use of both solar thermal and solar PV technologies in Tipperary and has already led the way in the installation of solar PV panels on its civic buildings.

4.6.2 Solar Energy Potential

The design and technologies around solar installations are evolving constantly and there has been research into their installation on roadways and in water bodies. It is expected that over the lifetime of this Renewable Energy Strategy solar energy will by primarily ground mounted or roof mounted.

Ground Mounted Solar Arrays

The following site selection criteria for ground mounted arrays apply:

- Typically suited to lowing-lands due to the need for level sites.
- Accessibility/proximity to electricity networks. Ability to achieve a network connection, typically via a 10kV or 20KV overhead cable on the distribution system. In general, it is not viable to locate solar farms over 1km from network infrastructure.
- Site area of at least 25 acres.
- South facing aspect with either flat terrain or sloping gently.

- Land free from obstacles that may cause shading.

As they are relatively new, solar farms are not specifically identified in the classes of Environmental Impact Assessment (EIA) development listed either in the EIA Directive or in Schedule 5 to the Planning and Development Regulations.

Roof Mounted Solar Arrays

Part L of the Irish Building Regulations state that a building shall be designed and constructed so as to limit the amount of energy required and the amount of carbon dioxide (CO2) emissions for its operation insofar as is reasonably practicable.

Building regulations requirements for new dwellings also prescribe that a reasonable proportion of the energy consumption to meet the energy performance of a dwelling is provided by renewable energy sources. Solar technologies can be used to help meet this contribution.

Solar panels are typically located on the roofs of houses or other structures and require a southern aspect for solar gain. The area required for solar panels is directly related to the amount of energy gain sought. The Planning and Development Regulations 2001 (as amended) set out the area of roof space considered to be exempt from planning permission for residential, industrial and agricultural structures.

4.7 Hydro Energy

4.7.1 Hydro Energy Development to date in Tipperary

Due to its upland areas and fast flowing streams and rivers there is potentially an unexploited hydroelectricity storage and production resource available in Tipperary. The amount of electricity a hydroelectric site can generate is the product of flow volume and head height or in run of river cases flow volume alone is the key consideration. In general hydro electric schemes can be set out in two categories:

Pumped Hydro Electric Scheme (PHES)

Low-cost off-peak electric power is used to run pumps. During periods of high electrical demand, stored water is released through turbines to produce electric power. The best sites have large volumes of water all year round, with a large vertical drop in a short distance, PHES using a high head and impoundment of water is effective

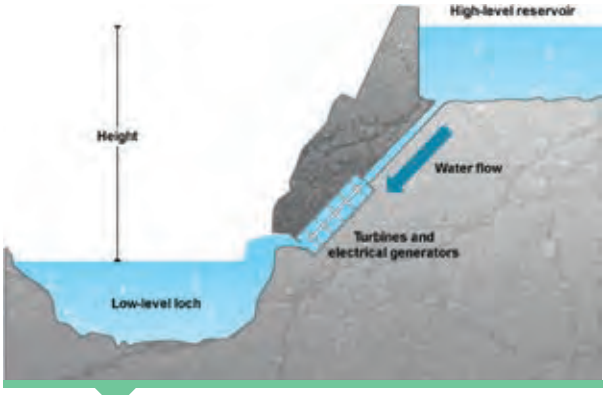

Figure 12: Diagram of a PHES (Source BBC)

as an energy storage and generator of electricity. To date there is no permitted or operational PHES in Tipperary.

Run of the River Hydro Electric Installation

This is a type of hydroelectric generation whereby the natural flow and elevation drop of a river is used to generate electricity. Such installations and are generally much smaller than PHES. At present, there are three grid connected run- of-river hydro power stations located in Tipperary, each of these are located on the River Suir and are in lowland areas. These are located at Holycross, Cahir and Clogheen and these have a combined installed capacity of 0.43MW of power per annum between them.

Any installation with an output of 300 megawatts or more, or where the new or extended superficial area of water impounded would be 30 hectares or more, or where there would be a 30 per cent change in the maximum, minimum or mean flows in the main river channel, will be considered Strategic Infrastructure Development.

Photo 7: Officials and Elected Members inspect a Hydro turbine on the River Suir at Holycross (Source-TEA)

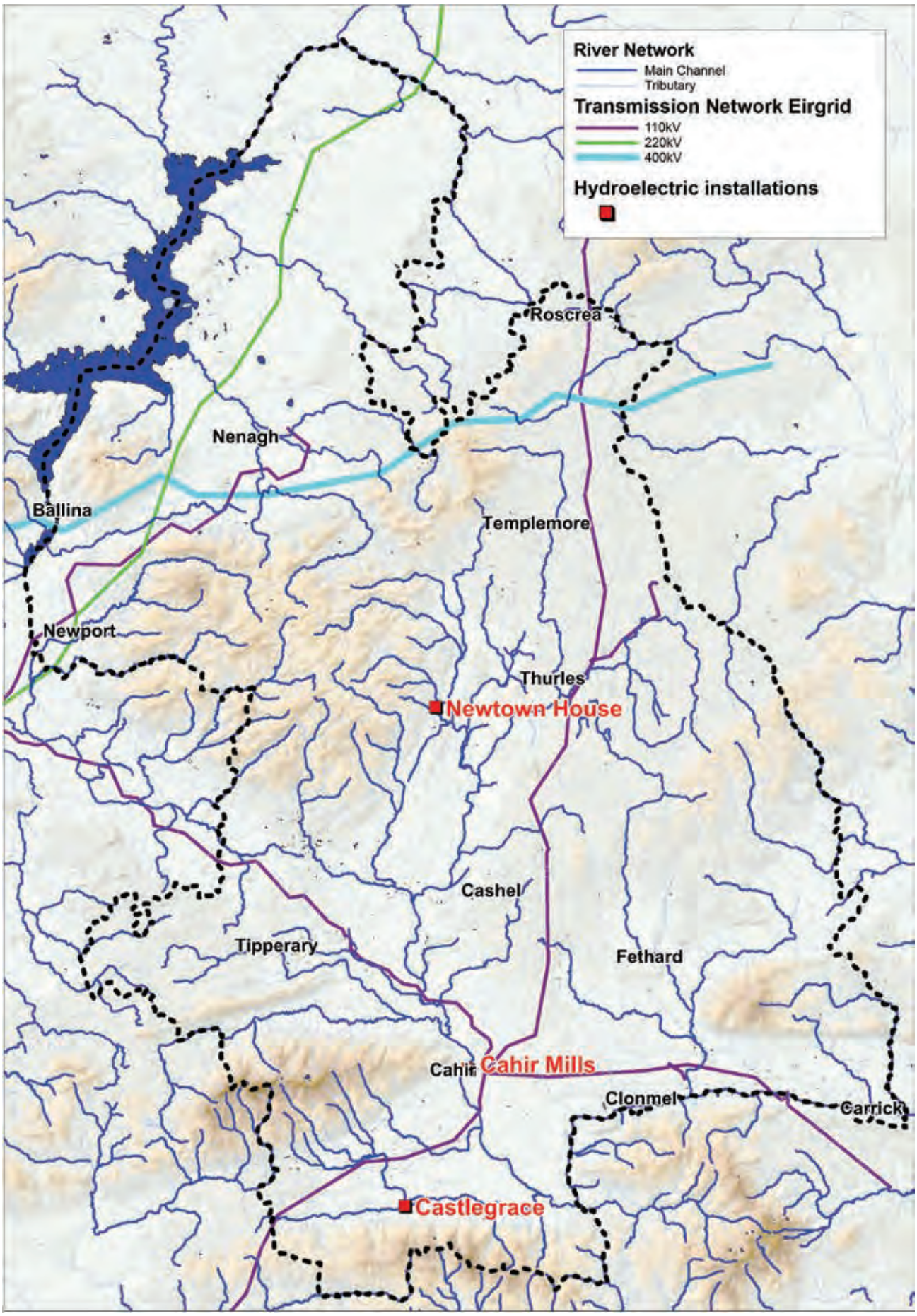

Figure 13 : Tipperary Rivers, Lakes and locations of existing hydroelectric facilities

4.7.2 Hydro Resource in Tipperary

The rivers and lakes of Tipperary are illustrated overleaf with a backdrop of the electrical network and topography of the county and existing hydroelectric installations. It can be seen that Tipperary is a hilly county with a significant network of rivers and lakes. It is possible that suitable sites for hydro resources (both upland PHES and lowland run-of-river hydro generators) may be identified having consideration to factors such as grid connection, topography, protected sites and ecology.

The Council recognises the national importance of energy storage, particularly PHES, in helping to meet targets for renewable electricity generation. In this regard, the Council notes that the White Paper for Energy, 2015 acknowledges that energy storage can mitigate some of the grid- connection challenges posed by intermittent power plants. Appropriate locations for pumped hydro energy storage facilities are guided by minimum physical criteria including:

- A difference in elevation between the upper and lower reservoir,
- Within close proximity to existing electricity transmission network,
- Within an area which has sufficient hydrological resources.

The Council considers that there are opportunities in the up-land areas of Tipperary to provide such nationally important, large scale PHES developments. Historic mining sites, brownfield sites or existing environmentally de-graded sites shall be considered by the Council as potentially suitable, particularly in cases where environmentally beneficial site remediation measures can be incorporated. The Council will support the development of the hydro resource of the County as an energy generator and also of PHES as an important attribute (storage of energy) of the renewable energy capacity of the county. An example of a site for further study is the former Macgobar Site and surrounding lands in Silvermines, Co. Tipperary.

4.8 Geothermal Energy

4.8.1 Geothermal Energy Development to date in Tipperary

A heat pump looks similar and can perform the same functions as a conventional gas or oil boiler, i.e. space heating and sanitary hot water production, and can be used in place of conventional oil or gas heating in both the residential and commercial sectors. They are particularly suited for buildings with a high demand for space heating and sanitary hot water production, extensive work-in times and a simultaneous need for cooling.

Despite the fact that ground source heat pumps are an ideal solution for heating and cooling in commercial buildings, there has been little significant investment in this area in Tipperary other than for domestic dwellings. This is largely due to the initial capital costs of installing a geothermal heat pump system being usually higher than other conventional central heating systems.

4.8.2 Geothermal Resource in Tipperary

A study of the geothermal resource in the country was performed by the CSA Group, in co-operation with Conodate Geology, Cork Institute of Technology and the GSI in 2004 and shows the geothermal resource at different depths, Figure 14 illustrates the geothermal temperatures at 2500m and gives an indication of the resource available in the county. The results of this review indicate that Ireland is particularly well suited to the use of ground source heat pumps, due to its temperate climate, along with rainfall levels that ensure good conductivity and year-round rainfall recharge.

Considering the Republic of Ireland and Northern Ireland together, this review has indicated a regional increase in temperatures ranging from 17°C to 19°C in the Republic to 25°C to 27°C in

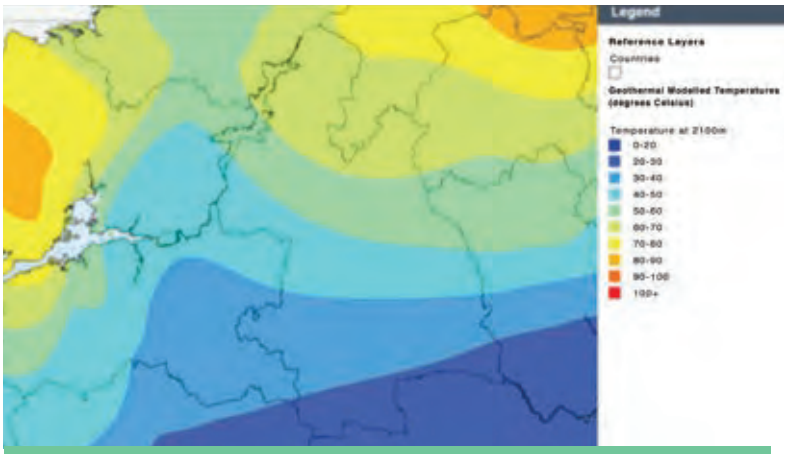

Figure 14: Geothermal resource in Tipperary at 2500m (Source SEAI)

Northern Ireland at a depth of 500m. At 2500m, the increase in temperature ranges from 28°C to 45°C in the South to 64°C to 97°C in the North. This indicates significant geothermal sources, with the potential for commercial development.

A geothermal system of any scale has three main components: a series of pipes in the ground, a heat pump and a heat distribution system. Lengths of plastic pipes are buried in the ground, either in a borehole or a horizontal trench near the building to be heated or cooled. Fluid, normally water with anti-freeze, absorbs or emits heat to the soil, depending on whether the ambient air is colder or warmer than the soil. In winter, the heat pump removes the heat from the fluid, upgrades it to a higher temperature for use in the building, typically in under-floor heating. A distribution system is needed to transfer the heat extracted from the ground by the heat pump. The heat is often in the form of hot water and is distributed around the dwelling by radiators or a low temperature underfloor heating system.

It is noted that it is a key objective of the White Paper for Energy 2015 to 'establish a regulatory framework to facilitate the development of geothermal energy resources'. The Council will support and welcome measures to facilitate the use of geothermal energy.

4.9 Auto-generation and Micro-generation

Auto-generation of energy has already been defined in this Renewable Energy Strategy and it has been seen that the key determinant of an auto generator is that the energy is produced on site for use on site. An auto-generator may be of a micro-generator scale or may be a much greater energy installation to contribute to the energy needs of a large commercial enterprise in an urban or rural area. Typical technologies for the auto-production of energy include:

- Natural gas fuelled CHP.
- Biomass CHP.
- Anaerobic digestion CHP.
- Small hydroelectric installation
- Wind turbine
- Solar photovoltaic arrays.

Investment in auto-generators of renewable energy has been limited in Tipperary at both the domestic and commercial level. In addition to date, there are a limited number of auto-producer installations using biomass, solar and wind for the production of energy for use on site.

It is evident that the lack of REFITT for auto-producers and micro-generators in Ireland, especially when compared to the Northern Ireland Renewables Obligation Scheme feed in tariffs, has been a limiting factor to development.

Case Study:
Renewable Energy production at Gurteen

Gurteen College has installed a 50 kilowatt wind turbine beside its main campus. Manufactured in Canada, supplied and constructed by Renewable Energy Systems, the turbine should supply much of the College's electricity needs. The project was grant aided by Sustainable Energy Ireland and generously co-funded by the Julia Trench Trust.

Other energy efficiency projects are being planned at the moment including biomass fuelled heating systems and use of insulation to reduce fuel use. It is hoped that within 2 years the College will have reduced its total energy usage by at least 50%

4.10 Planning Requirements for Renewable Energy

Planning permission from the Council is required in respect of renewable energy development unless it is exempted development or is Strategic Infrastructure Development (SID) development where consent is required from An Board Pleanála.

4.10.1 Planning Exemptions

Certain micro-renewable generation installations for domestic, agricultural and light industrial activities are exempted development subject to criteria detailed in the Planning and Development Regulations 2001 (as amended) (Statutory Instrument No. 83 of 2007, No. 235 of 2008 and No. 256 of 2008). Planning permission is not required for small-scale renewable energy generator that comes within the exemption limits and restrictions.

4.10.2 Strategic Infrastructure Development

SID is development which is of strategic

Photo 8: Farmers discuss energy at the Energy in Agriculture Conference 2016 (Source-TEA)

economic or social importance to the State or a region. It also includes development which will contribute significantly to the fulfilment of any of the objectives of the NSS or any regional spatial and economic strategy for an area, or which would have a significant effects on the area of more than one planning authority. In this respect, a large scale renewable energy development proposal could be SID.

The 7th Schedule to the Planning and Development Act 2000 (as amended) lists the classes of infrastructure development which, if considered by the Board to be SID, require direct application for permission to the Board instead of the Council. The 7th Schedule sets out the forms of energy developments that classify as SID, these include thermal power stations, hydroelectric installations and wind energy developments.

In the event that an energy related SID is proposed in Tipperary, the Council will prepare and submit to An Bord Pleanála in the manner as prescribed in the Planning and Development Act, 2000 (as amended) a report setting out the views of the Council on the effects of the proposed development on the environment and the proper planning and sustainable development of the area of the authority.

4.11 Proposed Grid Connections

A list of all applicants seeking connection to the electrical grid Transmission or Distribution system is published periodically, entitled 'Connection Offers Disclosure of Applications' .The list accounts for all generation applications received by the Distribution System Operator (DSO), ESB Networks, or the Transmission System Operator (TSO), EirGrid. The location of potential grid connections in respect of the renewable energy resources of Biomass, Solar, Wind and Hydro are geographically illustrated in Figure 15 (opposite).

One application for a grid connection for a biomass facility has been made to date to Eirgrid, this connection is proposed to be located at the Littleton Briquette Factory with an installed capacity of 4.99MW. This highlights the need for much greater support for investment in biomass as an energy source for heating, transport and electricity.

There are 26 proposed wind energy grid connections made as part of the 'Gate 3' application process. There are 2 proposed grid connections for PHES; these could become a significant contributor to energy storage in the county. There are 18 proposed grid connections for ground mounted solar arrays. Proposed grid connections of 71.99MW to the electrical network in respect of solar energy could become a significant contributor to electrical output in the county.

[17] Department of Enterprise, Trade and Investment (DETI) Northern Ireland Renewables Obligation

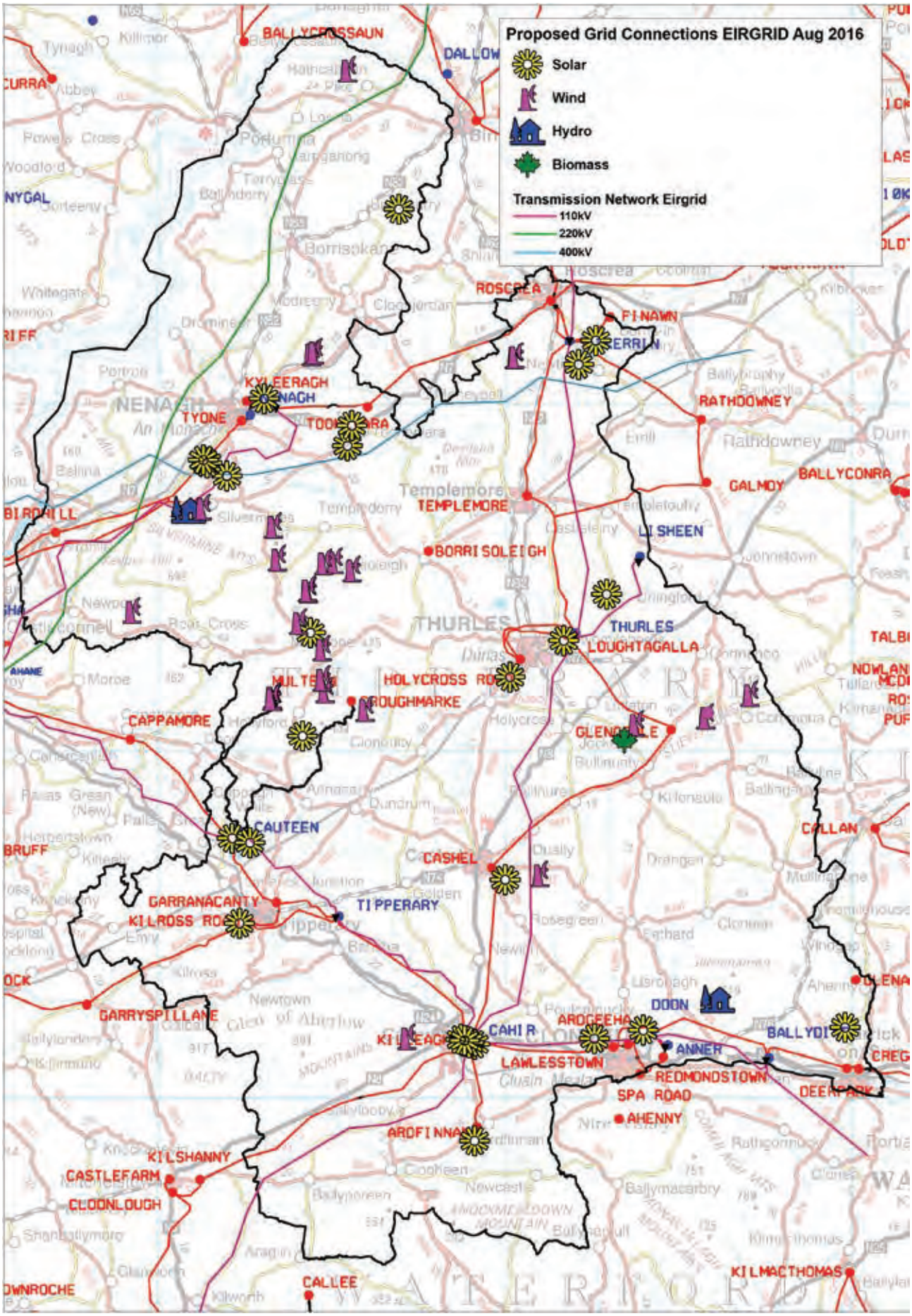

Figure 15: Location of proposed grid connection applications August 2016

5.0 Infrastructure & Supports

5.1 Introduction

This section examines the infrastructure and renewable electricity support schemes that support renewable energy development in Tipperary. The factors that stimulate investment in renewable energy are complex and include access to finance, research and development, expertise, markets, planning phase constraints, grant schemes etc. The capacity of underlying infrastructure is vital for the development of renewable energy particularly on a commercial basis. Infrastructural capacity can often be a constraining factor for renewable energy and is a key consideration at project development and planning stage. It also recognised in the White Paper for Energy 2015 that ongoing market support is needed to deliver investment to meet 2020 targets.

5.2 National Electrical Infrastructure

The national grid is a nationwide electricity transmission network that consists of both overhead and underground high-voltage power cables. EirGrid plc is the licensed Transmission System Operator (TSO) in Ireland and is responsible for connecting both generators, and large electricity users to the transmission system. ESB Networks as the Distribution System Operator (DSO) is responsible for connecting typically smaller generation and users of electricity. Both EirGrid and ESB Networks are licensed by the Commission for Energy Regulation (CER). The Grid25 Implementation Programme 2011–2016 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.

In March 2015, EirGrid published a Draft Strategy on Ireland's Grid Development Strategy. Central to the draft strategy is the provision of a strong and reliable electricity supply to the Southern region. This will ensure that the region is equipped for investments by both energy intensive indigenous and multinational companies seeking to locate or expand in the region. There are three paths available for connection of electricity generators to the National Electricity Grid, as follows:

1. Group Processing Approach (GPA) which is known as a "Gate" system.
2. Non-GPAs - smaller projects, research and development projects or those that satisfy 'public interest' criteria.
3. Micro-generators

'Gate' Process

Since December 2004, a CER approved Group Processing Approach (GPA) applies to applications for connection offers for large renewable electricity generators (mostly wind). Under the GPA or 'Gate' process, applications for connections are processed in batches rather than sequentially.

To date there have been three 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 is designed to facilitate the delivery of 40% renewable electricity and government policy in that area. It is estimated, given current demand projections, that 4,000 MW of renewable generation will be required to deliver 40% RES-E, while the combination of the grid connection offers issued under the three Gates amounts to almost 6,000 MW.

Outside of the 'Gate' Process

The CER published a decision in 2009 (CER 09/099) that allows for certain renewable, small and low-carbon generators to have offers for connection to the grid without going through the GPA. This includes small projects, research and development projects and those that qualify as they are deemed to provide benefits of a public nature that merit qualification. Offers are based on a 'first come first served' basis per grid 'node' (110kV sub-station). Public benefits that may be acceptable include diversity of fuel mix, predictability and power system support, environmental benefits, and research or innovation.

The decisions set out in CER/09/099 differentiate between wind and non-wind, and only wind

projects with MEC less than or equal to 0.5MW can avoid the GPA. New proposals for renewable energy generated from non-wind resources i.e. commercial solar farms, can apply for connection to the national grid and will be assessed depending on their scale i.e. if they are greater than 5MW interaction studies will be required.

In summary, Tipperary has a very strong electrical grid and substation network and this network will be instrumental in supporting the development of the renewable energy industry in the county.

Figure 16: Transmission Grid in Tipperary

5.2.1 Smart Grid

According to the SEAI, the 'Smart Grid' is the current electricity grid as it evolves to include added monitoring, analysis, control and communication capacity to maximise the efficiency of the electricity system. This will allow the generation, transmission and distribution of electricity around the system as efficiently as possible.

An Irish Smart Grid will help to:

- Better manage the electricity resources already in place. This means minimising the number of new transmission and distribution wires that are needed and minimise the number of new fossil fuel generation plants needed in the future.
- Effectively incorporate the renewable generators that will be connecting to the grid. By the year 2020, 40% of Ireland's electricity requirements must be met from renewable sources.
- Facilitate entry of new participants into the electricity generation and supply sectors. This will increase the level of competition and make for greater levels of consumer choice.
- Give greater levels of information on electricity pricing and consumption to consumers, which will give them greater control over their consumption and help them reduce their bills.

The Council fully supports the evolution of the current electricity grid to meet the criteria outlined above and to better deliver energy to Tipperary.

5.3 National Gas Infrastructure

Bord Gáis Networks develop, operate and maintain the natural gas transmission and distribution networks in Ireland and provide gas transportation services to suppliers and shippers, including Bord Gáis Energy. Tipperary is supplied by the natural gas network (Bord Gáis Networks) in the towns of Clonmel, Carrick on Suir, Tipperary, Cashel, Cahir, Ballina, Newport and Ballyclerahan. The network is also being extended to Nenagh Town.

At the moment there is no biomethane injection into the Irish natural gas grid. However, the CER is planning to issue a consultation on biogas, with regard to the technical and regulatory aspects and it is an objective of the White Paper for Energy 2015 to 'complete an economic assessment of the potential for the development of biogas'. Technical issues that will need decisions include those around gas quality etc; however, the Council would support and encourage the distribution of natural gas produced from renewable sources via the existing gas network.

Figure 17: High and Medium Pressure Gas Networks in Tipperary

5.4 Transport and Electric Vehicles

5.4.1 Biofuels and Electric Vehicles (EVs)

The White Paper for Energy 2015 is cognisant of the need to support alternatives to fossil fuels for transport and it is set out that:

- The adoption of electric and gas vehicles through grants and tax relief will be supported and,
- A national policy framework to support infrastructure for alternative transport fuels will be developed.

The NREAP specifies a two-pronged strategy that combines increased use of biofuels with the accelerated development and use of EVs in Ireland. The national Biofuel Obligation Scheme 2010 obliges all road transport fuel suppliers to use biofuel in the fuel mix (6% since January 2013). The Government has also set a target of 10% penetration of EVs in the national vehicle fleet by 2020. The ESB is responsible for the rollout of EV charging points across the country with 3 types of charge points being installed by 'ESB ecars' nationwide: home charge points, public charge points and fast charge points.

The Council supports the expansion of the EV charging network in Tipperary in conjunction with the ESB and will seek to require the installation of additional public charge points as part of car-parking facilities of private developments through its development management standards for car-parking as set out in the County Development Plan (as varied).

5.4.2 Transport Infrastructure

Transport infrastructure is important for many renewable energy resources, during the construction/installation phase and the operation (particularly for biomass facilities) and decommissioning of projects. The Council will consult with relevant bodies determining planning applications, including, but not limited to: Transport Infrastructure Ireland (TII), airport or aviation authorities, harbour authorities, port companies and public transport bodies.

The Council may, in line with its transportation policies set out in the County Development Plan (as varied) specify that renewable energy proposals include traffic management plans, where appropriate, to address impacts on the local road network and local residents.

Roads, ports and transportation infrastructure are particularly important to the development of a sustainable biomass and biofuels industry. In many cases, the point of use of biomass and other biofuels may not be directly beside the point of production. In such cases, and particularly for large biomass projects, the logistics around receiving large quantities of biomass in a cost-effective and low-impact manner is critical. The proposed development of large-scale biomass production and biomass projects will be considered against the backdrop of these logistics aspects. Proximity to energy feedstock's and end-markets is a key planning consideration in locating new development.

5.5 Heat Distribution

District Heating (DH) schemes involve the development of infrastructure in a local area to distribute heat from a point of production to a point of demand. The localised production and use of heat from renewable energy resources as set out in the NREAP is essential for Ireland to

reach its overall legally binding target. DH can increase the opportunity for renewable heat to be used and is most effective to support heat consumers in high-energy-density areas.

At present, there has been little development of DH systems in Tipperary and therefore, little supporting infrastructure is in place, however, it is envisaged that proposals for DH systems will occur over the lifetime of this Strategy.

Case Study:
Council operated DH system at Tralee

Kerry County Council operates and maintains a woodchip-fired DH system at a mixed use development in Tralee using local woodchip. The DH system comprises two wood chip boilers linked to two thermal store tanks housed in a central plant room with district heat pipes connected apartment blocks and the council library, former convent, primary school and housing units. Heat meters measure the amount of hot water and heat used in kWhs in each apartment enabling the Council to bill the tenants.

The project was grant aided from the SEAI under the 'ReHeat' programme. The Council manages the purchase of locally grown and harvested wood chip and maintenance of the DH plant.

This Council owned and operated scheme is an excellent example of investment in sustainable heat in the public sector and it is an objective of this Council to investigate opportunities for the roll out of similar projects in Tipperary.

5.6 Renewable Electricity Support Schemes

It is a key objective of the White Paper for Energy 2015 to '*introduce a new support scheme for a range of renewables in the RES-E sector from 2016*'. In support of this statement, a review of the requirement for and potential to introduce a new support scheme for electricity from renewable resources is under way by the Department of Communications, Energy and Natural Resources with consultation commenced in 2015.

The objective of this review is to develop a new support scheme for electricity for renewable energy to be available in Ireland from 2016 onwards. This review will re-examine the existing supports under the Alternative Energy requirement (AER) Schemes and the REFIT schemes. It is envisaged that this review will deliver a new impetuous for the development of renewable energy from all resources as supported by a support scheme that provides regulatory and policy certainty to developers, enables cost effective investment in renewable energy and seeks to minimise cost to the consumer.

6.0 Policies and Objectives for Renewable Energy

6.1 Introduction

This Renewable Energy Strategy has been developed as a planning and regulatory framework to support and underpin the Core Strategy and policies and objectives of the County Development Plan (as varied).

This section sets out the planning policies that will be applied to proposals for the development of renewable energy development in Tipperary and also sets out the specific objectives of the Council with respect to renewable energy. This Renewable Energy Strategy replaces Section 8.4 Planning for Renewable Energy of the County Development Plan (as varied) and should be read in conjunction with the County Development Plan (as varied) and the Tipperary Landscape Character Assessment 2016.

6.2 Renewable Energy and Protection of the Environment

The written statement of the County Development Plan (as varied), sets out the appropriate mechanisms for the protection of the environment and all relevant environmental policy and objectives will apply to planning proposals for new development in Tipperary.

Policy RE1:
Protection of the Environment

It is the policy of the Council that renewable energy developments and associated supporting infrastructure shall be assessed for compliance with the environmental standards and policies as set out in the County Development Plan (as varied) and the Development Management standards set out in Chapter 10.

Photo 9: River Suir (Source -John O'Neill)

The Council will seek to protect the conservation status of Natura 2000 sites and in this respect and in line with the existing policy of the County Development Plan (as varied) all projects will be subject to Appropriate Assessment Screening to ensure the protection of species and sub-species listed in the Habitats Directive (Annex 11, IV and V) and the Birds Directive (Annex 1).

In determining individual proposals / applications for renewable energy development and associated EIA /AA under the EIA and Habitats Directive, the Council will assess and take into account potential cumulative effects/ in- combination effects in association with other relevant plans, programmes and projects.

Environmental Impact Assessment (EIA) is the process by which the anticipated impacts on the environment of a proposed development or project are measured and if the likely effects are unacceptable, design measures or other steps can be taken to avoid, reduce or mitigate against these effects. EIA may be required for development proposals below statutory thresholds at the discretion of the Council. The Council will have regard to Schedule 7 of the Planning and Development Regulations, 2001 (as amended) in deciding whether any renewable energy development is likely to have significant effects on the environment, and also the supporting Guidelines 'Environmental Impact Assessment Guidance for Consent Authorities', DEHLG 2003. Further detail regarding EIA is set out in Chapter 10 of the County Development Plan (as varied).

6.3 Renewable Energy and Landscape

The Tipperary Landscape Character Assessment 2016 (LCA) has classified the landscape features of the county and established policies for the protection and management of the landscape and unique 'sense of place' of Tipperary. The LCA 2016 supports the existing polices for landscape management and protection as set out in Chapter 7 of the County Development Plan (as varied).

The LCA classifies landscape character and landscape sensitivity along with the capacity for the landscape to accommodate new development and human activity. Appropriate consideration of landscape capacity and impacts on Primary and Secondary Amenity areas should be carried out to determine the suitability of any site to accommodate new development and should influence the design, scale and nature of any proposal.

Policy RE2:
Landscape Capacity and Renewable Energy Development

It is the policy of the Council to facilitate new development which integrates with and respects the character, sensitivity and value of the landscape in accordance with the guidelines set out in the Tipperary Landscape Character Assessment 2016 and the policies as set out in the County Development Plan (as varied) and the Development Management standards set out in Chapter 10.

6.4 Community Involvement in Renewable Energy

It is an objective of the Council to encourage direct community investment in renewable energy in Tipperary. The White Paper for Energy 2015 places emphasis on the need for people to be supported in a change 'From Passive Consumers to Active Citizens', and outlines that community-based energy initiatives will emerge to facilitate and drive the energy transition. In this respect, the Council supports the principle of a circular economy with local energy, created and used in the local economy.

Community investment is encouraged at the design and conception stage for all renewable energy installations, and particularly in large scale proposals. The Council will seek to support communities in identifying the potential for local renewable energy as an investment, employment and socio-economic opportunity.

There are a number of ways that local communities can invest in and/or benefit from energy development;

1. **Community Ownership/Investment -** where the community either own a renewable energy development in full or own a percentage of the investment
2. **Community Benefits Scheme -** the establishment of a community benefits agreement (between the developer and the local community), with funds contributed annually by the developer.

Opportunities for community investment and benefit in renewable energy development

will be encouraged by the Council. However, outside of the requirement with respect to SID development, community benefit is not a material consideration under the Planning and Development Act 2000, (as amended) and no weight can be given to community benefit when considering a planning application. However, it is an objective of the Council to investigate how community investment in energy with resultant returns to the local community can became much more commonplace in Tipperary.

Policy RE3:
Community Investment in Local Renewable Energy

It is the policy of the Council to support and facilitate renewable energy proposals that bring about a direct socio-economic benefit to the local community. The Council will engage with local communities and stakeholders in energy and encourage developers to work with local communities to identify how they can invest in/gain from significant renewable energy development.

6.5 Wind Energy Strategy

The Tipperary County Wind Energy Strategy contained in Appendix 1, sets out a planning framework for development of wind energy in the county. The Strategy, which has been informed by a LCA and SEA/HDA, identifies areas where wind energy development is 'open for consideration' and where wind energy developments are considered 'unsuitable'. The Strategy also set out the appropriate planning policy and development management standards to support and manage sustainable wind energy development.

6.6 Bioenergy Strategy

The Council encourages the sustainable development of the bio-energy sector in the county due to the positive contribution it can make to the economy and to the achievement of renewable energy targets. In this respect, the Council is cognisant of the multiple contributors to the industry including forestry, agriculture, waste recovery, research funding and business development, the range of technologies and processes involved and the need to balance demand side and supply in markets that contribute to the circular economy that supports this sector.

6.6.1 Bioenergy Development in Tipperary

The Council will support proposals for local biomass processing facilities that identity both biomass demand and need for biomass processing in Tipperary and put in place suitability located processing facilities that can cater for this identified biomass demand. The

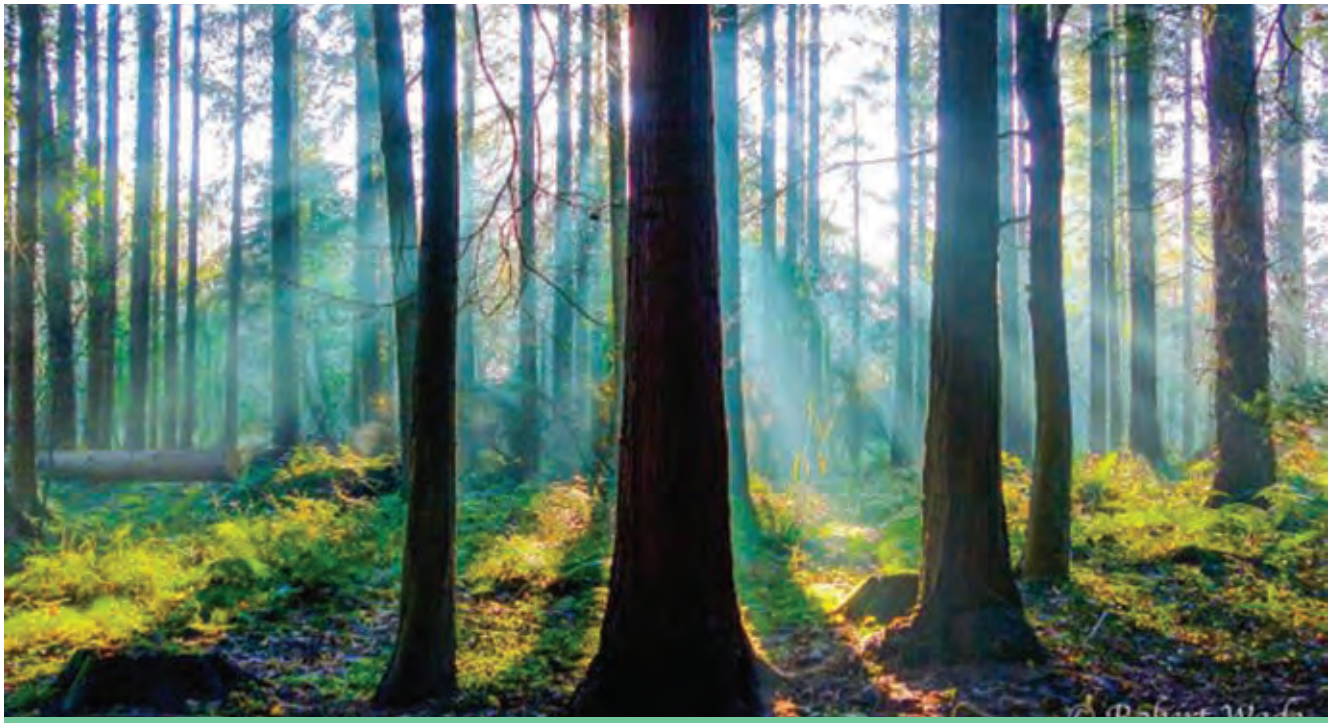

Photo 10: Biomass energy in the form of coniferous plantation in Tipperary (Source-Robert Wade)

Photo 11: Tipperary Cornfield (Source-Sinclair Adare)

Council will consider the expansion of existing biomass processing facilities and new facilities on appropriately located sites. New development of any scale will be located centrally to feedstock catchment areas and to final users of the process products, including heat, energy and substrates to ensure that transportation of biomass and biomass products is minimised.

In line with this general statement, a planning framework is set out for the following:

1. On-Farm AD/fermentation facilities using slurries both produced on site and feedstock's imported from the surrounding area (mixed).
2. Imported mixed biomass processing facilities (using a range of technologies) using feedstock (mixed) imported from the surrounding areas.
3. Woody biomass processing facilities to cater for local heat energy markets

The processing of agricultural waste on farms as a means to extract heat and energy before the land-spreading of farm slurries is encouraged by the Council.

Policy RE4:
On-Farm Anaerobic Digeston/Fermentation

It is the policy of the Council to support the installation of on-farm AD/fermentation plants using slurries produced on site, and the importation and treatment of feedstock's imported from the surrounding local area to supplement the on-site treatment of agricultural waste. Such facilities shall be located within existing farm complexes, use excess heat on site and may be connected to the national electrical grid.

Mixed biomass processing facilities may involve processes such as anaerobic digestion, combustion, pyrolysis, gasification, wood pellet manufacture etc. from biomass resources on a commercial scale and may require large scale plant and machinery and activities that are industrial in nature. Therefore, the preferred location for such processes will typically be on land zoned for industrial uses, suitable 'Brownfield' sites in rural areas and sites in rural areas that have a proven capacity (environmental and infrastructural) to accommodate for the

proposed development. As stated, the proximity of such processes to their raw material sources and energy markets, and the impact on traffic movement are a critical aspect in site selection. Visual, noise and odour impacts on adjacent residential property will also be key considerations when assessing any such proposals.

Policy RE5:
Mixed Biomass Processing Installations

It is the policy of the Council to support mixed biomass processing (using a range of technologies) and using mixed feedstock (including biological waste) imported from surrounding areas on suitable sites.

(a) Mixed bioenergy plants should be located close to the energy source and the point of demand, where they can be served by a transport network with sufficient capacity to safely absorb increased traffic movements and where waste heat can be used. Such facilities will be assessed against the ability of the receiving environment to accommodate them without causing an adverse impact on residential or environmental amenity.

(b) Proposals for bioenergy in Tipperary that will cater for regional energy demand or feedstocks imported from the region will be assessed for compliance with appropriate regional plans, strategies and policies.

As stated it is considered appropriate to support the processing of wood biomass for local energy markets in Tipperary.

Policy RE6:
Local Wood biomass storage and chipping facilities

It is the policy of the Council to support proposals for wood biomass storage and chipping facilities that identify biomass demand in the form of wood chip in Tipperary and put in place suitability located processing facilities that can cater for this local heat demand. Such facilities will be located in areas where both timber resources and final markets can be readily accessed. The Council will consider expansion of existing timber processing facilities and new facilities on suitable sites.

Planning applications for all biomass processing facilities should as a minimum requirement, identify the following to assist in the determination of the planning application.

(a) Tonnes per annum to be processed at the facility.

(b) Details of the source of and nature of all feedstock to be processed at the facility.

(c) Detailed technical specifications of the types of technologies proposed.

(d) Detailed description of traffic movements to and from the site.

(e) Description of and location of proposed energy markets.

(f) Details and specifications of proposed connection to the national energy networks.

(g) Details for storage and stockpiling of biomass feedstock and biomass products on site.

These issues should be addressed in detail at planning stage and consideration should be given to the need for EIA in support of large scale proposals. Where it has been determined that EIA is not required for sub-threshold development the applicant shall submit an environmental assessment with the planning proposal.

6.6.2 District Heating (DH)

The Council supports the distribution of heat (including excess heat) from installations that generate heat such as industrial processes, solar thermal, biomass boiler, biomass CHP, biogas CHP, heat pumps, storage technologies in DH systems. Where DH is proposed to be incorporated in new development infrastructure should be identified at planning stage along with other services such as water and other pipe-based infrastructure and shall be for the approval of the Council. Where DH is being integrated as part of new development, the long-term management and maintenance arrangements shall be to the satisfaction of the Council.

Planning applications for DH shall include the following:

- Specifications of the heat generator proposed and the type of heat source to be used.
- Identification of each heat user and their heat requirements.
- Route of pipes taking into account potential

customer locations, land use, pipe sizing, pipe type, no. of road crossings required, etc
- Details of the plans for the long-term management, maintenance and customer billing of the DH and service delivery for its customers.

Policy RE7:
District Heating

It is the policy of the Council to support and facilitate the installation DH technologies in new developments in Tipperary including multi-unit apartment developments, commercial and industrial developments. Where DH is proposed, the associated infrastructure, networks and services for such systems shall be identified at planning stage and the long-term management and maintenance arrangements shall be to the satisfaction of the Council.

6.7 Waste to Energy Strategy

The Council supports the objectives of the Southern Regional Waste Management Plan 2015 as it relates to energy recovery from waste sources. In particular the Council is cognisant of the capacity for municipal biological waste from various sources to be co-treated along with biomass waste sources in the biomass biological treatment sector, in line with the polices set out above.

There is a need for local thermal recovery capacity for industrial process wastes, including sludges, at the location of generation by producers or manufacturers. The principle of small-scale development of thermal recovery capacity for on-site treatment of industrial process wastes in Tipperary is considered to accord with the principle of sustainable development and reduces the need to export industrial process wastes.

In line with the approach for mixed biomass processing (RE4) outlined above, organic waste products have a role to play as feedstock for biomass facilities, and form a useful feedstock for mixed biomass processing.

Policy RE8:
Waste to Energy

It is the policy of the Council to support the recovery of energy from waste in accordance with the provisions of the Southern Regional Waste Management Plan 2015. In particular the Council will facilitate waste to energy processes on the site of production or in local biomass processing installations, as follows:

(a) Small scale thermal recovery technologies will be permitted for industrial process wastes, including sludges, at the location of generation by producers or manufacturers.

(b) In line with Policy RE7: Mixed Biomass Processing, organic waste products may be incorporated as feedstock for biomass facilities in accordance with the requirements of the Waste Management Act 1996 as amended.

Photo 12: Solar Demonstration at the Energy In Agriculture Conference Gurteen (Source -TEA)

6.8 Solar Energy Strategy

The Council is supportive of the use of roof mounted solar panels on all structures and buildings as a means to reduce dependency on fossil fuels and will encourage the use of innovative design to incorporate solar energy technology to comply with Part L of the Building Regulations.

Proposals for new installations on the roof space of buildings will be required to demonstrate that there will be no significant adverse impact on the built environment - particularly in historic town centres or on protected structures, where panels may require planning permission. Commercial scale proposals on buildings should consider how the overall facility would affect the visual quality of the area.

Policy RE9:
Roof Mounted for Solar Installations

It is the policy of the Council to facilitate solar energy installations on structures where it is demonstrated to the satisfaction of the Council that there will be no significant adverse impact on the built and natural environment, the visual character of the landscape or on residential amenity. The Council will encourage and facilitate the incorporation of solar energy technologies in the design of new houses and buildings and the use of innovative and high quality design to achieve this objective.

There has been recent interest in the development of large-scale ground mounted solar PV installations. The Council will facilitate proposals for solar PV installations; subject the demonstration by the applicant that the proposal will not have a significant adverse impact on the built and natural environment, the visual character of the landscape or on residential amenity. Particular care must be taken in respect to proposals for commercial PV in Primary and Secondary Amenity Areas, where the Council may require a Visual Impact Assessment (VIA) in support of the proposal, particularly where there is potential for cumulative visual impact as a result on existing and permitted solar development in the area.

Key considerations are:

(a) Site aspect, area and topography,
(b) Availability and method of grid connection,
(c) Impact on sensitive receptors including roads, residential development, areas of tourism and landscape amenity value, airfields and ecology,
(d) The visual impact of the proposal and other permitted large-scale solar PV developments on the visual character of the area having regard to the provisions of the LCA 2016,
(e) Management, fencing and upkeep of the site,
(f) Construction phase activities and impacts,
(g) Proposed lifespan of the development,
(h) Decommissioning and reinstatement of site subject to the satisfaction of the council.

Photo 13: Local Community at Templederry wind farm (Source-TEA)

Photo 14: Officials and Elected Members inside a wind turbine at Lisheen Windfarm (Source-TEA)

These issues should be addressed in detail at planning stage and consideration should be given to the need for EIA in support of large scale proposals or proposals in sensitive areas. Where it has been determined that EIA is not required for sub-threshold development the applicant shall submit an environmental assessment with the planning proposal.

Solar PV will normally be regarded as a temporary use of land. Therefore conditions will be attached to planning permissions to limit the duration for which the system can remain in place and to manage site remediation after cessation, in this respect a bond will be required.

Policy RE10:
Ground Mounted for Solar PV Installations

It is the policy of the Council to facilitate solar energy installations where it is demonstrated to the satisfaction of the Council that there will be no significant adverse impact on the built and natural environment, the visual character of the landscape or on residential amenity.

In the absence of Irish guidelines, the provisions of 'Planning guidance for the development of large scale ground mounted solar PV systems' BRE 2013, may be consulted.

6.9 Hydro Energy and Hydro Storage Strategy

The Council recognises the importance of energy storage, particularly PHES, in helping to meet targets for renewable electricity generation.

In assessing new development, the Council will apply Inland Fisheries Irelands 'Best Practice Guidelines – Construction and Operation of Small-Scale Hydroelectric Schemes and Fisheries', 2005 (and any review thereof) in assessing planning applications for new small-scale hydropower facilities and PHES facilities. The Council will also seek to ensure that any proposed projects will not conflict with the requirements of the Water Framework Directive.

Larger scale schemes may have environmental impacts such as:

- Impact on the visual character of the landscape
- Geological/groundwater impacts
- Ecological impacts
- Noise and disturbance during construction

Therefore, proposals for large-scale hydro power

[21] Directly on roofs or on brackets etc
[22] Located in the administrative area of the North Tipperary County Development Plan 2010 (as varied)

schemes (greater than 5MW), including PHES will be assessed against suitability of the site having regard to the environmental capacity of the receiving environment, key considerations will be proximity to energy market, ecology and visual amenity. The environmental standards and provisions of the Development Plan (as varied) will apply to new development.

Policy RE11:
Hydro Electricity and PHES

It is the policy of the Council to facilitate and support large scale PHES and proposals for hydroelectric generation. Particular consideration will be given to historic mining sites, brownfield sites or existing environmentally de-graded sites. Large-scale PHES developments shall be assessed for compliance with the relevant environmental standards and policies as set out in the County Development Plan (as varied).

6.10 Geothermal Strategy

There are two forms of geothermal installation to be considered at planning stage, deep or shallow pipe installations, in general the potential impacts that may arise are more significant in cases where deep installations are proposed. In assessing planning applications for developments that include geothermal installations the Council will have regard to impacts that may arise as a result of ground excavation and potential impacts on ecology, environment, groundwater and archeology and impacts that may arise to adjoining amenity as a result of noise/visual impact from pumps.

Policy RE12:
Geothermal Technologies and Heat Pumps

It is the policy of the Council to facilitate the installation and use of geothermal heating technologies in new developments in Tipperary. The associated infrastructure, networks and services for such systems shall be identified at planning stage and the proposals will be assessed for impacts on, environment, groundwater and archeology, and impacts that may arise to adjoining amenity.

In new development proposals, geothermal infrastructure shall be identified at planning stage along with other services such as water and other pipe-based infrastructure and shall be for the approval of the Council.

6.11 Micro-generation and Auto-Generation

Certain energy installations that qualify as being micro-generators will also qualify for an exemption for the need for planning permission as per the provisions of the Planning and Development Regulations 2001 (as amended), introduced by SI 83 of 2007 and SI 235 of 2008. These planning exemptions apply to residential scale and some commercial scale wind turbines, solar arrays, heat pumps and biomass boilers subject to certain conditions in each case. These planning exemptions are welcome and give certainty to those who may wish to install a micro-generator.

Certain installations may be of a scale and nature or maybe so located to render them outside of the planning exemption criteria and will therefore, require planning permission. As already stated auto-generators may be proposed at a scale much greater than planning exemptions and fall under the requirement for planning permission.

Policy RE13:
Micro-Generators and Auto-Generators

It is the policy of the Council to facilitate micro-renewable energy installations and auto-generator installations where it is demonstrated to the satisfaction of the Council that they will not result in a significant adverse impact on residential, visual or environmental amenity.

6.12 Objectives for Renewable Energy development in Tipperary

6.12.1 Introduction

The Council has identified objectives relating to renewable energy that it will seek to achieve over the lifetime of this Renewable Energy Strategy through the collaboration and support of key stakeholders. The objectives will be a key aspect of the measurement of the success of the implementation of the Strategy. The objectives of the Council are set out below.

6.12.2 Renewable Energy Objectives

SO1: It is an objective of the Council to support the implementation of the targets and objectives of the White Paper for Energy 2015.

SO2: As part of its commitment to the Covenant of Mayors, it is an objective of the Council, with the support of the TEA, to prepare a SEAP and to continue to be a leader renewable energy technology and in energy efficiency use across its own services.

SO3: It is an objective of the Council to carry out a review of this renewable energy strategy after publication of the 2020 targets for energy in order to ascertain Tipperary's progress in contributing to national targets and its own commitment under the Covenant of Mayors.

SO4: It is an objective of the Council, in conjunction with relevant stakeholders, to be proactive supporting the renewable energy sector in the county through training, information awareness, and networking events with respect to renewable energy technologies and opportunities.

SO5: It is an objective of the Council through the Local Enterprise Office (LEO) and the Planning Authority, provide guidance, advice and support to local communities and businesses through the day to day delivery of its services.

SO6: It is an objective of the Council to maintain a high level of awareness and training of its staff in the area of renewable energy planning and development and in the area of existing and emerging technologies in order to better deliver pre-planning support and guidance as part of the planning process.

SO7: It is an objective of the Council, in conjunction with the TEA and the SEAI to support research to assess the potential and economic feasibility of local community investment in renewable energy development.

SO8: It is an objective of the Council to support and facilitate objectives outlined in the Mid-West and South East Action Plan for Jobs 2015 – 2017 including the development of 'Green Energy Demonstration Hub' focused on the research and development of renewable energy resources in Tipperary.

SO9: It is an objective of the Council to support the objectives of the White Paper for Energy 2015, in the provision of energy storage developments of national importance. The Council will support the examination of the development of appropriate sites, of such strategic importance in the county, including the former Macgobar Site and surrounding lands in Silvermines, Co. Tipperary.

SO10: It is an objective of the Council to maintain a record and monitor all planning applications received in respect of proposals for renewable energy developments.

SO11: It is an objective of the Council to examine the potential of preparing a feasibility study on energy recovery from landfill gas from existing landfills in the county.

SO12: It is an objective of the Council to carry out a Heat Mapping exercise with the support of the TEA to help visualise and assess heat demands, where sources of heat might come from and how these can be connected in an efficient way to reduce the cost of heat supply and the carbon intensity of heat generation in Tipperary.

SO13: It is an objective of this Renewable Energy Strategy to support the objectives of the White Paper for Energy 2015 as they relate to energy storage as an important element of renewable energy systems in the county.

SO14: It is an objective of the Council to support the White Paper for Energy 2015, as it relates to DH and in particular its preparation of a DH national strategy and policy framework.

7.0 Monitoring and Review

Monitoring of this Renewable Energy Strategy is concerned with achieving the renewable energy production targets of the NREAP and also ensuring the protection of the environment as a result of the implementation of this Renewable Energy Strategy.

Monitoring for impacts on the environment are addressed in the monitoring section of the SEA as set out in Volume 2 of this Strategy.

The success of the implementation of this Renewable Energy Strategy will be measured against the following:

- Energy Consumption Figures
- Renewable Energy Installations
- Investment in range of renewable energy technologies
- Adherence to the principals of the Covenant of Mayors.
- Achievement of the Special Objectives set out above.

1. Energy Consumption Figures

Individual targets for renewable energy production have been set at the national level. Notwithstanding this it is possible to assess energy consumption in the county under the key areas of electricity, heat and transport and to consider the consumption of energy in the county against national targets.

The TEA maintains energy consumption figures for the county and can determine the success achieved in increasing renewable energy production and consumption. It is proposed that a county energy balance be prepared every two years as a means to monitor county renewable energy production and consumption in Tipperary.

2. Renewable Energy Installations

The numbers, scale and energy output of installations will be assessed, to determine success in investment in alternatives to fossil fuel energy sources.

3. Investment in range of renewable energy technologies

The roll-out of a range of renewable energy technologies is considered to be an indicator of the successful integration of alternative energy sources to fossil fuels in the economy. A key measures of success of the policy of this Strategy will be the contribution of a wide range of renewable energy technologies and installations across the county, without a reliance on any single resource or technology.

4. Adherence to the principals of the Covenant of Mayors.

After 2020, the Councils success in meeting the objectives of the Covenant of Mayors will be considered as part of the overall objective of this Strategy.

5. Achievement of the Special Objectives set out above.

Another measure of the implementation of this Strategy will be an assessment of how the Special Objectives as outlined in Section 6.12 have been achieved over the lifetime of this Renewable Energy Strategy

Comhairle Contae Thiobraid Árann
Tipperary County Council

TIPPERARY energy AGENCY

Appendix 1:

Tipperary Wind Energy Strategy 2016

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1.0 Introduction

This document is the Tipperary Wind Energy Strategy 2016. It replaces the Wind Energy Strategy of the North Tipperary County Development Plan 2010 (as varied) and the Wind Energy Strategy of the South Tipperary County Development Plan (as varied). This Wind Energy Strategy is a key element of the Renewable Energy Strategy.

The existing wind energy strategies in the North and South County Tipperary Development Plans, while adhering to the principles of the wind energy guidelines, both take differing approaches to the methodology used in the identification of areas suitable or unsuitable for wind energy development.

The aim of this Strategy is to build upon its predecessors and develop an updated, county-wide tool for identifying potentially suitable locations for wind energy development and to guide future assessment of wind energy planning applications in the county. The Strategy also takes account of new technologies in wind energy development that have evolved since previous strategies were prepared.

A review and update of the existing Landscape Character Assessments (LCAs) for Tipperary has concurrently been undertaken to assess the capacity of the landscape to accommodate wind energy development. The Wind Energy Strategy reviews the existing wind energy policies for Tipperary and based on these a county wide policy for wind energy has been developed, informed by the LCA review and the requirements of EU and National targets for renewable energy production. The Strategy has been prepared after consideration of relevant European, national, and local planning frameworks including regional planning guidelines and county development plans. This Strategy presents a vision that supports and promotes the development of wind energy development in a balanced and sustainable manner.

This Strategy is set out as follows:

- Chapter 1: Introduction
- Chapter 2: Summary of Wind Energy Policy
- Chapter 3: Review of Existing Wind Energy Development
- Chapter 4: Consideration of pre-draft submissions
- Chapter 5: Challenges, Constraints & Opportunities
- Chapter 6: Developing a Wind Energy Strategy
- Chapter 7: Wind Energy Policy for Tipperary

A Strategic Environmental Assessment (SEA) and Appropriate Assessment (AA) have been undertaken in relation to this Wind Energy Strategy and their findings have been incorporated into the strategy. These assessments have helped to identify areas for wind development, and ensured that impacts on sensitive areas were avoided or mitigated against.

2.0 Summary of Wind Energy Policy

2.1 Introduction

European Union (EU) and Irish Government policies identify the development of renewable energy, including wind energy, as a primary strategy in implementing national energy policy. The Tipperary RES sets out a detailed chapter looking at these over-arching energy policies. This strategy therefore only references those energy policies whose targets directly impact on wind energy development. The focus of this chapter will be to summarise policies specifically relevant to wind energy development in County Tipperary.

2.2 National Policy

2.2.1 Directive on the Promotion of the Use of Energy from Renewable Resources (2009/28/EC)[i]

As part of this EU Directive, Ireland's overall national target for the share of energy from renewable sources in gross final consumption of energy in 2020 is 16% (increased from 3.1% in 2005)[ii]. The sectoral components of the overall 16% target are detailed in Table 2.1, which outlines each form of renewable energy supply (RES). The current share of renewable energy in these components is also presented[iii]. Of particular relevance to this strategy is the electricity target (RES – E), which aims to derive 40% of supply from renewable sources by 2020.

Form of Renewable Energy Supply	Target Share (2020)	2013 Position[iv]
Electrical (RES–E)	40%	20.9%
Heat (RES-H)	12%	5.7%
Transport (RES-T)	10%	2.8%

Table 2 1: Target and Current Share of Renewable Energy in Energy Sectors

An update on progress to meeting this 2020 targets was published by SEAI (Renewable Energy in Ireland 2013 - SEAI March 2015). This shows that Ireland is currently approximately 60% of the way to meeting its overall 16% target[v]. The European Environment Agency (EEA) also recently published

Share of energy from renewable sources in the EU Member States, 2013
(in % of gross final energy consumption)

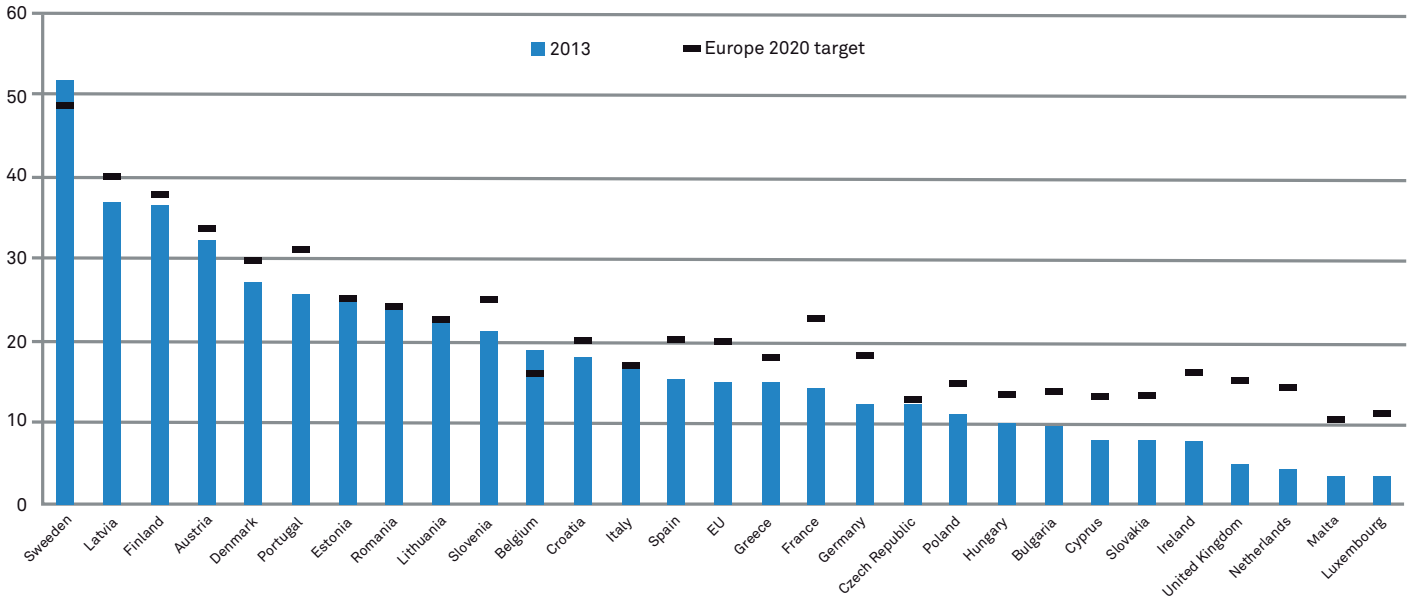


Figure 2.1: Share of energy from renewable sources in the EU Member States, 2013

[i] European Parliament, EU Directive 2009/28/EC on Promotion of the Use of Energy from Renewable Sources, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:140:0016:0062:EN:PDF

[ii] Directive of the European Parliament and of the Council on the Promotion of the Use of Energy from Renewable Sources, 2008/0016 (COD), Council of the European Union, Brussels, December 2008; http://www.ewea.org/fileadmin/ewea_documents/documents/00_POLICY_document/RES-directive_consolidated.pdf

[iii] SEAI Report - Energy in Ireland Key Statistics 2014 http://www.seai.ie/Publications/Statistics_Publications/Energy_in_Ireland/Energy_in_Ireland_Key_Statistics/Energy-in-Ireland-Key-Statistics-2014.pdf [Accessed March 2016]

[iv] SEAI Report - Energy in Ireland 1990 -2012, 2013 Report http://www.seai.ie/Publications/Statistics_Publications/Energy_in_Ireland/Energy_in_Ireland_1990_-_2012_Report.pdf [Accessed March 2016]

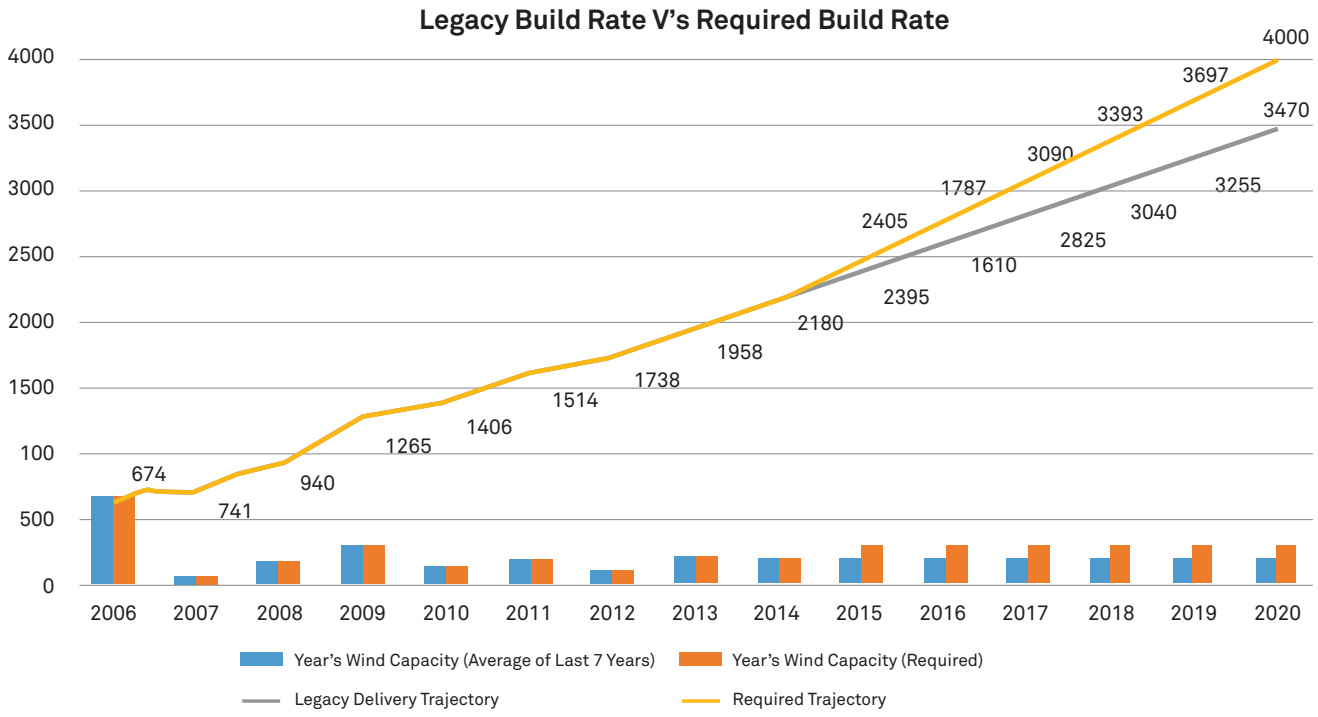


Figure 2.2: Legacy Build Rate V's Required Build Rate for wind energy (Source: Irish Wind Energy Association)

a report entitled 'Tracking progress towards Europe's climate and energy targets for 2020'[vi]. This report stated that Ireland was one of three EU countries that is at risk of not meeting its targets.

According to the Irish Wind Energy Association, the Republic of Ireland's total installed wind energy capacity is 2,400 MW generated from over 199 wind energy developments in 23 counties[vii]. of this number, approximately 18 wind farms and approximately 268 MW are located in County Tipperary.

Recent analysis of Ireland's wind energy development by the Irish Wind Energy Association shows that at the current build rate, Ireland is going to have 3,470 MW of wind energy installed by 2020. The IWEA has shown an estimated 40% demand of 4,000 MW by 2020 in its Legacy Build Rate vs Required Build Rate chart, see Figure 2.2.

The EPA's most recent publication (Ireland's Greenhouse Gas Emission Projections 2013-2030, May 2015), stated that under 'best case scenario' projections Ireland's total national greenhouse gas emissions will comply with the 2020 target reduction if 'focus and effort' are put into delivering all national policies in the areas of transport and heat as well as energy efficiency. It emphasizes that the difficulty in achieving these targets should not be underestimated. In addition, it notes that Ireland will face 'severe compliance challenges' to meet the, as yet undefined, post-2020 obligations and based on this states that Ireland is not 'on-track towards decarbonizing the economy'. The transport sector emissions are projected to increase by 20% between 2020 and 2035, in the absence of additional policies and measures. Agricultural emissions are also predicted to increase until 2025. The report states that further energy efficiencies and renewables penetration will be required to counter-balance these increases[viii].

SEAI suggests the cost to Ireland of missing the 2020 target may be in the range of €70 million to €140 million per percentage point shortfall (equivalent to €50 to €100 per MWh)[ix].

[v] SEAI Report - Renewable Energy in Ireland 2013 available at; http://www.seai.ie/Publications/Statistics_Publications/Renewable_Energy_in_Ireland/Renewable-Energy-in-Ireland-2013-Update.pdf [Accessed March 2016]

[vi] Trends and projections in Europe 2014" European Environment Agency ,2014, ISSN 1977-8449

[vii] http://www.iwea.com/index.cfm?page=bycounty&county=tipperary; last updated: Jan 2016

[viii] Environmental Protection Agency, 2015, Ireland's Greenhouse Gas Emission Projections 2014 - 2035

[1] The target is determined by the demand load in 2020 which will not be exactly known until 2020.

Over the last decade Irish Government Policy has consistently identified wind energy as its primary focus in achieving these targets. This is re-iterated in several policy papers:

2.2.2 White Paper – Delivering a Sustainable Energy Future for Ireland (2007)

The primary objectives of this White Paper are: security of supply, environmental sustainability and economic competitiveness. The White Paper sets out clear actions, targets and time-frames to meet these interlinked objectives. It is estimates that wind energy will provide up to 90% of the renewable energy required to meet these targets.

2.2.3 National Renewable Energy Action Plan 2010 (NREAP)

This Action Pan sets out the Government's strategic approach to deliver on Ireland's 16% target under Directive 2009/28/EC. It acknowledges that Ireland has immense potential for the development of renewable energy particularly wind energy, both on and offshore, as well as wave energy. The plan shows that the majority of the renewable electricity target will be delivered by onshore wind.

2.2.4 Strategy for Renewable Energy 2012 -2020

Published by the Department of Communications, Energy and Natural Resources in May 2012, the first strategic goal of this strategy is the generation of progressively more renewable electricity from onshore and offshore wind power for the domestic and export markets.

2.2.5 UNECE Aarhus Convention

In 2012 Ireland ratified the UNECE Aarhus Convention which promotes public involvement in environmental matters. Arising from that, and in response to increasing community concern over energy infrastructure developments, more emphasis has been placed on public participation and information dissemination in the area of renewable energy infrastructure development.

2.2.6 White Paper – Ireland's Transition to a Low Carbon Energy Future (2015 - 2030)

This White Paper provides a framework for energy policy up to 2030. The objective is to guide a transition to a low carbon energy system, to provide secure supplies of competitive and affordable energy to Ireland's citizens and businesses.

The White Paper focuses on sustainability, cost-effectiveness and security of supply, while emphasising innovation and technology change. The significant contribution of onshore wind in this transition is recognised, with renewable energy sources accounting for 23% of Ireland's electricity consumption in 2014, of which 18.2% was derived from wind generation. To achieve the 2020 40% target, the average rate of build of onshore wind generation will need to increase to up to 260 MW per year from the current rate of build of about 170 MW per year. It recognises the continuing need for larger wind energy projects, but also envisages an increasing role for smaller community-level projects and micro generation.

The White Paper also identifies the need for deploying other technologies. The All-Island Grid Study identified that the transmission grid could accommodate up to 42% of its supply from wind penetration without compromising security of supply standards. Higher levels of penetration would require additional interconnection and/or storage.

The document has a strong focus on empowering and engaging communities across Ireland in the transition to a low carbon energy future and community-led developments are particularly supported.

2.2.7 National Landscape Strategy for Ireland (2015 – 2025)

This landscape strategy was produced by the Department of Arts, Heritage and the Gaeltacht and includes the following six core objectives:

- Recognise landscape in law
- Develop a National Landscape Character Assessment
- Develop Landscape Policies
- Increase Landscape Awareness
- Identify Education & Training needs
- Strengthen Public Participation.

It aims to seek a balance between management, planning and protection of a landscape.

2.3 Regional and Local Policies

2.3.1 Regional Planning Guidelines (RPG)

The RPG's aim is to give regional effect to national planning policy and to inform the

[ix] SEAI (February 2014) Renewable Energy in Ireland

Development Plans in each Council area. Until 2014 the administrative area of North Tipperary fell under the Mid-West Regional Authority and the administrative area of South Tipperary fell under the South-East Regional Authority. In 2014 the areas were both incorporated into the new Southern Regional Assembly. The Southern Regional Assembly is currently preparing a new Spatial Economic and Planning Strategy for the Region. This Strategy will inform future wind energy strategies in Tipperary. However, policies of the Mid-West Regional Planning Guidelines 2010 – 2022[x] and the South-East Regional Planning Guidelines 2010 – 2022[xi] are currently those applicable to the Tipperary Wind Energy Strategy.

Both guideline documents recognise that the regions (South-East and Mid-West) have substantial renewable energy resources, including wind power and are supportive of wind farm development at appropriate locations. In relation to wind power they both concur that a consistent, collaborative approach is required at regional and inter-regional level and advocate reference to the DoEHLG Guidelines to Planning Authorities on Wind Energy.

The South-East Regional Guidelines recognise the pressure on the landscape for development of sustainable energy resources (e.g. wind farm development) specifically in the Tipperary and North Waterford sub-area. The Mid-West Regional Guidelines recommend that landscape protection policies in Development Plans address the need to manage renewable energy development in vulnerable landscapes. In relation to North Tipperary it identifies that the county's rural area has great potential for newer enterprise opportunities, including renewable energy production. This would build on the significant reputation of the area for renewable energy production and sustainable energy.

2.3.2 County Development Plans

County Tipperary has two adopted County Development Plans: North Tipperary County Development Plan 2010 (as varied) and South Tipperary County Development Plan 2009 (as varied). These documents remain the strategic planning framework for the County until a new Tipperary County Development Plan is prepared.

The Wind Energy Polices in both County Development Plans were informed by Landscape Character Assessments which have been in place since 2006. Both adhered to the principles of the Wind Energy Development Planning Guidelines (2006) published by the Department of the Environment, Heritage and Local Government (DoEHLG); and contained written policy and associated mapping.

The existing wind energy polices currently in the County Development Plan(s) are outlined in more detail in Appendix A.

In Chapter 6 of this Wind Energy Strategy these existing policies are consolidated into one integrated, comprehensive suite of policies for the entire County Tipperary. Where it has been identified that there is a requirement for additional new policies, these have been added.

Other plans considered in this Wind Energy Strategy are the County Development Plans and Wind Energy Strategies of adjoining counties, these are:

County	Description
Limerick	Limerick County Development Plan 2010 – 2016 – Chapter 8
Cork	County Development Plan 2014 – Chapter 9 & Energy Background Paper 2012
Waterford	Waterford County Development Plan 2011 – 2017 – Appendix A8
Kilkenny	Kilkenny Wind Energy Strategy 2014 – 2020 – Chapter 10 & 2008 Wind Energy Strategy – Revised 2014
Laois	Laois County Development Plan 2012 – 2018 Appendix 5 (2010)
Offaly	Offaly Wind Energy Strategy 2014 – 2020 – Wind Energy Strategy & Methodology Statement 2014

[x] Mid-West Regional Authority (2010), Mid-West Regional Planning Guidelines 2010 – 2022. http://www.mwra.ie/Regional_Planning/MidWestDraftRPGs2010-2022.shtml

[xi] South-Eastern Regional Authority (2010), South East Regional Planning Guidelines 2010 – 2022, available at; http://www.sera.ie/media/FinalRPG_doc.pdf

County	Description
Galway	Galway Development Plan 2015 – 2021 & Wind Energy Strategy 20111
Clare	Clare Wind Energy Strategy 2011 – 2017 – Volume 5

Table 2 2: Policy in adjoining Counties

2.3.3 South Tipperary Renewable Energy Strategy 2014

A Renewable Energy Strategy (RES) for South Tipperary[xii] was prepared in 2014 in accordance with the Local Authority methodology for RES as set out by the SEAI (LARES).

The RES identified all the renewable energy resources of South Tipperary and set out the manner in which they could be developed sustainably. The RES was prepared by South Tipperary County Council in conjunction with the Tipperary Energy Agency.

The Council has now decided to prepare a Renewable Energy Strategy (RES) for the new administrative area of County Tipperary. This will be supported by the development of this WES and the associated Landscape Character Assessment (LCAs) from which the capacity of the landscape to accommodate wind energy development will be assessed.

2.4 Other Relevant Guidelines

2.4.1 Department of the Environment, Heritage and Local Government – Wind Energy Development – Planning Guidelines

The Wind Energy Development Planning Guidelines (2006) published by the Department of the Environment, Heritage and Local Government (DoEHLG)[xiii], provides national guidance on the preparation of Wind Energy Strategies and the assessment of wind energy applications. County level strategies are required to ensure consistency with guidelines and parameters contained in this document. The guidelines set out criteria which assist in the identification of suitable locations for wind energy development. They are also of assistance to developers and the wider public in considering wind energy development. The DoEHLG Wind Energy Development Planning Guidelines are currently being revised, with a technical update being undertaken in relation to the shadow flicker, proximity and noise requirements.

Photo 15: Wind turbines located near Dualla, Co. Tipperary (Source Tipperary County Council)

In order to assist planning authorities in identifying suitable areas for wind farm development,

[xii] South Tipperary County Council (2014), South Tipperary Renewable Energy Strategy, South Tipperary County Council: Tipperary, available at; http://www.tipperarycoco.ie/sites/default/files/South%20Tipperary%20Renewable%20Energy%20Strategy%202014.pdf

[xiii] Department of Environment Heritage and Local Government, Wind Energy Development Planning Guidelines, 2006, http://www.environ.ie/en/Publications/DevelopmentandHousing/Planning/FileDownLoad,1633,en.pdf

Appendix 1 of the guidelines sets out a step-by-step methodology for landscape sensitivity analysis.

This approach strikes a balance between environmental, landscape, technical and economic criteria to identify suitable areas for wind energy development. It advocates that this exercise is carried out in consultation with adjacent planning authorities to ensure a consistent approach.

2.4.2 SEAI Methodology for Local Authority Renewable Energy Strategies (2013)

In 2013 the SEAI produced a methodology for Local Authority Renewable Energy Strategies (LARES).

The objective of this was to establish a structured, consistent and transparent approach to preparing LARES and to provide information and support for their production. The methodology includes a step-by-step approach to LARES production involving policy review, resource assessment, analysis of constraints and facilitators and finally developing a renewable energy policy. The use of GIS is recommended in the "sieve mapping" stage of resource assessment. Emphasis is also placed on cumulative and transboundary issues.

2.4.3 Irish Wind Energy Association – Best Practice Guidelines for the Irish Wind Energy Industry

The 'Best Practice Guidelines for the Irish Wind Energy Industry' were published by the Irish Wind Energy Association in 2008[xiv] with a subsequent update in 2012[xv]. These guidelines encourage responsible and sensitive wind farm development and they provide assistance and recommendations for those developing onshore wind projects in Ireland.

2.4.4 Scottish Natural Heritage Guidance on Assessing the Cumulative Impact of Onshore Wind Energy Developments

While Scottish Natural Heritage (SNH) supports the development of on-shore windfarms it recommends that their cumulative impacts on natural heritage should to be carefully considered to ensure they are acceptable. This guidance is aimed at planning authorities, developers and consultants involved in wind energy development

Photo 16: Officials and Elected Members at a wind turbine at Lisheen Windfarm (Source-TEA)

and sets out methodologies to assess cumulative impacts on landscapes and birds.

It recommends that cumulative impacts should be considered at both the strategic planning and the development management stages. In relation to strategic planning it suggests a range of scenarios should be considered in terms of numbers, scale and distribution of windfarm developments. The resulting cumulative impact assessment should then inform which scenario is acceptable.

Trans-boundary assessment of these impacts is recommended. The approach to assessment of cumulative impacts will be enhanced by association with landscape capacity information.

[xiv] Irish Wind Energy Association, Best Practice Guidelines for the Irish Wind Energy Industry, 2008; http://www.iwea.com/contentFiles/Documents%2ofor%20Download/Publications/IWEA%20Policy%20Documents/IWEA%20best%20practise%20guidelines.pdf

[xv] Irish Wind Energy Association, Best Practice Guidelines for the Irish Wind Energy Industry, 2012; http://www.iwea.com/index.cfm/page/industryreports?twfId=1061&download=true

2.5 Other Relevant Schemes

2.5.1 Renewable Energy Feed in Tariff (REFIT)

Since 1994, the government has sponsored various schemes whereby wind energy developments could acquire a contract to sell their electricity to the national grid. The Renewable Energy Feed in Tariff scheme, or REFIT, was set up in 2006 to support the construction of renewable energy-powered electricity by providing financial support in the form of a minimum price per unit of energy for long-term power purchase agreements.

The initial aim of the scheme (REFIT 1) was to more than double the contribution of renewable sources in electricity production from 5.2% in 2004 to 13.2% by 2010, by increasing the total capacity of renewable energy technologies to 1,450 MW. Additional renewable categories have been added to the scheme to ensure the national 40% target for 2020 can be achieved .

The REFIT 2 scheme was opened in March 2012 for onshore wind, small hydro and landfill gas. The REFIT 3 scheme was opened in February 2012 for biomass technologies.

2.5.2 Commission for Energy Regulation (CER) – Gate System

The Gate 3 Offer Project refers to the third round of connection offers that were issued to generators under the Group Processing Approach (GPA) by the System Operators (EirGrid and ESB Networks). The GPA allows for strategic processing of generation applications for grid connection and was introduced by the Commission for Energy Regulation (CER) in 2004. It allows applications to be processed by the System Operators in groups or batches known as 'Gates'.

The scope is based on the CER's decision papers CER/08/260 CER Direction on Criteria for Gate 3 Renewable Generator Offers and CER/09/191 Direction on Conventional Offer Issuance Criteria and Matters Related to Gate 3.

It involves offers for connection to circa 4,000 MW of wind generation and 1,700 MW of conventional generation. The 4,000 MW of wind developments which received an offer as part of Gate 3 provides for the 40% renewable generation target[xvii].

[xvi] Department of Communications, Energy and Natural Resources, REFIT Schemes and Supports, Accessed 21st March 2016: http://www.dcenr.gov.ie/NR/rdonlyres/3B13ECAA-9351-41E0-8B44-7C02E98E4F50/0/AdditionalREFITcetegories.pdf

[xvii] IWEA_Galway_Autumn_National_Conference-final-03_10_13.pdf

3.0 Review of Wind Energy Development

3.1 Terms and Definitions

Wind energy developments can vary significantly in scale and nature: from large scale commercial wind farms to small-scale individual micro-producers, with a range of permutations in between. However, regardless of size, most wind farm developments are composed of a number of typical elements. These are presented in Table 3.1 below:

Item	Description
Turbines	Composed of a tubular tower with typically three blades connected to machinery inside an enclosure at the top of the tower called the nacelle. A transformer is typically located in the tower and each turbine has a concrete base.
Wind (Meteorological) Monitoring Mast	Mast for measuring wind speeds over the site.
Substation Compound	This includes transformers, circuit breakers and a control building.
Power Cables	These are usually underground within the site.
Poles/Pylons	These connect the development to the National Grid.

Table 3 1: Typical Elements of a Wind Farm

3.1.1 Large-scale Commercial Wind Farms

For commercial operations turbine heights currently range from 75m up to 170m to blade tip, however, with developments in turbine technology this range changes regularly. Since 2007 planning applications in Tipperary for turbines over 100m (to tip height) have been the norm.

In addition to their larger height, commercial wind farms generally have a larger spatial extent, reflecting the number of turbines involved and their spacing. The largest permitted wind farm in Tipperary to-date comprises 22 turbines and is located in Lisheen Mine near Thurles. The spatial extent of any wind energy development should be balanced and in scale with its landscape context.

3.1.2 Community Development

Community-led wind farm developments are common practice in countries in Western Europe, such as Denmark and Germany. While, to date, there are limited examples of community-led development in Ireland, Tipperary is home to Ireland's first community Wind Farm in Templederry.

The Council considers that community-led development can bring many social and economic benefits to an area, and will through this strategy seek to support such developments in areas identified as suitable for development.

The Council further encourages developers to engage with communities at an early stage in the preparation of commercial wind farm applications.

3.1.3 Auto-producers

Auto-production of electricity is the production of electricity for a consumer's own use on a premise/site where the energy is to be consumed. While there is no upper limit to the definition of an auto-producer, the Maximum Export Capacity (MEC) must be less than twice the Maximum Import Capacity (MIC). Auto-producers are generally industrial large volume energy users who generate wind energy to offset their immediate energy needs and reduce their reliance on fossil fuels. For generation up to 0.5MW, auto-producers do not have to apply via the Group Processing Approach Process (Gate queue) for connection to the grid. For generation of between 0.5MW and 1MW they are processed as non GPA applicants if they can demonstrate that there are no interactions and public good criteria are met. Auto-producers can avail of an export tariff, agreed upon between the auto-producer and their energy supplier. The tariff rates offered vary with electrical supplier and technology exporting to the electrical grid. However, it is more cost effective for an auto-producer to use the electricity generated to replace imported electricity.

3.1.4 Micro-generation

Micro-generation is a subset of auto-production classified by ESB Networks as generation of less than 11kW when connected to the three phase portion of the distribution grid (400V). However, in the case of most users, who are connected to the single phase portion of the distribution grid (230V), a maximum rating of 6kW is permitted. Small scale wind energy developments (consisting of 1 turbine) with a total height of 13m for domestic use or 20m for agricultural and light-industrial use are exempted developments subject to criteria specified in the Statutory Instruments (SI 83 of 2007 and SI 235 and SI 256 of 2008).

3.1.5 Re-powering Existing Developments

Re-powering is the upgrading of older turbines with more efficient technology or replacement with larger capacity turbines. Repowering may also seek to extend the overall lifespan of the development. As wind turbine technology continues to advance, existing windfarms and sites being developed today have the potential to greatly increase efficiency and capacity by repowering.

In the SEAI Wind Energy Roadmap to 2050, it recognises that repowering will drive onshore wind capacity growth from 2030 onwards. It envisages

that repowering begins approximately 20 years after the first wind installation.

Nationally, the first commercial wind farm was commissioned in 1992, in Tipperary the first commissioned wind farm was Mienvee Wind Farm in 2004. In 1992 the average size of onshore turbines was around 400 kW, in 2016 the average size of turbines being manufactured is between 2.5 and 3MW. The largest turbines currently available are 7.5 MW turbines, 15 MW turbines are planned and 20 MW turbines are considered to be theoretically possible.

In addition to improved capacity and efficiency the potential benefits of re-powering are:

- a reduction in avian mortality with the installation of a smaller number of larger turbines
- the improved design of modern turbines could reduce aesthetic concerns
- cost efficiencies due to the re-use of existing infrastructure (tracks and substations).

3.2 Tipperary in the National Context:

According to the Irish Wind Energy Association in 2015 there were 18 operational wind farms in County Tipperary. A total of around 132 turbines have been erected with a generation capacity of approximately 268 MW1. To put this in the context of the national picture, just over 11% of the 2400MW wind energy capacity installed nationally was located in Tipperary.

3.3 Tipperary Developments to date

Up to February 2016 there have been 94 planning applications in relation to wind energy in Tipperary; 48 applications related to the north of the county and 46 applications related to the south.

In County Tipperary overall, 47 applications were granted, 31 have been commenced of which 18 are connected to the grid. 16 have not yet commenced and the planning permission for 3 of these has since expired. As of February 2016, 6 applications are currently under consideration and 42 applications have been refused. Multiple applications per wind farm account for the discrepancy between the numbers of granted and constructed applications and the number of operational wind farms.

In terms of turbine numbers, approximately 317 turbines have been permitted, and approximately 203 of these have been commenced. The location of the planning applications overlaid on the existing wind energy development policy areas is shown in Map 1.

3.3.1 South Tipperary Development Plan Area 2009 (as varied)

In the South Tipperary Development Plan area, wind energy development policy has been guided since 2006 by the Landscape Character Assessment covering the upland areas. As of February 2016, 98 turbines have been granted and 80 of these have already been constructed.

The majority of these are in areas preferred for wind energy development, approximately 20 are in areas open for consideration (as discussed in section 2.3.2 of this strategy), but within 1km of the preferred areas and approximately 16 turbines were in areas classified as unsuitable for wind energy development. In all granted applications turbine power output has remained below 3MW per individual turbine.

In terms of refusals, 8 applications from 21 were in areas preferred for wind energy development, 1 in areas *open to consideration* and 11 applications in *unsuitable areas for wind energy development*.

This has led to a pattern of distinct clustering of wind energy development in the areas preferred for wind energy development.

One of this areas, located in and around the Hollyford Hills and Mountain Mosaic in the Northwest of South Tipperary holds the highest concentration of both operational, granted and submitted applications for wind farms, as shown in Map 1. The other area with clustered projects is located near Slieveardagh Hills Farmland Mosaic in the east of Tipperary.

3.3.2 North Tipperary Development Plan Area 2010 (as varied)

The existing policy on wind energy development in the North Tipperary Development Plan area was based on the North Tipperary Wind Capacity Strategy and Outline Landscape Strategy (2009). These identified areas with adequate wind resources and then differentiated between those *deemed suitable for wind energy development* and those *deemed unsuitable* due to scenic,

ecological, historic or tourism considerations. This approach did not specifically identify preferred areas for wind energy development. As of February 2016, 198 turbines from 27 wind energy applications have been granted or are pending (decision awaiting) from which 105 have been commenced. In the areas *deemed suitable*, approximately 99 turbines have been granted/pending. In areas *where wind resource is not adequate* but not deemed as unsuitable 66 turbines have been granted (one third of the total) and 33 turbines (one sixth) were granted in areas deemed unsuitable for wind energy development. In all granted applications turbine power output has remained at 3MW or less.

In terms of refusals, 21 applications have been refused, 11 of these were in areas *deemed suitable* for Wind Energy Development with Adequate Wind Resources, 6 in areas *deemed suitable but where wind resource is not adequate* and 4 applications were in areas *deemed unsuitable* for wind energy development.

The majority of the applications have been in the Silvermines – Rearcross area and the Upperchurch – Kilcommon area in the west of Tipperary. This development cluster is compatible with the wind energy policy in South Tipperary, where there is an adjacent wind farm development cluster in the Hollyford Hills and Mountain Mosaic area. The remaining wind energy developments are concentrated on the Devilsbit Uplands and the Templemore Plains in the east of the county. The latter area is adjacent to the Kilkenny County boundary and compatible with the Kilkenny wind energy policy of *"Acceptable in Principle"*.

It can be seen from this that the presence of wind energy policy areas has effectively guided the distribution of wind energy development to-date in Tipperary.

Over half of the wind energy applications have been in "*preferred areas for wind development*" and these areas account for three-quarters of the granted or pending applications. The applications in "*Areas open for Consideration*" were generally granted while conversely around 70% of the applications in "areas unsuitable for wind energy development" were refused.

3.4 Future prospects on Wind Energy Developments in Tipperary

Future projections under the NEEAP/NREAP scenario are targeted to achieve 4000MW of installed wind energy in the RoI. The White Paper: Ireland's Transition to a Low Carbon Energy Future (2015 - 2030) extends this growth in renewable energy in its vision where Ireland becomes a leader in renewable energy deployment of large and small-scale renewable energy technologies. As individual renewable energy targets are not set out at the county level it is difficult to identify how much wind energy power is to be generated in County Tipperary to meet these the NREAP or subsequent targets.

Tipperary County Council however, fully supports the strategic national goals and recognises the importance of progressing towards the development of a sustainable renewable energy sector[xviii].

The assignment of Gate 3 grid connections to accommodate new wind energy developments in County Tipperary have been approved and the approved MW at Gate 3 together with the actual operational capacity and forecasts for 2020 are shown in the table below.

If the forecasted 575MW of wind energy is installed in Tipperary by 2020 by Gates 1, 2 and 3, this would account for c. 14% of the national installed wind energy capacity (assuming the NREAP target of 4,000MW is reached at a national level). This target for 2020 would require the installation of more than double the existing installed capacity in a 5-year period. This reflects the national situation, noted in the 2015 White Paper, where it is calculated that to achieve the 2020 40% target, the average rate of build of onshore wind generation will need to increase to up to 260 MW per year from the current rate of build of about 170 MW per year.

The existing Wind Energy Strategies have actively encouraged and successfully guided Tipperary's wind energy development to-date. However, there are barriers to its further development (ref Chapter 4 and Chapter 5) that will need to be addressed if Tipperary is to continue to develop in line with

Wind Energy in Tipperary (MW)		
Grid connected/Operational in 2015[3]	**Approved in Gate 3[4]**	**Forecasted for 2020 (Gate1+2+3)[5]**
268	405	575

Table 3.2: Wind Energy Forecast for Tipperary

the Strategic goals set out by the Department of Communications, Energy and National Resources for 2020. In addition, there have been significant legislative changes in relation to the requirements for Strategic Environmental Assessment (SEA), Environmental Impact Assessment (EIA), Appropriate Assessment (AA) and Flood Risk Assessment (FRA) as well as planning law in the intervening time since the existing strategies were developed. The incorporation of these changes will require amendments to the existing policy areas. The most notable example of this will be the exclusion of the European Environmental Designated sites (Natura 2000) from areas considered suitable for wind energy development.

2 The Commission for Energy Regulation Gate 3 policy allows for over 150 new renewable generators (almost all of them wind farms), with a combined capacity of about 4,000 MW, to connect to the network across Ireland. These renewable projects are selected for a connection offer by order of those which applied earliest for connection to the network.

3 Irish Wind Energy Association. http://www.iwea.com/index.cfm/page/bycounty/id/24 [Accessed March 2016]

4 Source: Gate 3 Node Assignments – Update 20th May 2011. https://www.esb.ie/esbnetworks/en/downloads/node_assignments_list.pdf

5 Projections made by Tipperary Energy Agency for NEEAP/NREAP scenario

viii ESB Networks published Contracted Wind Generators information, December 2015=

4.0 Consultation and Engagement with Stakeholders on Wind Energy

It was considered necessary and appropriate to engage widely with all stakeholders during the development of a new framework for the development of renewable energy in Tipperary, including wind energy development. This section sets out the details of consultation carried out over the process which commenced in May 2015.

4.1 Consultation processes

An extensive programme of stakeholder consultation was carried out as part of the development of the Tipperary Renewable Energy Strategy 2016. The details of the consultation processes are set out in Section 1.7 of the Renewable Energy Strategy. This section examines stakeholder engagement as it relates to wind energy development only.

4.2 Consultation details

Consultation Stage	Number submissions received	Key ares of comment
Pre-Draft	144	Approximately 130 submissions related to the wind energy development sector in Tipperary. Many of the submissions supported the principle of renewable energy however, expressed concern at the apparent concentration of wind energy development in Tipperary. Particular concern was expressed by persons from the Ahenny area where a wind energy development was proposed.
Draft Stage	900	The publication of the draft Renewable Energy Strategy generated a significant response from stakeholders. The majority of these comments related to a proposal for a wind energy development near Ahenny, and expressed concern regarding the potential impact on the area. Comments were also received from the wind energy development industry and from local farmers expressing concern that the proposed policy and maps would excessively restrict new wind energy development, particularly in areas where there has already been investment in infrastructure.
Material Amendments	15	Submissions were received from prescribed bodies and from the wind energy industry.

Table 4.1: Consultation Process

4.3 Conclusion

The Council is satisfied that a good level of engagement was achieved throughout the process, and that Stakeholders who engaged with the process were varied, with input ranging from prescribed bodies, the wind energy industry, local persons involved in the industry and local persons with no involvement. There was a strong input from persons with concerns regarding wind energy development, particularly at pre-draft stage and draft stage, this engagement decreased noticeably at material amendment stage. There was also strong support from local persons and particularly landowners positively engaged in wind energy development. All comments and suggestions were considered in the development of this wind energy strategy for Tipperary.

5.0 Challenges, Constraints & Opportunities

5.1 Wind Energy in Adjoining Counties

5.1.1 Adjoining Policy Areas

Map 1 indicates the previous wind energy development policy areas in Tipperary and the adjoining counties. The DoELG 2006 Wind Energy Guidelines emphasise that it is critically important to take into consideration adjacent planning authorities classifications to ensure the classifications in one county fit with that of their neighbour. Areas in adjoining Local Authorities classified as *unsuitable for wind energy development* are listed below. These were examined to see whether they conflict with the adjacent policy areas of the Tipperary Wind Energy Strategy. With the exception of one area in Kilkenny, all these policy areas are consistent. The area in Kilkenny is zoned unsuitable because it is a High Amenity Area. On the basis of this the adjoining area in Tipperary will be precluded from consideration as a *preferred area for wind energy development*, but will be considered for zoning as open for *consideration*.

This consistency arises on account of the following landscape factors-that arise on account of similarity of the majority of the landscape conditions along relevant boundaries, as follows:

Relevant Boundary	Adjoining County	Relevant Landscape Conditions	Consistency
North	Offaly	Wet lowlands and callows in South Offaly define the boundary with Tipperary which contains the Shannon Callows and adjoin Borrisokane, thus the edge conditions on both are similar	Very High
	Galway	The River Shannon and parts of Lough Derg edged by wet lowlands defines the majority of the boundary between the two counties, thus the edge conditions on both are similar	Very High
West	Clare	Lough Derg edged by wet lowlands defines the majority of the boundary between the two counties, thus the edge conditions on both are similar	Very High
	Limerick	The River Shannon, enclosed by steep-sided and heavily wooded uplands define the majority of the boundary between the two counties, thus the conditions on both are identical	Very High

Table 5.1: Relevant Landscape Considerations with Adjoining Counties

Relevant Boundary	Adjoining County	Relevant Landscape Conditions	Consistency
South	Cork	The Uplands of the Knockmealdown Mountains and associated foothills and adjoining valley floor. defines the majority of the boundary between the two counties, thus the edge conditions on both are similar	Very High
	Waterford [western part]		
	Waterford [western part]	The River Suir between the environs of Clonmel and Carrick-on-Suir defines the boundary between the two counties. North of the Suir, Tipperary is characterised by an elongated, relatively level river valley which is bounded to the north by uplands of Slievenamon. South of the Suir Waterford is characterised by the steeply rising foothills of the Comeragh Mountains. Both uplands are similar – though the lowlands are broader on the Tipperary boundary than on the Waterford side.	Medium
East	Kilkenny	There is a relatively consistent set of boundary conditions between the two counties. In the northern part the two counties share an extensive area of boglands north of Urlingford. To the south of this area a series of east-west trending uplands and valleys continue between the two counties, these include the Slieveardagh Hills and the uplands east of Slievenamon.	Medium
	Laois	Between Templemore and Abbeyleix the central plains continues without interruption.	Very High

Table 5 1: Relevant Landscape Considerations with Adjoining Counties Contd...

County	Area Name	Reason for Sensitivity	Conflicts with Tipperary Wind Energy Strategy Areas
Offaly	No unsuitable areas		-
Laois	No unsuitable areas		-
Kilkenny	River Suir SAC	2km buffer of River Suir SAC	No
Kilkenny	River Barrow and River Nore SAC	2km buffer of River Suir SAC	No
Kilkenny	Tipperary/Kilkenny Border	2km buffer of High Amenity Area	Partial
Waterford	Clonmel Area	Appears as Sensitive Landscape in Scenic Landscape Evaluation (CDP 2011 – 2017)	No
Waterford	Knockmealdown Mountains	Appears as Sensitive Landscape in Scenic Landscape Evaluation (CDP 2011 – 2017)	No
Cork	Mitchelstown/ Fermoy Area (the Golden Vale)	Very high landscape value with very high sensitivity. Presence of Blackwater & Ballyhoura SAC. Catchment of Freshwater Pearl Mussel	No
Limerick	Shannon Coastal Zone Landscape Character Area	In objective EH O12 of the CDP 2010 - 2016 - this area is considered as being unsuitable for wind energy developments.	No
Clare	Lough Derg Basin Landscape Character Area	Lough Derg is designated as an SPA and cSAC. In the CDP 2011 – 2017, wind farm development in this area is not normally permissible in this landscape character area.	No
Galway	Lough Derg & River Shannon Callows	Lough Derg is designated as an SPA and cSAC. River Shannon Callows is designated as an SPA and cSAC.	No

Table 5.2: Areas Unsuitable for Wind Energy Development Adjoining County Tipperary

Photo 17: Biomass and Wind Energy in Tipperary (Source-Meave Murphy)

5.1.2 Wind Farm Development Patterns in Adjoining Counties

There have been 15 wind energy planning applications in adjacent counties within 5km of the Tipperary County boundary. The majority of these, 9 applications, are in County Waterford, with 1 application in County Limerick, 1 application in Offaly, 2 applications in Co Laois and 2 applications in Co Kilkenny.

In Waterford, the Knockmealdown Mountain Mosaic has been zoned as *unsuitable for wind energy development* consistently in both South Tipperary and Waterford and both a Tipperary and a Waterford application in this area have been refused. There were 2 applications in the Waterford area south of Clonmel with a policy of Acceptable in Principle, one was refused and one is still pending. The policy in this area is compatible with the adjacent area in Tipperary which has a current policy of *open for consideration*.

There have been 6 applications in relation to the Barranafaddock wind farm and extension to same, south of the Araglin River which is in an *Acceptable in Principle* area. These have been predominantly granted and are constructed and operational. The Tipperary area immediately adjacent to this is currently zoned as open *for consideration*.

In Limerick an application was granted in Knockastanna, north of Cappamore, in an *open for consideration* policy area. Approximately 1km to the north of this is the Tipperary Hollyford Hills and Mountain Mosaic area which has a policy of *preferred for wind energy development*. However, approximately 1km to the east is a Tipperary policy area of *unsuitable for wind energy development*.

In Offaly, the application for a wind farm at Meenwaun, 7km north of Birr, was granted, and subsequently appealed to An Bord Pleanála, who upheld Offaly County Councils decision. This application is in a policy area *suitable for wind energy development*. The adjacent area in Tipperary is currently zoned as *open for consideration*.

In Laois two applications have been granted in the Rathdowney area, which has a *preferred area* policy for wind energy development. The existing Tipperary policy adjacent to this is *open for consideration* and there is a cluster of 3 granted

		Range of sensitivity with a dark outline for the dominant sensitivity					
		Robust	Normal	Transitional Sensitivity	Sensitive	Transitional Vulnerability	Vulnerable
B. The Lakelands							
Lakeland Enclosure	River Shannon – Newport					Class 4	
	Arra Mountains – Lower Lough Derg					Class 4	
B. The Uplands							
	Slievenamon Mountain Mosaic						Class 5
	Glen of Aherlow Uplands [20[B]]						Class 5
	Galtee Mountain Mosaic						Class 5
	Devilsbit Uplands						Class 5
	Knockmealdown Mountain Mosaic						Class 5

Table 5.3: Areas with "Vulnerable"& "Transitional Vulnerable" LCA Sensitivity Rating

applications in Tipperary approximately 3.5km away.

In Kilkenny there are 2 granted applications in the Slieveardagh Hills in an *acceptable in principle* policy area. These are adjacent to an existing *preferred area for wind energy development* in Tipperary and an existing wind energy cluster in the Slieveardagh Hills Farmland Mosaic area.

5.2 Landscape Sensitivity

The DoELG 2006 Wind Energy Guidelines state that landscape sensitivity is the key consideration in the evaluation of areas suitable for wind energy development. Every landscape can be affected to some degree by new development and as such all wind energy development will have some visual impact on a landscape. The challenge is to determine whether the visual impact would be significant and have a detrimental impact on the landscape. A Consolidated Landscape Character Assessment of Tipperary County has been produced in conjunction with this study and has classified landscape character areas, based on a qualitative assessment of their landscape value, into 6 classes of sensitivity to development: ranging from "Robust" to "Vulnerable". Those "Vulnerable" and "Transitional Vulnerable" landscape character areas are listed in table 5.3.

In addition, the Consolidated Landscape Character Assessment identified areas least compatible (based on landscape sensitivity) with various land-uses, including wind farms. The

'vulnerable', 'transitional vulnerable' and 'least compatible' areas are automatically considered unsuitable for new wind energy development. As an adjunct to the LCA process, Map 4, a Wind Energy Landscape Sensitivity Map was produced to guide the delineation of wind energy policy areas from a landscape perspective. In this map the qualitative "Vulnerable" landscape character areas are combined with areas that are deemed unsuitable for new Wind Energy Development, based on a quantitative assessment of the physical characteristics of the landscape.

The following criteria were used to develop this map:

- Areas with a slope greater than or equal to 15° and with an elevation higher than 200m
- Areas with land cover in the following categories (based on CORINE 2012 data):
  - *Continuous urban fabric*
  - *Discontinuous urban fabric*
  - *Broad-leaved forest*
  - *Mixed forest*
  - *Natural grassland*
  - *Moors and heaths*
  - *Transitional woodland scrub*
  - *Inland marshes*
  - *Peat Bogs*
  - *Water bodies*
- Areas with soils having the following classification:
  - *Acid Shallow Well Drained mineral*
  - *Blanket Bog*
  - *Cutover Peat*
  - *Lacustrine*
  - *Scree*
- Primary Amenity Areas Designation
- Landscape Character Areas considered "Vulnerable"," Transitional Vulnerable" and least compatible with wind farms.

The resulting Wind Energy Landscape Sensitivity Map has informed the Wind Energy Policy Areas Map.

The LCA Sensitivity Rating and the corresponding objectives guidelines set out in Section 6 of the LCA and listed views will be considered in the assessment of any planning applications for wind energy developments.

5.3 Ecological & Natural Heritage Designations

Natura 2000 sites are European designations which include Special Areas of Conservation (SAC), candidate Special Areas of Conservation (cSAC) and Special Protection Areas (SPA). These and the nationally designated and proposed Natural Heritage Areas (NHA, pNHA) were identified as key policy considerations. Map 8 indicates the distribution of these environmental designated sites in County Tipperary.

SACs and cSACs are designed to protect, conserve and, where possible and necessary, to enable the restoration of certain habitats and/or species. SPAs are designated to protect rare or endangered birds and their habitats.

Any development in, or near these areas, must be subject to Ireland's obligations under the Habitats Directive (92/43/EEC), the EU (Birds) Directive (79/409/EEC) and the Environmental Impact Assessment Directive (85/337/EEC).

NHAs are a national designation introduced by the Wildlife (Amendment) Act 2000 to protect natural heritage of national importance. pNHAs were published on a non-statutory basis in 1995, while some have since been statutorily proposed or designated, this is not yet the case for all of them. These sites are of significance to wildlife and habitats. In practice, development proposals within NHAs are typically refused or given consent with specific conditions.

While these designations do not automatically preclude wind energy development, any development in these areas is subject to the policies and obligations that pertain to these designations. The construction and operation of wind farm projects can impact the quality and integrity of these ecologically designated areas.

Typically, Tipperary's SPAs are located in upland areas whilst cSACs include upland areas but also habitats such as rivers and wetlands (upland cSACs include the Galtee Mountains, the Silvermines Mountains, the Devilsbit Mountain and Moanroar mountain). The NHA/pNHAs have a wider distribution. As the SPAs coincide with elevated, isolated locations with lower population densities they have historically proven attractive to wind energy developers.

The Appropriate Assessment (AA) of the Tipperary Wind Energy Strategy has identified "Loss of Annex I habitat is likely to constitute a significant impact on integrity of cSAC" as a potential impact

of wind energy development on cSACs within Tipperary County.

The Appropriate Assessment recommends "Wind Energy Development is unlikely to be compatible with the COs [Conservation Objectives] of the site and therefore avoidance is recommended". In relation to SPAs in the county the AA recommends avoidance of wind energy development in relation to Lough Derg (Shannon) SPA, River Little Brosna Callows SPA and the Middle Shannon Callows SPA on the grounds of the protected species being particularly vulnerable to collision impacts.

In relation to the Slievefelim to Silvermines Mountains SPA, in view of the extent of existing and consented wind energy projects within the SPA and the as yet unknown cumulative impact of these, it advocates taking the precautionary approach and recommending avoidance of these areas for wind energy development.

Therefore, cSAC, SAC and SPA areas are considered unsuitable for further wind energy development. However, repowering of existing wind energy developments may be considered (subject to the requisite assessment under the Habitats Directive). This will be dealt with on a case by case basis in accordance with the development control standards set out in Appendix C of this Wind Energy Strategy. These standards are based on the mitigation measures recommended in the SEA.

5.4 Network and Grid Connection

As noted in Table 3.3, 405 MW of capacity has been offered in terms of transmission grid connections to wind farms in Tipperary under the Gate 3 Offer Programme in 2011. Eirgrid has completed a study to examine the potential impact of operating a system with high levels of wind penetration. The results show that with a combined installed capacity of over 6000 MW for the island of Ireland, the 40% NREAP target can be achieved. However, it will at times be necessary to curtail wind farm output in order to maintain a secure power system[xix].

Accessibility to electricity transmission and distribution grids is a key consideration when identifying areas suitable for wind energy development. The scale of modern larger windfarms can, however, ensure that grid connection at distances of up to 25km are generally not a significant constraint.

The transmission network for County Tipperary is shown on Map 5, depicting the 400kV, 220kV, 110kV and 38kV electricity lines and substations.

North Tipperary is well served and has 2 x 400kV transmission lines traversing the county from east to west and a 220kV line going from north-east to south-west. The southern part of Tipperary has several 110kV and 38kV transmission and distribution lines traversing it from north to south and east to west. In addition, there is a 220kV line within 10km of the western boundary between Tipperary and Limerick. The entire county is within 25km of either a transmission or a distribution substation. The wind energy guidelines specify that areas with economic wind speeds but without the corresponding infrastructure should be identified in order to inform the future planning of the transmission network.

Based on this assessment no areas were identified as being beyond 25km of a substation and therefore having a transmission deficit. It should be noted however, that the capacity at the substations and transmission lines is unknown.

In addition to grid connection, the transport of energy from the turbines to a substation, which connects to the grid, will usually require the establishment of ancillary infrastructure which may create additional visual impact. Generally, however, the connection of the wind turbines to the substation (and sometimes from the substation to the grid) now typically is done via underground cable (where feasible), thus minimising the visual impact of overhead lines.

5.5 Planning Case Law

In a judgement in 2014, O'Grianna v An Bord Pleanála, Cork County Council and Framore Limited, it was ruled that planning permission should not be granted for a wind farm project requiring a grid connection unless the grid connection details are provided in the Environmental Impact Assessment (EIA) process. Arising from this is it essential that details of any proposed grid connection should be provided in the EIA process.

[xix] SEAI, Ireland – Your Smart Grid Opportunity, Accessed March 21st 2016: http://www.seai.ie/Publications/Renewables_Publications_/New_Technologies/Ireland_Your_Smartgrid_Opportunity.pdf

Arising out of recent case law (including Kelly v An Bord Pleanála, 2014) it is now required that a specific cumulative assessment is carried out in respect of the entire project. The need for a very comprehensive AA processes has also been highlighted.

5.6 Settlement Pattern and Population Densities

Map 6 illustrates CSO population density data and the rural nature of Tipperary. Clusters of higher population density, in the form of towns (CSO towns and villages) and small settlements are scattered throughout the county, except for in upland areas. An Post 'Geodirectory' data is also included in Map 6, this indicates the location of all houses in the county and further illustrates the dispersed nature of settlement, and the low settlement density in upland areas. By their nature, wind farm developments are typically located on more elevated, isolated locations which coincide with lower population densities as these areas are often the most viable locations for turbines. Settlement centres are generally not favoured as locations for commercial wind turbines, other than auto-producer installations. Having consideration to this, the larger urban areas are identified on map 6 as 'unsuitable' for commercial wind energy development. In relation to individual houses and smaller settlements, impacts on residential amenity, such as noise and shadow flicker, will be considered on a case by case basis in accordance with the development control standards of the County Development Plan (as varied) and the Wind Energy Guidelines.

5.7 Landslide Susceptibility

The issue of landslide in relation to wind energy development was brought to the fore after landslides in Galway in 2003 and Kerry in 2007. A Landslide Incidence Map 7 shows the distribution of historic landslides in Tipperary, where there have been 5 recorded landslide events. Analysis of the national events shows that the majority involved peat as the principal material. The landslide mechanisms included both slides and flows.

They occurred in two contrasting situations:

- in blanket bog in upland locations and in the low-lying blanket bog of western Ireland; in the upland areas they occurred both on the relatively flat plateau surfaces and also on the steeper slopes surrounding them.
- raised bogs in the lowlands of Ireland where slope failure occurred on relatively low angle slopes around the edges of the bogs.

Map 7 also indicates the distribution of peat soils in Tipperary. However, peat soils are only one parameter in identifying areas of potential landslide susceptibility. Other factors such as slope, depth of peat, underlying bedrock, aspect and weather patterns all need to be taken into account.

Wind energy development applications in these peat soil areas will need to include a peat stability assessment as they have a higher landslide risk. Peat areas are not precluded from this analysis of areas suitable for wind energy development as many upland blanket bogs sites are suitable for wind farms despite the presence of peat. Again, landslide susceptibility will be assessed on a case by case scenario in accordance with best practice development control standards.

5.8 Architectural & Archaeological Heritage & Tourism

As can be seem from Map 9, Tipperary has a rich and extensive architectural and archaeological heritage. The high value with which these cultural assets are held was reflected in the public submissions to the Draft RES. Over 90% of the submissions raised concerns about the impact of wind energy developments on heritage and landscape areas. Wind energy developments should be sited so as not to have a visual or physical impact on architectural and archaeological sites. However, due to the geographically dispersed nature of these cultural assets and the fact that is not possible to prioritise them without undertaking a detailed survey, it is not possible to define meaningful standardised exclusion zones at the strategic level of a Wind Energy Strategy. In many individual instances adverse impacts may be mitigated. This will be dealt with on a case by case basis in accordance with the development control standards set out in Appendix C of this Wind Energy Strategy.

The Architectural Conservation areas (ACA) all fall within urban areas. Therefore, the 1km exclusion zone around settlements, will ensure that these areas will be protected when identifying areas suitable for wind energy development.

Tipperary has a significant number of tourist attractions, including some of the top historical sites in Ireland, these include:

- The Rock of Cashel,
- Lough Derg,
- The Butler Trail,
- Historic Town Walls

In addition, Fáilte Ireland's launched the "Ireland's Ancient East" tourism initiative in 2015 to build on the wealth of historical and cultural assets in the east and south of Ireland.

5.9 Water Framework Directive

The EU Council Directive 2000/60/EC (Water Framework Directive) sets out a comprehensive framework for the management of water resources in the European Community. Following on from this, in 2009 national legislation was developed to support the achievement of favourable conservation status for *Margaritifera margaritifera*, the freshwater pearl mussel. Siltation and possible nutrient loss from potential wind energy developments pose a serious risk to the freshwater pearl mussel populations.

Within Tipperary 9 river catchments are considered sensitive in respect of the freshwater pearl mussel. Map 10 shows the catchments of the known extant populations of freshwater pearl mussel in Tipperary, these are discussed in more detail in Appendix B.

Three categories of catchments are mapped:

- Catchments of SAC populations listed in S.I. 296 of 2009
- Catchments of other extant populations
- Catchments with previous records of *Margaritifera*, but current status unknown

Catchments with SAC populations are considered unsuitable for further wind energy development. Catchments of other extant populations are precluded from consideration as "*Areas Open to Consideration*".

Catchments with previous records of *Margaritifera* will be dealt with on a case by case basis in accordance with the development control standards set out in Appendix C of this Wind Energy Strategy.

Salmonid Rivers and Nutrient Sensitive Rivers are also afforded protection under various EU Directives and Regulations. These are also shown on Map 10. Wind energy development is not suitable within a buffer zone of 100m from the banks of these waters.

Wind energy development in proximity to any river, will be dealt with on a case by case basis in accordance with the development control standards set out in Appendix C of this Wind Energy Strategy.

5.10 Animals and Horses

Tipperary has an internationally renowned equine industry both for the breeding of and the training of horses. Under Policy ED8 of the North and South Tipperary County Development Plan (as varied), the Council recognised the need to protect, promote and enhance the viability and environmental quality of existing equine operations. The impact of wind farms on the equine industry has been considered by under the SEA and regard has been made to assessment of planning applications by An Bord Pleanála.[6]

The Council will consider, and will have regard to the impact of developments on the equine industry in assessing applications. The Council may, where appropriate require the submission of an impact statement, with particular with respect to noise and shadow flicker. In many individual instances any adverse impacts may be mitigated. The development control standards set out in Appendix C of this Wind Energy Strategy.

5.11 Cumulative Impact

Cumulative impacts can be defined as the additional changes caused by a proposed development in conjunction with other similar developments or as the combined effect of a set of developments, taken together. The cumulative

[6] ABP case reference PA0038 where the inspector concluded that the proposed development would not be likely to have significant negative effects on material assets, including the cattle, horses and poultry that are reared in the area. It would not be likely to have significant negative effects on the built fabric of the area, including its roads and houses, or to prevent its further sustainable development. Accessed March 21st 2016: http://www.pleanala.ie/casenum/PA0038.htm .

effect of wind energy development is an emerging issue because of the increasing development of on-shore wind energy developments. The EU Commission's 2010 Guidance Document "Wind Energy Development and Natura 2000" notes that cumulative effect can occur 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 states that cumulative effect is the combined effect of all developments taken together and therefore 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.

The cumulative effect of wind farms is a particular issue in relation to landscape and natural heritage. Scottish Natural Heritage (SNH) has produced a guidance document specifically on assessing the cumulative effect of wind farms. It advocates that cumulative effects should be considered both at development control and at strategic planning level.

It also recommends that such consideration should not be constrained by administrative boundaries and should cover the whole of a region, straddling more than one planning authority if necessary.

The SEA identified the following list of potential cumulative effects:

- Contributions towards meeting renewable energy targets and associated targets (in combination with plans and programmes from all sectors, including Wind Energy plans, transport plans and land use planning), e.g. those relating to greenhouse gas emissions, through increasing the amount of energy generated by renewables.
- Facilitation of new development which complies with environmental legislation thereby contributing towards environmental protection and management and sustainable development.
- Potential cumulative visual impacts - both within and outside of the County - arising from multiple wind energy developments.
- Potential cumulative effects upon bird species arising from multiple wind energy developments.
- Potential cumulative effects upon ecology and surface and ground water status as a result of pollution arising from land use (housing, commercial, agricultural and forestry for example) and infrastructural developments.
- In combination with plans and programmes from all sectors potential adverse effects on all environmental components arising from all development in greenfield and brownfield areas. These plans and programmes from other sectors undergo SEA and AA and comply with environmental legislation while projects are subject to EIA and AA, as relevant.

It is noted that Tipperary has made a positive and proactive contribution to energy targets through wind energy development. As a result, there is a concentration of existing and permitted (refer to Map 8) wind energy developments in certain parts of the County.

This is particularly evident in and around the Slievephelim-Silvermines and the Hollyford Hills uplands. Significant parts of these uplands are also subject to Natura 2000 Designations and are designated as Secondary Amenity Areas in the County Development Plan (as varied). The combined area at this location has seen the greatest intensity of wind energy development in recent years and there remains approximately 80 permitted turbines yet to be constructed in this area. It is recommended, in view of the significant numbers of turbines yet to be constructed, and in view of the environmental designations of the area, that over the lifetime of this Strategy that a precautionary approach to wind energy development in these areas be undertaken and that they be designated as unsuitable for new wind energy development.

This will not preclude the repowering of existing developments or the construction of permitted developments, however, it will prevent new wind energy development in the meantime. It is intended that this area will be re-examined again at the next review of wind energy in the county to determine if it is appropriate to permit further wind energy development in this area having consideration to cumulative impact of existing development.

The SEA refers to an assessment of "in-combination effects" which will need to be undertaken in a more comprehensive manner at the lower level plan or individual project-level. However, some potential adverse cumulative effects will be mitigated by provisions which have been integrated into the standards set out in Appendix C of this Wind Energy Strategy.

5.12 Interaction between the Wind Energy Strategy and the Strategic Environmental Assessment (SEA):

SEA and AA processes have been carried out in support of this Wind Energy Strategy. During the scoping stage of the SEA it was recognised that the Wind Energy Strategy may have the potential to significantly impact upon Natura 2000 sites, therefore AA was carried out. Both the SEA and the AA helped to define areas for wind energy development and ensured that highly sensitive environmental resources were avoided or potential negative impacts highlighted and addressed through mitigation measures. The SEA also assessed a number of reasonable alternatives which are capable of being implemented for the Wind Energy Strategy, taking into account the objectives and the geographical scope of the Strategy. These are presented below. The evaluation of these alternatives is discussed in detail in Section 7 of the SEA.

5.12.1 Need for a Strategy

First of all, it was examined whether there was a need for a Wind Energy Strategy. It was determined that there was a need for a Strategy with provisions in relation to wind energy development having consideration to the Wind Energy Guidelines, 2006 and in order to give direction and guidance to future applications for development in Tipperary.

- **Therefore, a "no strategy" alternative does not apply in this situation.**

5.12.2 Tier 1 Alternatives: Type of Strategy

At the first tier of decision making, three alternatives are identified in relation to the type of Strategy which could to be developed.

- **Alternative A ('Non-Spatial Strategy'):** Prepare a Strategy which does not identify specific Wind Energy Areas within County Tipperary. Such a Strategy would identify relevant legislative requirements and policy in relation to environmental protection and management but would not exclude wind energy development in areas with more sensitive environmental characteristics, in this scenario; all areas would be open for consideration.

- **Alternative B (Spatial Strategy):** Prepare a Strategy which identifies specific Wind Energy Areas within County Tipperary that are unsuitable for new wind energy development except in exceptional circumstances. In addition to facilitating compliance with relevant legislative requirements in relation to environmental protection and management, such a Strategy would generally exclude new wind energy from pre-identified sensitive areas and areas where there may be a need to manage cumulative impact.
- **Alternative C ('Exclusion Strategy'):** Prepare a Strategy that would be highly restrictive and would generally exclude and restrict the further development of wind energy in all parts of the County.

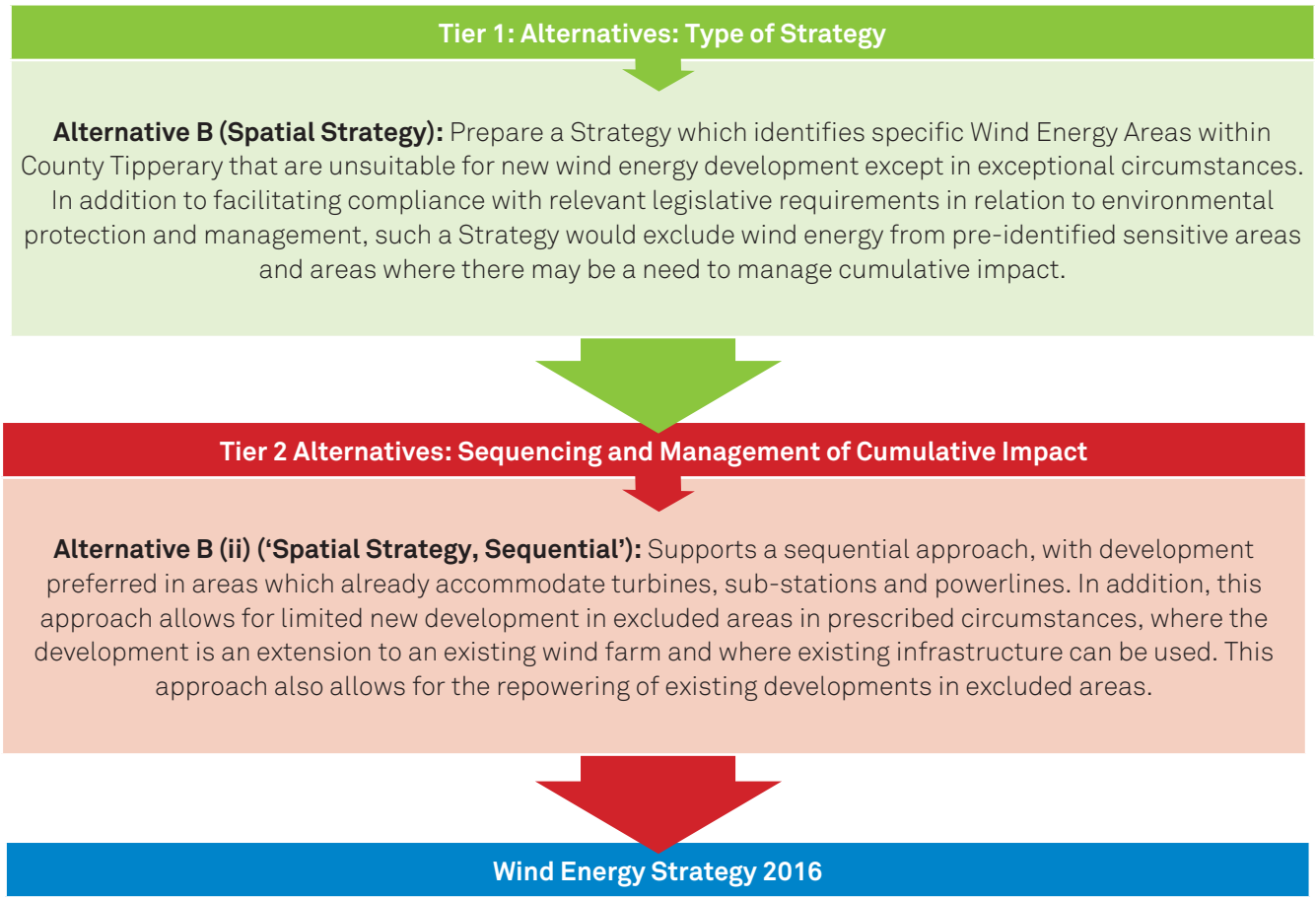
5.12.3 Tier 2 Alternatives: Sequencing

It was recommended that Alternative B ('Spatial Strategy') be selected from Tier 1 Alternatives (please refer to SEA for detailed evaluation of alternatives), as this will provide for a proactive approach to renewable energy development, while at the same time protecting the environmental resources of the county. Having consideration to this policy approach, the Tier 2 alternatives relate to the sequencing of development and management of cumulative impact under Alternative B.

- Alternative B (i) ('Spatial Strategy, Non-Sequential') does not provide for a sequential approach for the development of areas which are not excluded for wind energy development. The occurrence of development across all non-excluded areas would occur, depending on a variety of factors and new development in excluded areas would not be acceptable in any circumstance. This approach would give poor consideration to existing investment in energy infrastructure in the county.

- Alternative B (ii) ('Spatial Strategy, Sequential') supports a sequential approach, with development preferred in areas which already accommodate turbines, sub-stations and powerlines. In addition, this approach allows for limited new development in excluded areas in prescribed circumstances, where the development is an extension to an existing wind farm and where existing infrastructure can be used. This approach also allows for the repowering of existing developments in excluded areas.

In summary the SEA selected the Alternative B (ii) spatial strategy with Sequencing as the best approach for the development of the Wind Energy Strategy.



5.13 Wind Potential

Available wind speed is a key factor in determining the economic viability of potential wind energy locations. Wind speed increases with height above ground. In the past wind speeds above 8.5m/s at 50m hub height were generally considered necessary for economic viability. However, the latest generation of turbines can be 100m or more above ground level, with associated higher wind speeds at these heights. In addition, due to advances in turbine technology and economies of scale wind energy development can now be viable at much lower wind speeds – potentially from 6.5m/s for turbines at 100m - 125m above ground level. This lower base criterion means that wind energy development is viable in a more extensive area than hitherto. In the past wind energy was restricted to upland areas, whereas now it can also be viable in lower areas.

While this extended area of viability constitutes an opportunity, it can also be considered a challenge. As a consequence of the lower wind speeds, the turbines are larger. The size of these new wind turbines can be seen as an issue, where it is considered that the scale of the turbines is not in keeping with the landscape. Conversely, it can also be said that fewer, larger turbines are less intrusive than more numerous smaller towers.

It should be noted that the SEAI 2013 re-modelled wind speed data differs from that produced in 2003 (the 2003 atlas was based on 1990s data which contained several years with very high average wind speeds when compared to the long term average, this may have resulted in the 2003 atlas average wind speeds being higher than the long term average). Therefore, while Map 3 indicates the area with wind speeds at or above 6.5m/s modelled wind speed at 100m, this area is now significantly less than it would have been based on the 2003 data.

However, in view of the rapid changes in the technology it has been decided not to use wind speed as an exclusion criterion as areas that are currently not economically viable are in effect areas potentially viable with future technologies. Map 3 has been included for information purposes to reflect the current and near-current viable wind speed areas, however this information has not informed the wind energy suitability map.

6.0 Developing a Wind Energy Strategy

6.1 Department of the Environment, Heritage and Local Government – Wind Energy Development – Planning Guidelines

In identifying the key policy considerations which would need to be addressed in developing a draft wind energy strategy, guidance was taken from 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'. In addition, the list of policy considerations was informed from a best practice review of the approach adopted by other Local Authorities and from issues raised in the pre-Draft Renewable Energy Strategy public consultation process.

6.1.1 Policy Development Considerations

In accordance with the recommendations of the Planning Guidelines for Wind Energy Development for Planning Authorities 2006, a step-by-step methodology was used which involved sieve-mapping analysis of the key policy considerations. This process aims to balance environmental, landscape, technical and economic criteria in order to identify the most suitable locations in Tipperary for wind energy development.

Policy Consideration	
Wind Energy Policy Areas of Adjacent Local Authorities	The approach to planning policy for wind energy in adjoining Local Authority areas was considered.
Planning Application Review	The pattern of current wind development in Tipperary and adjacent areas was considered: identifying granted, pending and refused applications.
Wind Potential	Areas where commercial development of wind energy resources is viable were identified.
Landscape Character Assessment	The outcome of the LCA and how it influences this Wind Energy Strategy was considered.
Electricity Transmission Network	The capacity and accessibility to the existing and planned electricity transmission network and distribution grids were look at in relation to how they might constrain future wind energy development.
Settlement Pattern and Population Densities	Settlement pattern and population densities were studied in relation to minimising the residential impact of wind energy development.
Scenic Routes and Landscapes and Amenity Designations.	The impact of wind farm development on scenic and amenity areas were considered.
Landslide Susceptibility	A preliminary review of landslide risk areas based on slope and soil type was undertaken.

Table 6.1: Key Policy Considerations

Policy Consideration	
Ecological & Natural Heritage Designations	Consideration was taken of the policy objectives and obligations in relation to any development in these areas.
Architectural & Archaeological Heritage	Have consideration of the policy objectives and obligations in relation to any development in these areas.
Water Framework Directive	Have consideration of the policy objectives and obligations in relation to Freshwater Pearl Mussel Catchments.
Animals and Horses	Take into consideration.
Cumulative Impact	Consider the combined effect of all existing/granted wind farm developments in conjunction with the proposed wind energy development areas being considered under this Wind Energy Strategy process to determine if any area has an over-concentration of development.

Table 6.1: Key Policy Considerations Contd...

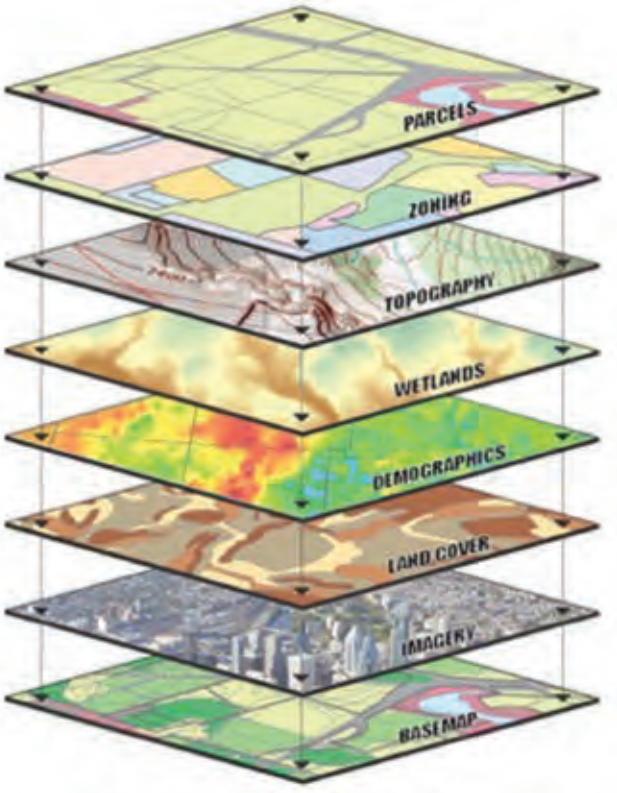


Figure 6.1: Example of Geographical Infrastructure System Model for Wind Policy

6.2 Sieve Analysis Tool

The methodology for developing this Wind Energy Strategy is based on that recommended by the 'A Methodology for Local Authority Renewable Energy Strategies' Draft for Public Consultation June 2012'. In this approach constraints and resources were identified, and areas suitable for wind energy development were identified based on the presence or absence of these. This approach enables a structured and consistent identification of viable wind energy resources across local authority areas and is similar to the approach adopted by a number of other local authorities in the region.

A Geographical Information System (GIS) was established to map and analyse the key policy considerations being considered in developing this Strategy. The SEA and AA processes have also informed this methodology and the identification of areas in the Wind Energy Strategy by highlighting significant environmental issues and assisting in developing mitigation measures reflected in the Development Control outlines in Appendix C.

Where appropriate the key policy considerations were mapped and combined in a "sieve mapping approach". This allows the data to be superimposed and combined in this manner such that areas where multiple overlapping constraints can be identified and areas where multiple overlapping opportunities can be identified. Arising from this analysis, Map 11 delineates the revised wind energy planning policy areas for Tipperary.

Policy Consideration	Exclusion Criterion	Development Control Implication
Wind Energy Policy Areas of Adjacent Local Authorities	Areas within Tipperary where policy in adjoining county are "Unsuitable for Wind Energy Development" were reviewed and where appropriate excluded from consideration as area "Open for Consideration for Wind Energy Development".	
Wind Potential	Due to rapid turbine technology change this was not used as an exclusion criterion.	
Landscape Sensitivity	Exclude Sensitive Landscapes and High Amenity Areas.	In certain circumstances, where wind energy developments are already in place, an extension may be permitted to a wind farm where existing infrastructure can be utilized.
Electricity Transmission Network	The location of electrical infrastructure was noted, but not used in the context of an exclusion criteria.	
Settlement Pattern and Population Densities	Exclude areas within 1km of CSO urban areas.	Concerns in relation to residential amenity impacts should be assessed in a case by case basis in accordance with the development control standards.
Scenic Routes and Landscapes and Amenity Designations.		Concerns in relation to visual impacts should be assessed in a case by case basis in accordance with the development control standards.
Landslide Susceptibility		Wind energy development applications in peat soil areas will need to include a peat stability assessment.
Ecological & Natural Heritage Designations	Exclude SACs and SPAs – see AA. Areas within 1km buffer can be "Open for Consideration", (subject to the requisite assessment under the habitats directive).	However, repowering of existing wind energy developments should be considered (subject to the requisite assessment under the habitats directive).

Table 6.2: Wind Energy Areas - Sieve Mapping Summary Matrix

Policy Consideration	Exclusion Criterion	Development Control Implication
Architectural & Archaeological Heritage		Wind energy developments should be sited so as not to have a visual or physical impact on architectural and archaeological sites. This will be dealt with on a case by case basis in accordance with the development control standards.
Water Framework Directive	Exclude Freshwater Pearl Mussel SAC population areas.	Re other FPM catchments: While these catchments are not automatically precluded from wind energy development areas, any development in these areas must, through SEA, EIA or other ecological assessment, take into consideration the potential impacts on the populations, including the potential to cause 'environmental damage' as per the Environmental Liability Directive and Regulations.
Water Framework Directive	This was considered not to be at an appropriate scale to be used as an exclusion criterion in the generation of wind policy areas.	100m exclusion zone from bank of Nutrient Sensitive Rivers. Riparian buffers (20m for rivers < 10m, 35-60m for rivers > 10m) should be applied to all rivers proximal to proposed wind energy developments. Development applications close to nutrient sensitive rivers should be accompanied by an Environmental Management Plan
Equine Facilities		This will be dealt with on a case by case basis in accordance with the development control standards set out in Appendix C of this Wind Energy Strategy

Table 6.2: Wind Energy Areas - Sieve Mapping Summary Matrix Contd...

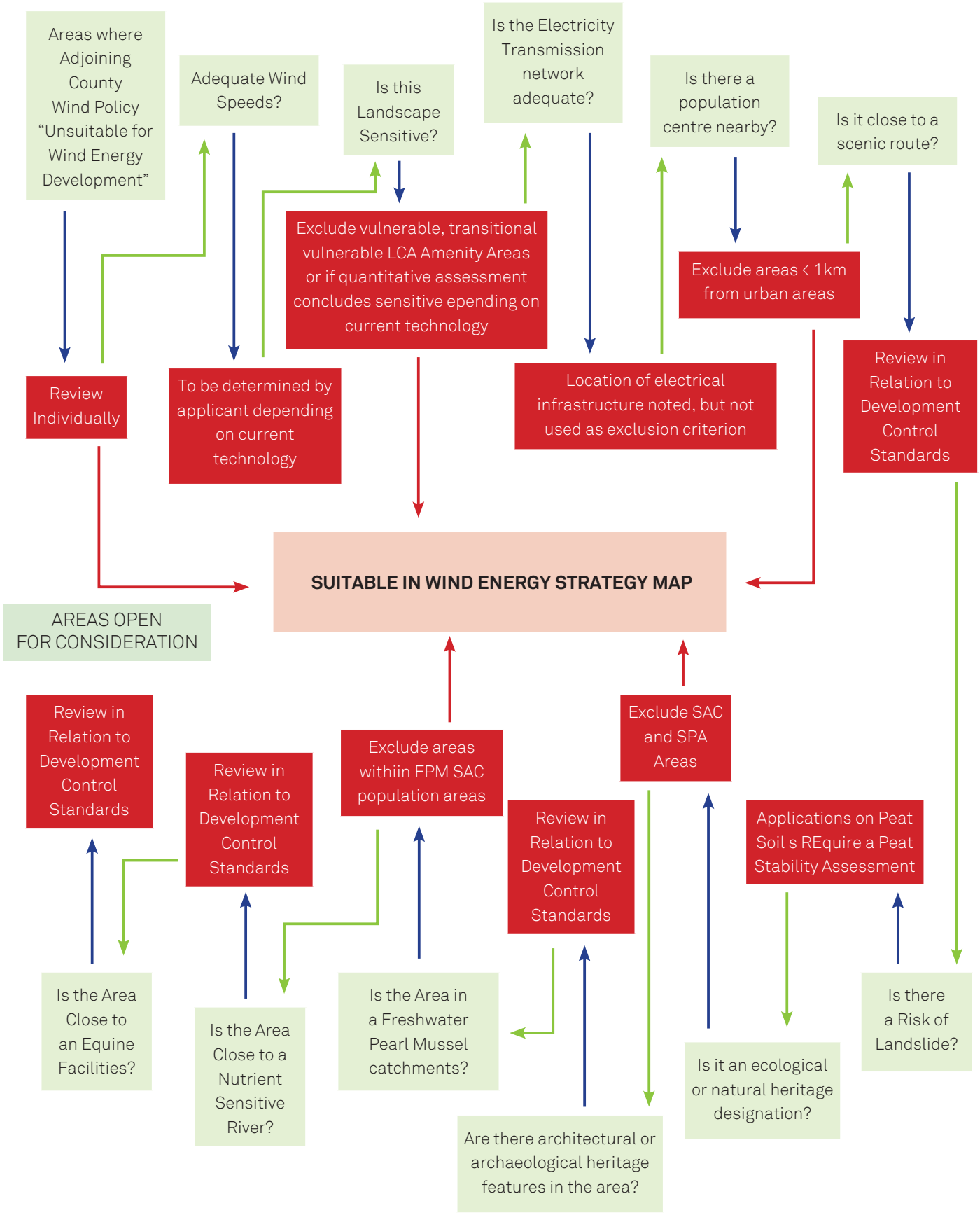


Figure 6.2: Flow Chart of Sieve Mapping Process

6.3 Conclusion

While there was significant overlap between the existing policies for North and South Tipperary, different approaches were adopted to identify areas suitable for wind energy development. South Tipperary was divided into three main landscape categories, based on the capacity of the landscape to facilitate wind energy development. Whereas in North Tipperary the policy differentiated between areas with adequate wind energy deemed open for consideration and areas considered unsuitable for wind energy development due to scenic, ecological, historic or tourism considerations. The existing policies required to be modified to ensure a standardised approach to wind energy throughout the county.

A review and update of the existing Landscape Character Assessments (LCAs) for Tipperary has concurrently been undertaken and has informed the review of the Wind Energy Strategy. In addition, there have been significant legislative changes in relation to the requirements for Environmental Impact Assessment (EIA) as well as planning law in the intervening time since the existing strategies were developed. The incorporation of these changes has necessitated amendments to the existing policy areas. The most notable example of the consideration of European Environmental Designated sites (Natura 2000) from areas considered suitable for wind energy development. These areas have been designated as unsuitable for further wind energy development until at least 2020 when the Renewable Energy Strategy may again be reviewed and assessed. In the interim wind energy development that have been permitted in these areas will continue to be constructed.

The new wind energy policy clearly designates areas 'unsuitable for new wind energy development' based on an intensive sieve analysis process and consideration of a complete review of the landscape of Tipperary. These areas include Natura 2000 sites, areas of high scenic amenity and areas where there has been a significant concentration of existing and permitted wind turbines. This approach will ensure the protection of the environmental and landscape assets of the county from inappropriate development.

The Council is also mindful of the need to manage cumulative impact, and in this sense will limit development of wind turbines in certain areas over the lifetime of this Strategy. However, repowering of existing turbines will be facilitated and in certain circumstances an extension to an existing wind farm may be permitted when existing infrastructure can be used.

This policy approach will ensure a balanced approach to wind energy development that both recognizes the need to manage cumulative impact of wind turbines in the county and the need to ensure the economical use of existing grid infrastructure assets.

Outside of areas designed as 'unsuitable for new wind energy development' planning applications for new wind energy development will be assessed on a case-by-case basis in line with the Wind Energy Guidelines (and any review thereof) and the policies set out in this Strategy as part of the County Development Plans (as varied).

7.0 Wind Energy Policy for Tipperary

7.1 Policies and Objectives

The aim of the Wind Energy Strategy is to set out one integrated, comprehensive suite of policies for wind energy development in Tipperary. These are outlined below.

This Wind Energy Strategy forms part of the North Tipperary County Development Plan 2010 (as varied) and the South Tipperary County Development Plan 2009 (as varied), therefore all relevant environmental, infrastructural, social etc. polices and standards of the Development Plans (as varied) will be applied. This Wind Energy Strategy should be read in conjunction with the appropriate County Development Plan for the area in which any new development is proposed.

7.1.1 General Wind Energy Policies

TWIND 1:	General Policy Statement on Wind Energy Development
It is the policy of the Council to support, in principle and in appropriate locations, the development of wind energy resources in county Tipperary. The Council recognises that there is a need to promote the development of 'green electricity' resources and to reduce fossil fuel dependency and greenhouse gas emissions in order to address the global issue of climate change, and to comply with European and International policies with regards to renewable and sustainable energy resources.	

TWIND 2:	Government Legislation and Guidance
It is the policy of the Council to ensure that all wind energy development in the county complies with the provisions of all applicable government legislation and guidance on wind energy development and renewable energy resources (and any review thereof).	

TWIND 3:	General Considerations for Applications for Wind Energy Development.
It is the policy of the Council that when assessing planning applications for wind energy development, to require compliance with the Wind Energy Development Guidelines, Guidelines for Planning Authorities (DoEHLG) 2006 or any revision thereof, and the policy and objectives of the County Development Plan (as Varied).	

TWIND 4:	Policy Areas for Wind Energy Development

It is the policy of the Council to assess new wind energy development in accordance with the associated wind energy strategy map and the following parameters:

Areas 'Open for Consideration' – wind energy development in these areas may or may not be appropriate, depending on the character of the landscape and the potential impact of the proposed development. Any impact on the environment must be low and subject to proper planning and sustainable development, and the guidelines set out in this policy document.

Areas 'Unsuitable for Further Development' – new wind energy development in these areas is not permitted. These areas have a special or unique landscape character where the main objective is conservation. Where there are existing wind energy developments in these areas, their repowering may be considered appropriate. Any impact on the environment must be low and subject to proper planning and sustainable development, and the guidelines set out in this strategy.

Areas Open for Consideration	
TWIND 4.1	Proposals shall demonstrate conformity with existing and approved wind farms to avoid visual clutter. In this respect, developers should consider the cumulative impact of new development in the context of the location of both existing and permitted developments.
TWIND 4.2	Proposals in Areas 'Open for Consideration' shall be sited having consideration to the landscape sensitivity and capacity analysis set out in the Tipperary Landscape Character Assessment 2016 and the provisions of the County Development Plan (as varied) in relation to landscape (Chapter 7). All applications shall have regard to the visual impact of turbines and ancillary development (such as access roads, boundary fencing, control buildings and grid connections).
TWIND 4.3	Within Areas 'Open for Consideration', proposed development within areas which already accommodate turbines, sub-stations and powerlines shall be considered appropriate from a sequential approach to the development of infrastructure, until these areas reach capacity.
TWIND 4.4	All Projects are required to be screened for Appropriate Assessment Screening in accordance with Article 6(3) of the Habitats Directive and the provisions of the County Development Plan (as varied).
TWIND 4.5	Applications for wind development shall be accompanied by a technical assessment in relation to the slope stability, landslide susceptibility of the development site and the proposed project. This assessment shall incorporate slope stability mapping and groundcover assessment in the context of potential cumulative effects arising from multiple developments.
TWIND 4.6	All proposals for wind energy development will have regard to the cumulative effect of the development on the environment when considered in conjunction with other existing and permitted wind energy developments in the area.
TWIND 4.7	All applications will have regard to the impact on existing built environment, particularly neighbouring residential properties and other sensitive amenity areas.

Areas Open for Consideration	
TWIND 4.8	All applications will have regard to the impact of any proposal for wind energy development on surrounding tourism and recreational related activities and the compatibility of same will be carefully considered in the assessment of any planning application.
TWIND 4.9	All applications will have regard to the impact of any proposal for wind energy development in the context of any flood risk in the area. A comprehensive flood risk assessment for proposals in an area at risk of flooding, adjoining same or where cumulative impacts may result in a flood risk elsewhere, in low lying areas or in areas adjacent to streams.
TWIND 4.10	All applications will ensure that details of the proposed grid connection and all associated infrastructure are considered in the Environmental Impact Statement (EIA) and Natura Impact Statement as may be required.
TWIND 4.11	All applications will have regard to the impact on rivers and streams and will demonstrate compliance with the Water Framework Directive.
TWIND 4.12	Wind energy development proposed in areas of lowland raised bog/peatland shall ensure that negative impacts including habitat disturbance and loss, and avoidance of hydrological disruption and risk of erosion are avoided or mitigated through design. Site specific geo-technical investigations shall be submitted as part of EIA unless otherwise agreed with the council.

Areas Unsuitable for New Development	
TWIND 4.13	New wind energy projects will not normally be considered in these areas.
TWIND 4.14	Proposals for wind farm development may be considered on a case-by-case basis in the following limited circumstances: **a)** Where there are existing wind farms in these areas, proposals for 'repowering' may be considered appropriate, on a case by case basis. Repowering is the process of replacing older turbines with newer ones that either have a greater capacity or more efficiency which results in a net increase of power generated. Repowering may also seek to extend the overall lifespan of the development. Proposals for repowering, shall not result in a net increase in turbines, and it shall be demonstrated that there is no adverse impact on the receiving environment. or **b)** In areas located outside of Natura 2000 sites, proposals for an extension to an existing wind farm (of up to 20% in terms of permitted numbers of turbines or in cases where 5 or less turbines are permitted in a wind farm, one additional turbine) will be considered. The proposal will be required to demonstrate that the additional turbines may be served by the infrastructure serving the existing development. or

[8] Refer to Map 4 and Map 7 for illustration of areas of Blanket Bog and Peat Soils

Areas Unsuitable for New Development	
TWIND 4.14 Contd...	**c)** In areas located outside of Natura 2000 sites, where an existing wind farm has been permitted and this permission expires over the lifetime of this Wind Energy Strategy, a revised proposal will be considered within the planning unit of the previously permitted development, and where it is demonstrated that the is no net increase in turbines. All proposals will be required to comply with the policies and development management standards set out in the Wind Energy Strategy

TWIND 5:	Conditions on Wind Energy Development

It is the policy of the Council that when granting planning permission for wind energy developments, to have regard to the proper planning and sustainable development of the area and in particular Chapter 7 of the Wind Energy Development Guidelines, Guidelines for Planning Authorities (DoEHLG) 2006 or any revision thereof. In addition, the Council may include conditions regarding:

a) Surface water management plans;
b) Environmental management plans for all phases of the development;
c) Limiting construction to a certain part of the year;
d) Duration of the planning permission and eventual decommissioning of the development;
e) Landscaping;
f) Surveys on birds and relevant protected species and other baseline environmental data collection; and,
g) Ongoing monitoring during operation of the wind energy development
h) Monitoring during construction phase
i) Protection of habitats and species of conservation concern
j) Protection of designated sites

TWIND 6:	Auto Producers[10]

It is the policy of the Council to support and facilitate, where appropriate, on site wind energy development by auto producers/micro producers where energy generated is required in order to meet the immediate needs of the development. The wind energy maps do not restrict the location of turbines for the purposes of auto-production and the Council will consider applications for auto-producers adjacent to users with large energy demands in both urban and rural areas subject to the proposal being acceptable from a visual, environmental and residential perspective in line with the policy and standards as set out in the Wind Energy Development Guidelines, Guidelines for Planning Authorities (DoEHLG) 2006 or any revision there and the policy and objectives of the County Development Plan (as Varied).

Key following criteria in assessing proposals for auto-producers of wind energy are as follows:

a) The energy will be primarily generated on-site to be used on the site;
b) The impact of noise on nearby residents will not be significant;
c) Shadow flicker will not impact on the amenity of nearby residents;
d) The proposed turbine should be visually acceptable in the context of its proposed location; and,
e) Proposals for auto-producers in visually sensitive areas will generally not be considered acceptable if there is likely be a significant visual impact on the character of the landscape.

9 As of the date of adoption of Variation No. 3 of the Development Plan (as varied) to incorporate the Tipperary Wind Energy Strategy 2016
10 TWIND 6 shall apply to wind energy proposals defined as auto-producers and micro-producers.

Comhairle Contae Thiobraid Árann
Tipperary County Council

TIPPERARY energy AGENCY

Tipperary Wind Energy Strategy 2016

Appendix 1: Sensitive River Catchments in Tipperary and Development Management of Wind Energy

Appendix 1:
Sensitive River Catchments in Tipperary and Development Management of Wind Energy

This section outlines the river catchments in the county classified as sensitive. The capacity of these catchments to accommodate new development were assessed in the SEA and AA accompanying the RES, and informed the preparation of the wind energy policy and incorporation of mitigation measures. Mitigation measures and development management standards are outlined in Table 2 below.

Catchment	Category
Nore Upper	Catchments of SAC populations listed in S.I. 296 of 2009
Munster Blackwater	Catchments of SAC populations listed in S.I. 296 of 2009
Nore Lower	Catchments with previous records of Margaritifera, but current status unknown
Suir	Catchments with previous records of Margaritifera, but current status unknown
Suir - Thonoge	Catchments of other extant populations
Suir - Tar	Catchments of other extant populations
Suir - Aherlow	Catchments of other extant populations
Suir - Multeen	Catchments of other extant populations
Suir - Clodiagh Tipperary	Catchments of other extant populations

Table 1: Margaritifera Sensitive Catchments in Tipperary

These three categories have implications in relation to ecological assessment of plans and potentially damaging developments and activities, as follows:

1.1.1 Catchments of SAC populations listed in S.I. 296 of 2009.

The Nore Upper and the Munster Blackwater catchment mussel populations are within Special Areas of Conservation (SAC) designated for the protection of the species. Site-specific conservation objectives for the restoration of these populations and their habitats are being developed by the NPWS. Under S.I. 296 of 2009, Sub-basin Management Plans have been developed to provide the programmes of measures necessary to achieve these objectives. Any plans or potentially damaging developments and activities in or overlapping with the catchments must be screened for Appropriate Assessment (Article 6 (3), Habitats Directive). These catchments are not suitable for wind energy development areas.

1.1.2 Catchments of other extant populations.

The Suir – Thonoge, Suir – Tar, Suir – Aherlow, Suir – Multeen, and the Suir - Clodiagh catchments

mussel populations may lie (in part) within an SAC, other nature conservation sites or in the wider countryside. Those populations within an SAC were not considered of sufficient quality to warrant designation for the species and detailed restoration objectives, targets, plans or measures are unlikely to be developed. While these catchments are not automatically precluded from wind energy development areas, any development in these areas must, through SEA, EIA or other ecological assessment, take into consideration the potential impacts on the populations, including the potential to cause 'environmental damage' as per the Environmental Liability Directive and Regulations. On these grounds these areas are precluded from consideration as "Areas Open for Consideration"

1.1.3 Catchments with previous records of Margaritifera, but current status unknown.

In the Nore Lower and the Suir catchments there are no recent records of freshwater pearl mussel. However, in most cases there has been little, if any, survey for the species since 1970. If any plans, or potentially damaging developments and activities are proposed for these catchments, freshwater pearl mussel should be considered as a constraint and dedicated survey is recommended. This will be dealt with on a case by case basis in accordance with the development control standards set out in Chapter X of this WES.

In addition to Freshwater Pearl Mussel, Salmonid Rivers and Nutrient Sensitive Rivers are also afforded protection under various EU Directives and Regulations.

These are also shown on Map 4.10, while there are no designated salmonoid waters in Tipperary, 11km of the Suir at Holycross, 16km of the Suir between Clonmel and Carrick-on-Suir and 12km of the Nenagh River north of Nenagh are designated as Nutrient Sensitive Waters on the WFD Register of Protected Areas. Where wind energy developments are proposed, close to designated salmonid fisheries or nutrient sensitive rivers adequate measures for the protection of these sensitive rivers should be developed as part of the Environmental Management Plan for the proposed development.

In relation to wind energy development in proximity to any river, it is recommended that a riparian buffer zone (i.e. a strip of vegetated land running parallel to the river which acts as a buffer against human development or activity) be set aside for the protection of water quality and habitat. The recommended width for larger river channels (>10m) is 35m to 60m and for smaller channels (<10m) is 20m or greater. The appropriate width should be assessed on a case by case basis in accordance with development control standards. In relation to the designated Nutrient Sensitive stretches of the Suir, wind energy development is not suitable within a buffer of 100m from the banks of these waters.

Environmental Component[1]	Potentially Significant Adverse Effect, If unmitigated	Residual Non-Significant Adverse Effect	Indicators
Biodiversity and flora and fauna	C- Loss of/damage to biodiversity in designated sites, ecological connectivity and non-designated habitats - Habitat loss, fragmentation and deterioration - Disturbance and displacement of protected species including bird species	Loss of an extent of non-protected habitats arising from the replacement of semi-natural land covers with artificial surfaces Movement restrictions arising from fencing in smaller areas	B1: Conservation status of habitats and species as assessed under Article 17 of the Habitats Directive B2: Percentage loss of functional connectivity without remediation resulting from development provided for by the Strategy B3i: Number of significant impacts on relevant habitats, species, environmental features or other sustaining resources in designated sites including Wildlife Sites resulting from development provided for by the Strategy B3ii: Number of significant impacts on the protection of listed species.

1 The SEA Directive identifies a number of environmental topics which must be considered in the assessments being undertaken for plans and programmes. These topics are listed in this column and comprise biodiversity and flora and fauna, population and human health, soil, water, air and climatic factors, material assets, cultural heritage including architectural and archaeological heritage, landscape.

2 Including Annex I habitats, Annex II species and their habitats and Annex IV species and their breeding sites and resting places (wherever they occur).

3 Including Annex I species and other regularly occurring migratory species, and their habitats (wherever they occur).

Mitigation - Delineation of Wind Energy Areas	Mitigation - Integration of individual SEA and AA provisions into the text of the Strategy *Proposed developments shall demonstrate compliance with the provisions laid out below as relevant and appropriate.*
Exclude candidate Special Areas of Conservation and Special Protection Areas.	**Protection of Biodiversity including Natura 2000 Network** Proposed developments shall contribute, as appropriate, towards the protection of designated ecological sites including candidate Special Areas of Conservation (cSACs) and Special Protection Areas (SPAs); Wildlife Sites (including Natural Heritage Areas, proposed Natural Heritage Areas and Nature Reserves); Salmonid Waters; Flora Protection Order sites; Wildfowl Sanctuaries (see S.I. 192 of 1979); Freshwater Pearl Mussel catchments; and Tree Preservation Orders (TPOs). Proposed developments shall contribute towards compliance with relevant EU Environmental Directives and applicable National Legislation, Policies, Plans and Guidelines, including the following and any updated/superseding documents: ▯ EU Directives, including the Habitats Directive (92/43/EEC, as amended)[2], the Birds Directive (2009/147/EC)[3], the Environmental Liability Directive (2004/35/EC)[4], the Environmental Impact Assessment Directive (85/337/EEC, as amended), the Water Framework Directive (2000/60/EC) and the Strategic Environmental Assessment Directive (2001/42/EC). ▯ National legislation, including the Wildlife Acts-2010[5], the European Communities (Environmental Impact Assessment) Regulations 1989 (SI No. 349 of 1989) (as amended), the European Union (Water Policy) Regulations 2003 (as amended), the Planning and Development Act 2000 (as amended), the European Communities (Birds and Natural Habitats) Regulations 2011 (SI No. 477 of 2011) and the European Communities (Environmental Liability) Regulations 2008[6]. ▯ National policy guidelines (including any clarifying Circulars or superseding versions of same), including the Landscape and Landscape Assessment Draft Guidelines 2000, the Environmental Impact Assessment Sub-Threshold Development Guidelines 2003, Strategic Environmental Assessment Guidelines 2004 and the Appropriate Assessment Guidance 2010. ▯ Catchment and water resource management Plans, including the relevant River Basin Management Plan(s). ▯ Biodiversity Plans and guidelines, including Actions for Biodiversity 2011-2016: Ireland's 2nd National Biodiversity Plan (including any superseding version of same). ▯ Ireland's Environment 2012 (EPA, 2012, including any superseding versions of same), and to make provision where appropriate to address the report's goals and challenges.

Table 2: Environmental Effects, Indicators and Mitigation and influence on Development Management of Wind Energy

4 Including protected species and natural habitats.
5 Including species of flora and fauna and their key habitats.
6 Including protected species and natural habitats.

Environmental Component[1]	Potentially Significant Adverse Effect, If unmitigated	Residual Non-Significant Adverse Effect	Indicators

Mitigation - Delineation of Wind Energy Areas	**Mitigation - Integration of individual SEA and AA provisions into the text of the Strategy** *Proposed developments shall demonstrate compliance with the provisions laid out below as relevant and appropriate.*
	Appropriate Assessment All projects and plans arising from the Strategy (including any associated improvement works or associated infrastructure) will be screened for the need to undertake Appropriate Assessment under Article 6 of the Habitats Directive. A project will only be authorised after the competent authority has ascertained, based on scientific evidence, Screening for Appropriate Assessment, and a Stage 2 Appropriate Assessment where necessary, that: • The project will not give rise to significant adverse direct, indirect or secondary effects on the integrity of any European site (either individually or in combination with other plans or projects); or • The project will have significant adverse effects on the integrity of any European site (that does not host a priority natural habitat type/and or a priority species) but there are no alternative solutions and the project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature. In this case, it will be a requirement to follow procedures set out in legislation and agree and undertake all compensatory measures necessary to ensure the protection of the overall coherence of Natura 2000; or • The project will have a significant adverse effect on the integrity of any European site (that hosts a natural habitat type and/or a priority species) but there are no alternative solutions and the project must nevertheless be carried out for imperative reasons for overriding public interest, restricted to reasons of human health or public safety, to beneficial consequences of primary importance for the environment or, further to an opinion from the Commission, to other imperative reasons of overriding public interest. In this case, it will be a requirement to follow procedures set out in legislation and agree and undertake all compensatory measures necessary to ensure the protection of the overall coherence of Natura 2000. **Annex I Species** The developer should liaise with the National Parks and Wildlife Services if Annex 1 species are present at or in the vicinity of the site. **Natura 2000 Sites** No projects giving rise to significant cumulative, direct, indirect or secondary impacts on Natura 2000 sites arising from their size or scale, land take, proximity, resource requirements, emissions (disposal to land, water or air), transportation requirements, duration of construction, operation, decommissioning or from any other effects shall be permitted on the basis of this Strategy (either individually or in combination with other plans or projects[7]).

Table 2: Environmental Effects, Indicators and Mitigation and influence on Development Management of Wind Energy Contd...

[7] Except as provided for in Section 6(4) of the Habitats Directive, viz. There must be: a) no alternative solution available, b) imperative reasons of overriding public interest for the project to proceed; and c) Adequate compensatory measures in place.

Environmental Component[1]	Potentially Significant Adverse Effect, If unmitigated	Residual Non-Significant Adverse Effect	Indicators

Mitigation - Delineation of Wind Energy Areas	**Mitigation - Integration of individual SEA and AA provisions into the text of the Strategy** *Proposed developments shall demonstrate compliance with the provisions laid out below as relevant and appropriate.*
	Freshwater Pearl Mussel Applications for development shall be accompanied by an assessment of potential impacts, mitigation and residual impacts upon the freshwater pearl mussel. Cumulative impacts should be considered in this assessment. **Biodiversity and Ecological Networks** Proposed developments shall contribute towards the protection and enhancement of biodiversity and ecological connectivity, including woodlands, trees, hedgerows, semi-natural grasslands, rivers, streams, wetlands, other landscape features and associated wildlife where these form part of the ecological network and/or may be considered as ecological corridors or stepping stones in the context of Article 10 of the Habitats Directive. Where trees or hedgerows have to be removed there should be suitable planting of native species in mitigation. Where possible hedgerows and trees should not be removed during the nesting season (i.e. March 1st to August 31st). Birds nests can only be intentionally destroyed under licence issued under the Wildlife Acts 1976-2000. Bat roosts may be present in trees, buildings and bridges. Bat roosts can only be destroyed under licence under the Wildlife Acts and a derogation under the Habitats Regulations and such a licence would only be given if suitable mitigation measures were implemented. Applications for development shall be accompanied by an assessment of potential impacts, mitigation and residual impacts upon the otters (including potential interactions with food sources and aquatic and terrestrial habitats), bats (including potential interactions with roosts, foraging sites and lighting) and birds (including flight paths) **Non-Designated Sites** Proposed developments shall contribute towards the protection of non-designated habitats and species, as appropriate. **Riparian Zone and Waterbodies and Watercourses** Proposed developments shall contribute towards the protection of waterbodies and watercourses, including rivers, streams, associated undeveloped riparian strips, wetlands and natural floodplains, from inappropriate development. In relation to wind energy development in proximity to any river, it is recommended that a riparian buffer zone (i.e. a strip of vegetated land running parallel to the river which acts as a buffer against human development or activity) be set aside for the protection of water quality and habitat. The recommended width for larger river channels (>10m) is 35m to 60m and for smaller channels (<10m) is 20m or greater. The appropriate width should be assessed on a case by case basis in accordance with development control standards. In relation to the designated Nutrient Sensitive stretches of the Suir, wind energy development is not suitable within a buffer of 100m from the banks of these waters.

Table 2: Environmental Effects, Indicators and Mitigation and influence on Development Management of Wind Energy Contd...

Environmental Component[1]	Potentially Significant Adverse Effect, If unmitigated	Residual Non-Significant Adverse Effect	Indicators
Population and human health	- Potential interactions relating to noise and shadow flicker, landslides or bogbursts and flood risk	None	PHH1: Occurrence (any) of a spatially concentrated deterioration in human health arising from environmental factors resulting from development provided for by the Strategy, as identified by the Health Service Executive and Environmental Protection Agency
Soil	- Damage to structure and stability of soil e.g. occurrence of landslides or bogbursts	Loss of an extent of soil function arising from the replacement of semi-natural land covers with artificial surfaces	S1i: Consideration of landslide/ bogburst susceptibility assessments by the development management process S1ii: Number of landslides or bogbursts

Mitigation - Delineation of Wind Energy Areas	Mitigation - Integration of individual SEA and AA provisions into the text of the Strategy *Proposed developments shall demonstrate compliance with the provisions laid out below as relevant and appropriate.*
	Alien invasive species Cooperate as relevant with the National Parks and Wildlife Service in protecting against the accidental introduction of such species during development. **Fisheries** Where potential impacts on fishery components (such as water quality, surface water hydrology, aquatic habitats including spawning and nursery grounds and the riparian zone) are identified, Inland Fisheries Ireland shall be consulted in order to ensure that impacts are mitigated in compliance with relevant legislation.
Exclude areas within 1km of CSO urban areas	**Human Health** Where proposed developments would be likely to have a significant adverse effect on the amenities of the area through pollution by noise, fumes, odours, dust, grit or vibration, or cause pollution of air, water and/or soil, the Council shall ensure the introduction of mitigation measures in order to eliminate adverse environmental impacts or reduce them to an acceptable operating level. **Shadow Flicker and Noise** Proposals for wind turbines must demonstrate that the orientation, private amenity space and disposition of windows in residential dwellings is such that the dwelling will be largely unaffected by shadow flicker and that the amenity of the dwelling will not be significantly impacted upon. Proposals must also demonstrate that the residential amenity will not be impacted by virtue of noise and all applications should be accompanied by a Noise Impact Statement of noise sensitive locations such as occupied dwellings. The Department of the Environment's most up to date Guidelines on Wind Energy shall be adhered to with regard to shadow flicker and noise issues.
	Geological Sites Proposed developments shall contribute towards the protection and maintenance of the character, integrity and conservation value of features or areas of geological interest. **Soil** Proposed developments shall ensure that adequate soil pollution prevention measures are undertaken where appropriate.

Table 2: Environmental Effects, Indicators and Mitigation and influence on Development Management of Wind Energy Contd...

Environmental Component[1]	Potentially Significant Adverse Effect, If unmitigated	Residual Non-Significant Adverse Effect	Indicators
Water	- Adverse impacts upon the status of water bodies and entries to the WFD Register of Protected Areas, arising from changes in quality, flow and/or morphology - Increase in flood risk	Flood related risks remain due to uncertainty with regard to extreme weather events	W1: Classification of Overall Status (comprised of ecological and chemical status) under the European Communities Environmental Objectives (Surface Waters) Regulations 2009 (SI No. 272 of 2009) W2: Groundwater Quality Standards and Threshold Values under Directive 2006/118/EC W3: Number of incompatible developments granted permission on lands which pose - or are likely to pose in the future - a significant flood risk
Air and climatic factors	- None – noise issues considered under population	None	C1: Percentage electricity consumption from renewable energy

Mitigation - Delineation of Wind Energy Areas	Mitigation - Integration of individual SEA and AA provisions into the text of the Strategy *Proposed developments shall demonstrate compliance with the provisions laid out below as relevant and appropriate.*
	Landslide/Bogburst susceptibility Wind energy development applications shall include a landslide/bogburst susceptibility assessment which identifies any landslide risks associated with wind farm development (including any associated improvement works or associated infrastructure). Such assessments shall take into account factors including soil types, slope, depth of soils, underlying bedrock, aspect, weather patterns, cumulative effects arising from existing and proposed developments and all phases of the proposed development. Reference should be made to, inter alia, the Geological Survey of Ireland, Report on Landslides, with relevant details to be submitted by a suitably qualified engineer.
- Exclude Freshwater Pearl Mussel Special Area of Conservation population areas.	**Water Framework Directive and associated legislation** Proposed developments shall contribute towards the protection of existing and potential water resources, and their use by humans and wildlife, including rivers, streams, wetlands, groundwater and associated habitats and species in accordance with the requirements and guidance in the EU Water Framework Directive 2000 (2000/60/EC), the European Union (Water Policy) Regulations 2003 (as amended), the European Communities Environmental Objectives (Surface Waters) Regulations 2009 (SI No. 272 of 2009), the Groundwater Directive 2006/118/EC and the European Communities Environmental Objectives (groundwater) Regulations, 2010 (S.I. No. 9 of 2010) and other relevant EU Directives, including associated national legislation and policy guidance (including any superseding versions of same). Also see measures under soil above and material assets below. **River Basin Management Plan(s)** Proposed developments shall support the implementation of the relevant recommendations and measures as outlined in the relevant River Basin Management Plan(s), as well as relevant recommendations contained in the Water Quality in Ireland 2010-2012 (EPA, 2015, and any updated/superseding document). Proposals for development shall not have an unacceptable impact on the water environment, including surface waters, groundwater quality and quantity, river corridors and associated woodlands. **Groundwater Flows and Well Water Supplies** Applications for development shall be accompanied by an assessment detailing potential impacts, mitigation and residual impacts upon groundwater flows and well water supplies.
	See all Strategy provisions

Table 2: Environmental Effects, Indicators and Mitigation and influence on Development Management of Wind Energy Contd...

Environmental Component[1]	Potentially Significant Adverse Effect, If unmitigated	Residual Non-Significant Adverse Effect	Indicators
Material Assets	- Failure to maximise use of existing infrastructure - Potential impact on road networks as result of the movement of the component parts of turbines	Residual wastes to be disposed of in line with higher level waste management policies	M1: Proportion of new wind energy developments located within areas which already accommodate turbines, sub-stations and powerlines

Mitigation - Delineation of Wind Energy Areas	Mitigation - Integration of individual SEA and AA provisions into the text of the Strategy *Proposed developments shall demonstrate compliance with the provisions laid out below as relevant and appropriate.*
Exclude areas further than 25km from transmission and distribution substations	**Equine Industry** Applications for development shall be accompanied by an assessment detailing potential impacts, mitigation and residual impacts upon the equine industry. Such assessments shall consider issues including noise and shadow flicker. **Tourism** The impact of any proposal for wind energy development on surrounding tourism and recreational related activities and the compatibility of same will be carefully considered in the assessment of any planning application. The Planning Authority will endeavour to liaise with Fáilte Ireland and regional and local tourist bodies during the assessment of planning applications for wind energy development which may impact on tourism / recreational related activities and will consider any observations received accordingly. **Construction Waste** Construction wastes arising will be managed and disposed of in a way that ensures the provisions of the Waste Management Acts and new Southern Waste Management Plan. Construction Waste Management Plans will be implemented where relevant to minimise waste and ensure correct handling and disposal of construction waste streams in accordance with the Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects, Department of the Environment, July 2006. **Waste Creation** Proposed developments shall support the minimisation of waste creation and promote a practice of reduce, reuse and recycle where possible. **Waste Disposal** Proposed developments shall safeguard the environment by seeking to ensure that residual waste is disposed of appropriately. **Construction and Environmental Management Plans** see end of this table

Table 2: Environmental Effects, Indicators and Mitigation and influence on Development Management of Wind Energy Contd...

Environmental Component[1]	Potentially Significant Adverse Effect, If unmitigated	Residual Non-Significant Adverse Effect	Indicators
Cultural Heritage	-- Potential effects on protected and unknown archaeology and protected architecture	Potential alteration to the context and setting of designated architectural and archaeological heritage however these will occur in compliance with legislation. Potential loss of unknown archaeology however this loss will be mitigated by measures integrated into the Strategy Provisions have been integrated into the WES that will contribute towards the protection of a variety of built and natural heritage sites including those at Lough Derg, the Butler Trail, Cahir, Clonmel, Carrick-on-Suir and various other cultural heritage sites including those included in Fáilte Ireland's "Ireland's Ancient East" initiative.	CH1: Percentage of entries to the Record of Monuments and Places - including Zones of Archaeological Potential (and the context of the above within the surrounding landscape where relevant) - protected from significant adverse effects arising from new development granted permission under the Strategy CH2: Percentage of entries to the Record of Protected Structures and Architectural Conservation Areas and their context protected from significant adverse effects arising from new development granted permission under the Strategy

Mitigation - Delineation of Wind Energy Areas	Mitigation - Integration of individual SEA and AA provisions into the text of the Strategy *Proposed developments shall demonstrate compliance with the provisions laid out below as relevant and appropriate.*
- Exclude Freshwater Pearl Mussel Special Area of Conservation population areas.	**Protection of Archaeological and Architectural Heritage** Proposed developments shall contribute towards: ▯ The protection and sympathetic enhancement of archaeological heritage, in particular by implementing the relevant provisions of the Planning and Development Act 2000 (as amended) and the National Monuments Act, 1930 (as amended). ▯ The protection of archaeological sites and monuments and their settings, archaeological objects and underwater archaeological sites that are listed in the Record of Monuments and Places, in the ownership/guardianship of the State, or that are subject of Preservation Orders or have been registered in the Register of Historic Monuments. Contribute, as appropriate, towards the protection and preservation of archaeological sites, which have been identified subsequent to the publication of the Record of Monuments and Places. ▯ The protection of architectural heritage by complying, as appropriate, with the legislative provisions of the Planning and Development Act 2000 (as amended) in relation to architectural heritage and the policy guidance contained in the Architectural Heritage Protection Guidelines 2011 (and any updated/superseding document). ▯ The protection and preservation of underwater archaeological sites. **Archaeological and Architectural Heritage Surveys and Assessments** Wind energy developments should be sited so as not to have a visual or physical impact on archaeological (known and unknown) and architectural heritage. Detailed archaeological and architectural surveys and assessments should be submitted with each application for development demonstrating potential impacts, mitigation and residual impacts. Applicants shall consult with the National Monuments Service of the Department of Arts Heritage and the Gaeltacht in relation to proposed developments adjoining archaeological sites or where the context of archaeological heritage will be potentially affected. Such surveys and assessments shall take into account cumulative effects and consider cross-County border impacts such as those which might occur along the County Tipperary and County Kilkenny borders - with particular reference to those areas around Slievenamon and the Lingaun River Valley – including Rathclarish, Ahenny, Kilcash (in County Tipperary) and Kilkieran, Knockroe and Killamery (in County Kilkenny).

Table 2: Environmental Effects, Indicators and Mitigation and influence on Development Management of Wind Energy Contd...

Environmental Component[1]	Potentially Significant Adverse Effect, If unmitigated	Residual Non-Significant Adverse Effect	Indicators
Landscape	- Occurrence of adverse visual impacts and conflicts with the appropriate protection of statutory designations relating to the landscape	Residual visual effects in landscapes outside of those which are sensitive	L1: Number of complaints received from statutory consultees regarding avoidable adverse visual impacts on the landscape resulting from development which is granted permission under the Strategy
All – see above			

Mitigation - Delineation of Wind Energy Areas	Mitigation - Integration of individual SEA and AA provisions into the text of the Strategy *Proposed developments shall demonstrate compliance with the provisions laid out below as relevant and appropriate.*
-Exclude Sensitive Landscapes	**Visual Impact Assessment** Applications for development shall be accompanied by an assessment of potential visual impacts, mitigation and residual visual impacts of wind turbines and any associated improvement works or associated infrastructure. Such surveys and assessments shall take into account cumulative effects and consider cross-County border visual impacts, including impacts on landscape designations. Protected views shall also be taken into account by such assessments.
	Environmental Impact Assessment (EIA) It is the policy of the Council to require wind energy development to be accompanied by an Environmental Impact Assessment (EIA) in compliance with Government legislation, policy or guidelines which pertain at time of consideration of the planning application. The Council may, if it is considered necessary, require the preparation of an environmental assessment for sub-threshold development. Note: the current requirement under the Planning and Development Regulations is that an EIA is required for the development of installations for the harnessing of wind power for energy production with more than 5 turbines or having a total output greater than 5 megawatts.
	Construction and Environmental Management Plans Construction Environment Management Plans (CEMPs) shall be prepared in advance of the construction of larger projects and implemented throughout. Such plans shall incorporate relevant mitigation measures which have been integrated into the Strategy and any lower tier Environmental Impact Statement or Appropriate Assessment. CEMPs typically provide details of intended construction practice for the proposed development, including: ▯ location of the sites and materials compound(s) including area(s) identified for the storage of construction refuse, ▯ location of areas for construction site offices and staff facilities, ▯ details of site security fencing and hoardings, ▯ details of on-site car parking facilities for site workers during the course of construction, ▯ details of the timing and routing of construction traffic to and from the construction site and associated directional signage, ▯ measures to obviate queuing of construction traffic on the adjoining road network, ▯ measures to prevent the spillage or deposit of clay, rubble or other debris, ▯ alternative arrangements to be put in place for pedestrians and vehicles in the case of the closure of any public right of way during the course of site development works,

Table 2: Environmental Effects, Indicators and Mitigation and influence on Development Management of Wind Energy Contd...

Environmental Component[1]	Potentially Significant Adverse Effect, If unmitigated	Residual Non-Significant Adverse Effect	Indicators
All – see above			

Mitigation - Delineation of Wind Energy Areas	**Mitigation - Integration of individual SEA and AA provisions into the text of the Strategy** *Proposed developments shall demonstrate compliance with the provisions laid out below as relevant and appropriate.*
	▯ details of appropriate mitigation measures for noise, dust and vibration, and monitoring of such levels, ▯ containment of all construction-related fuel and oil within specially constructed bunds to ensure that fuel spillages are fully contained; such bunds shall be roofed to exclude rainwater, ▯ disposal of construction/demolition waste and details of how it is proposed to manage excavated soil, ▯ a water and sediment management plan, providing for means to ensure that surface water runoff is controlled such that no silt or other pollutants enter local water courses or drains, ▯ details of a water quality monitoring and sampling plan. ▯ if peat is encountered - a peat storage, handling and reinstatement management plan. ▯ measures adopted during construction to prevent the spread of invasive species (such as Japanese Knotweed). ▯ appointment of an ecological clerk of works at site investigation, preparation and construction phases.
	Maintenance and Decommissioning Planning applications should address maintenance and decommissioning issues and associated impacts.

Table 2: Environmental Effects, Indicators and Mitigation and influence on Development Management of Wind Energy Contd...

Comhairle Contae Thiobraid Árann
Tipperary County Council

TIPPERARY energy AGENCY

Tipperary Wind Energy Strategy 2016

Appendix 2: Maps

North Tipperary County
Development Plan 2010 Area (as varied)

South Tipperary County
Development Plan 2009 (as varied)

GALWAY
OFFALY
LAOIS
CLARE
KILKENNY
LIMERICK
CORK
WATERFORD

N
W
E
S

0 5 10 15 20
Kilometers

Map 1 Previous Wind Energy Policy Areas & Planning Applications

Legend

Wind Energy Planning Applications (Tipperary County Council and within 5km Buffer of Adjoining Counties)

- Granted, Constructed
- Granted, Not Constructed
- Granted, Not Constructed, Expired
- Application Under Consideration
- Refused
- 10Km Buffer of Tipperary County Boundary

Standardised Wind Energy Policy Areas

- Preferred Area
- Area Open for Consideration
- Areas Unsuitable

North Tipperary County
Development Plan 2010 Area (as varied)

South Tipperary County
Development Plan 2009 (as varied)

GALWAY
OFFALY
LAOIS
KILKENNY
CLARE
LIMERICK
CORK
WATERFORD
TIPPERARY

1 Submission(s) from Nenagh
2 Submission(s) from Borrisoleigh
1 Submission(s) from Currabaha
1 Submission(s) from Grousehall
1 Submission(s) from Thurles
1 Submission(s) from Longford Pass
1 Submission(s) from Two Mile Borris
1 Submission(s) from Slieveardagh
18 Submission(s) from Co.Tipperary with no Specific Location
1 Submission(s) from Cappawhite
2 Submission(s) from Killenaule
1 Submission(s) from Knockroe
57 Submission(s) from Faugheen
23 Submission(s) from Ahenny
2 Submission(s) from Kilmacoliver
1 Submission(s) from Poulrone
3 Submission(s) from Suir Valley
3 Submission(s) from Birc
1 Submission(s) from Ballypatrick
1 Submission(s) from Knockglass
1 Submission(s) from Clonmel
2 Submission(s) from Lisadobber
2 Submission(s) from Carrick-on-Suir
22 Submission(s) from Ballyneale
1 Submission(s) from Ballinurra
1 Submission(s) from Ballyrichard
1 Submission(s) from Newtown
6 Submissi fromNation Regional B
1 Submission(s)from Co.Kilk with no Specific Location

N

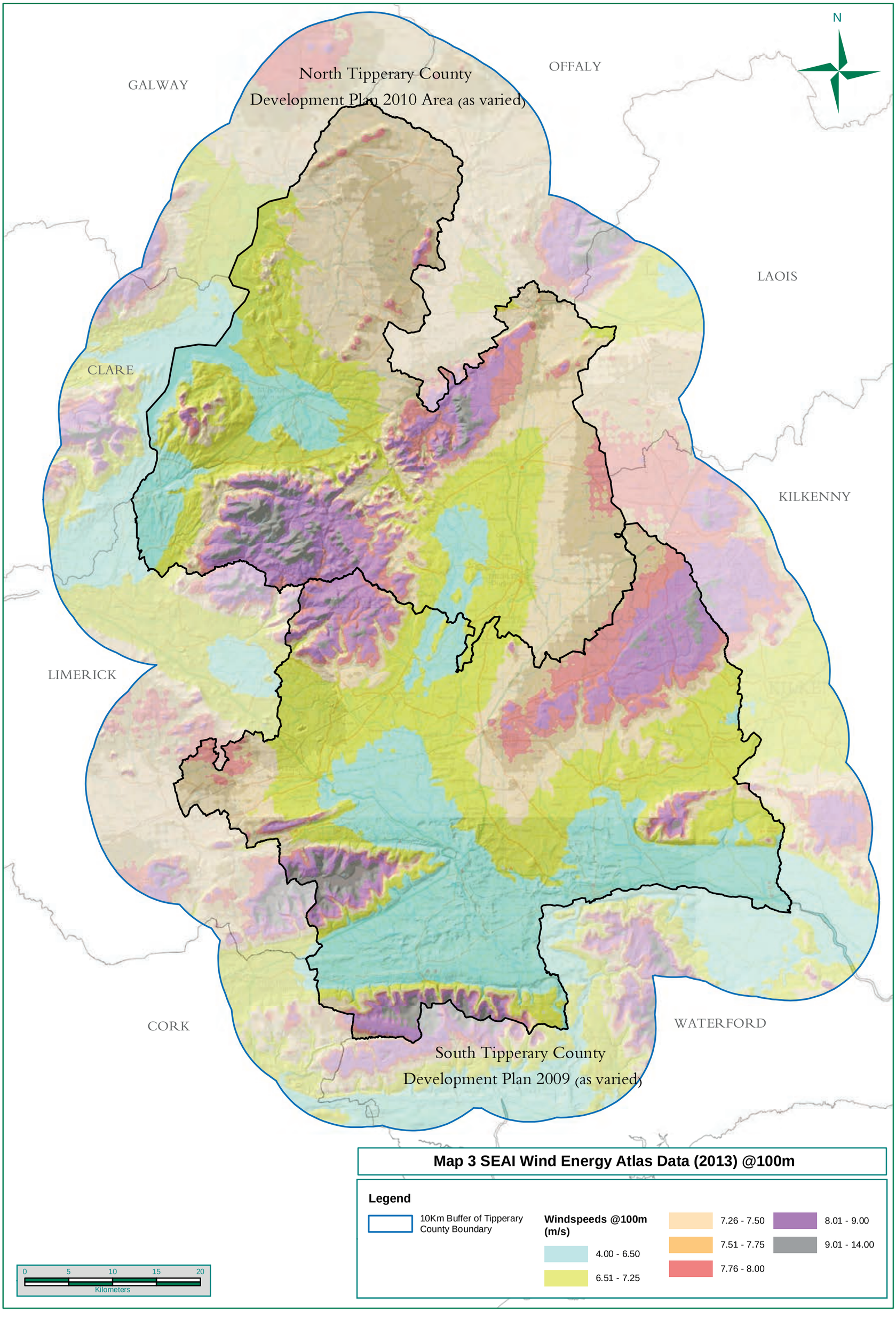
0 5 10 15 20
Kilometers

Map 2 Distribution of Pre-Draft Submissions

Legend

Distribution of Submissions
- 1 - 2
- 3 - 6
- 16 - 23
- 24 - 57
- 10Km Buffer of Tipperary County Boundary

Tipperary County Council Wind Energy Planning Application Data
- Granted, Not Constructed
- Granted, Constructed
- Application Under Consideration


N
North Tipperary County
Development Plan 2010 Area (as varied)
South Tipperary County
Development Plan 2009 (as varied)
GALWAY
OFFALY
LAOIS
CLARE
KILKENNY
LIMERICK
CORK
WATERFORD
0 5 10 15 20
Kilometers
Map 3 SEAI Wind Energy Atlas Data (2013) @100m
Legend
10Km Buffer of Tipperary County Boundary
Windspeeds @100m (m/s)
4.00 - 6.50
6.51 - 7.25
7.26 - 7.50
7.51 - 7.75
7.76 - 8.00
8.01 - 9.00
9.01 - 14.00

North Tipperary County
Development Plan 2010 Area (as varied)

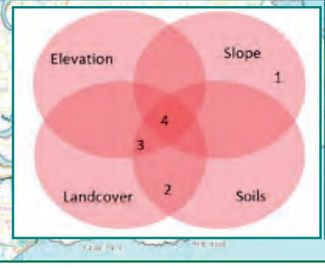
South Tipperary County
Development Plan 2009 (as varied)

GALWAY
OFFALY
LAOIS
CLARE
KILKENNY
LIMERICK
CORK
WATERFORD

N

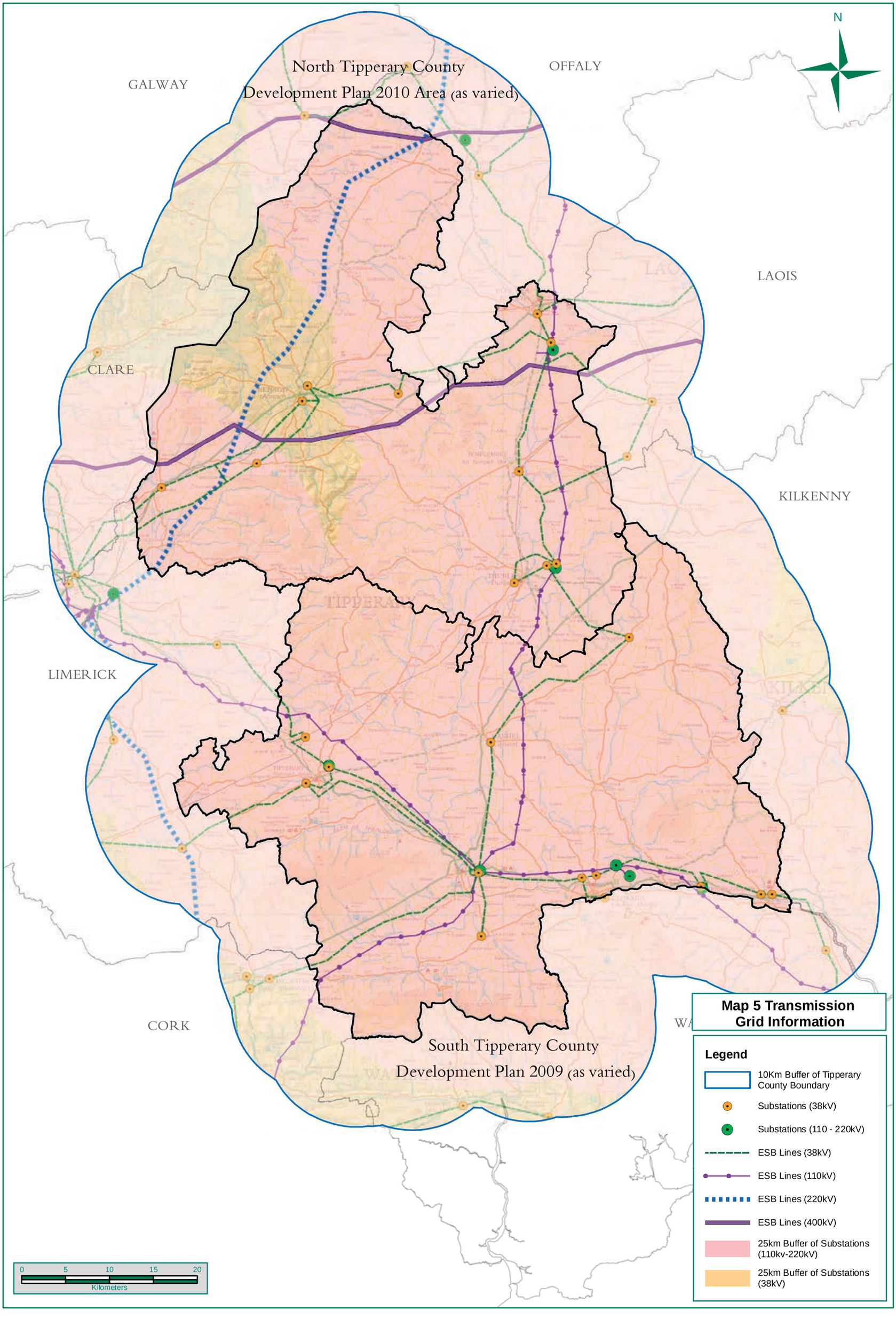
0 5 10 15 20
Kilometers

Map 4 Quantitative Landscape Sensitivity Analysis



Legend

- 10Km Buffer of Tipperary County Boundary
- Primary Amenity
- Soils Restricted to: Acid Shallow Well Drained Mineral, Blanket Bog, Cutover Peat, Lacustrine and Scree
- Selected Land Cover Classes (based on CORINE 2012)
- Slope Greater than or Equal to 15 Degrees
- Elevation Greater than 200m


N
North Tipperary County
Development Plan 2010 Area (as varied)
South Tipperary County
Development Plan 2009 (as varied)
GALWAY
OFFALY
LAOIS
CLARE
KILKENNY
LIMERICK
CORK
0 5 10 15 20
Kilometers
Map 5 Transmission Grid Information
Legend
10Km Buffer of Tipperary County Boundary
Substations (38kV)
Substations (110 - 220kV)
ESB Lines (38kV)
ESB Lines (110kV)
ESB Lines (220kV)
ESB Lines (400kV)
25km Buffer of Substations (110kv-220kV)
25km Buffer of Substations (38kV)

North Tipperary County
Development Plan 2010 Area (as varied)

South Tipperary County
Development Plan 2009 (as varied)

N

GALWAY
OFFALY
LAOIS
CLARE
KILKENNY
LIMERICK
CORK
WATERFORD

Banagher
Portumna
Birr
Birr Env.
Roscrea
Nenagh
Rathdowney
Ballina
Killaloe
Templemore
Ardnacrusha (Castlebank)
Castleconnell
Limerick City
Newport
Thurles
Annacotty
Callan
Cashel
Fethard
Tipperary
Cahir
Carrick-on-Suir
Clonmel
Mooncoin
Portlaw
Mitchelstown
Lismore

0 5 10 15 20
Kilometers

Map 6 Population Density and Settlement Patterns

Legend

- 10Km Buffer of Tipperary County Boundary
- Urban Areas (CSO Towns and Villages)
- 1km Buffer from Urban Areas
- Residential Properites

CSO Population Density Grid (1km2)

- 0 - 50
- 51 - 100
- 101 - 250
- 251 - 500
- 501 - 1000
- 1001 - 1500
- 1501 - 2000
- 2001 - 3000
- 3001 - 4000
- 4001 - 5000

North Tipperary County
Development Plan 2010 Area (as varied)

South Tipperary County
Development Plan 2009 (as varied)

GALWAY
OFFALY
LAOIS
CLARE
KILKENNY
LIMERICK
CORK
WATERFORD
TIPPERARY

Birr
Roscrea
Nenagh
Ballina
Templemore
Newport
Thurles
Cashel
Fethard
Tipperary
Cahir
Clonmel
Carrick-On-Suir

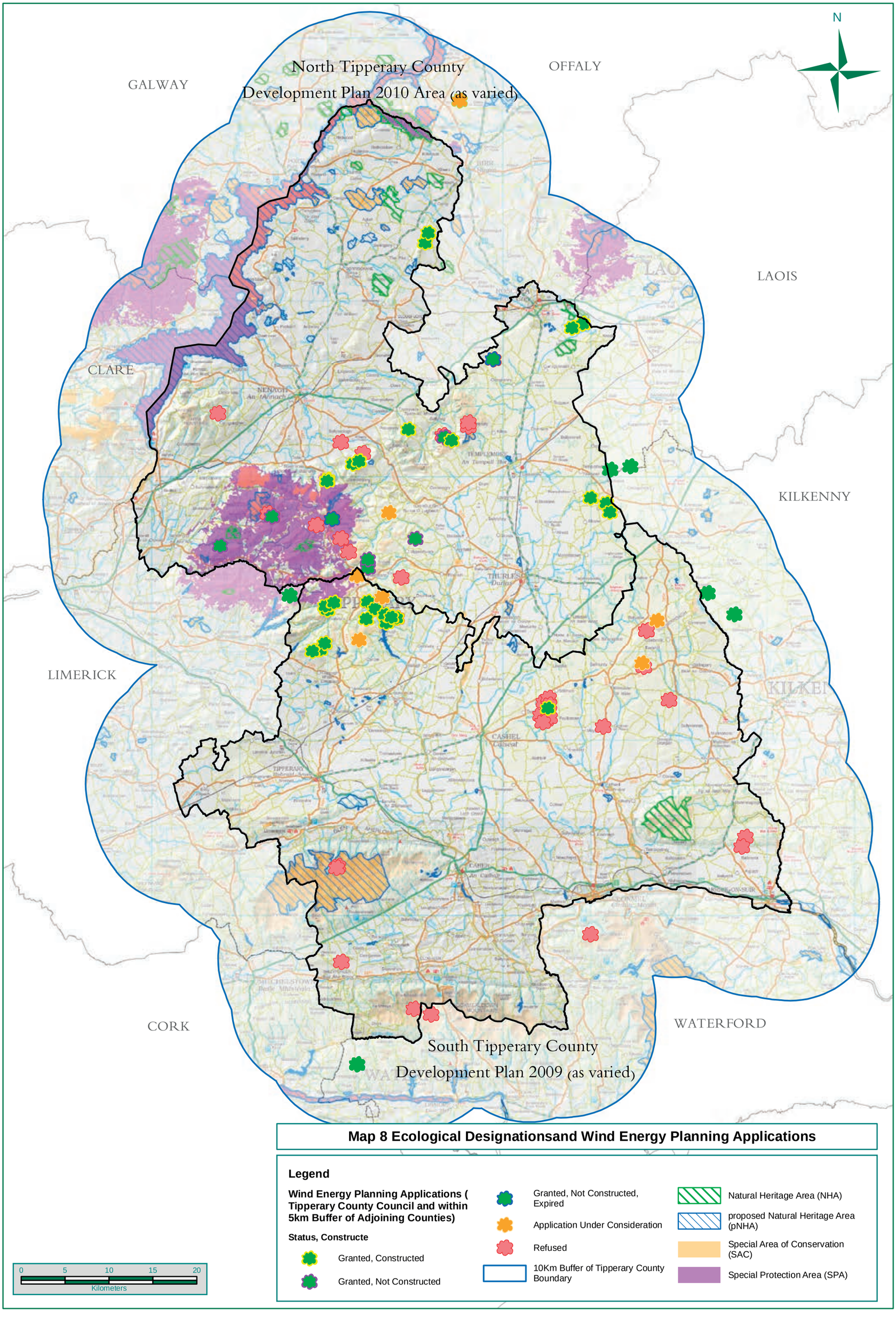
N

0 5 10 15 20
Kilometers

Map 7 Landslide Incidence and Peat Soils

Legend

- Historic Landslide Incidence Database (GSI)
- 10Km Buffer of Tipperary County Boundary
- Settlements (population > 1000)
- Peat Soils
- Peat-based Quaternary Sediments



Map 8 Ecological Designationsand Wind Energy Planning Applications

Legend

Wind Energy Planning Applications (Tipperary County Council and within 5km Buffer of Adjoining Counties)

Status, Constructe

- Granted, Constructed
- Granted, Not Constructed
- Granted, Not Constructed, Expired
- Application Under Consideration
- Refused
- 10Km Buffer of Tipperary County Boundary
- Natural Heritage Area (NHA)
- proposed Natural Heritage Area (pNHA)
- Special Area of Conservation (SAC)
- Special Protection Area (SPA)

North Tipperary County
Development Plan 2010 Area (as varied)

South Tipperary County
Development Plan 2009 (as varied)

GALWAY
OFFALY
LAOIS
KILKENNY
CLARE
TIPPERARY
LIMERICK
CORK
WATERFORD

Birr
Roscrea
Nenagh
Ballina
Templemore
Newport
Thurles
Cashel
Fethard
Tipperary
Cahir
Clonmel
Carrick-On-Suir

N

0 5 10 15 20
Kilometers

Map 9 Cultural Heritage

Legend

- Record of Protected Structures (RPS)
- National Inventory of Architectural Heritage (NIAH)
- Architectural Conservation Areas (ACA)
- 10Km Buffer of Tipperary County Boundary
- Settlements (population > 1000)

N

North Tipperary County
Development Plan 2010 Area (as varied)

GALWAY

OFFALY

LAOIS

KILKENNY

WATERFORD

CLARE

LIMERICK

CORK

Shannon - Woodford

Shannon - Graney / Scariff

Nore Upper

Nore Middle

Nore Lower

Suir - Clodiagh Tipperary

Suir - Multeen

Suir

Suir - Aherlow

Suir - Tar

Suir - Thonoge

Suir - Clodiagh Waterford

Mahon

Munster Blackwater

South Tipperary County
Development Plan 2009 (as varied)

Map 10 Water Framework Directive - Protected Surface Water Areas (Salmonid & Nutrient Sensitive Rivers & Freshwater Pearl Mussel Catchments)

Legend

- 10Km Buffer of Tipperary County Boundary
- Salmonid Rivers
- Nutrient Sensitive Rivers

Freshwater Pearl Mussel (Margaritifera) Catchments

- Catchments of SAC populations listed in S.I. 296 of 2009
- Catchments of other extant populations
- Catchments with previous records of Margaritifera, but current status unknown

0 5 10 15 20
Kilometers

North Tipperary County Development Plan 2010 Area (as varied)

GALWAY

OFFALY

LAOIS

CLARE

KILKENNY

LIMERICK

WATERFORD

CORK

South Tipperary County Development Plan 2009 (as varied)

N

0 5 10
Kilometers

Map 11 Wind Energy Policy Areas

Legend

- South Tipperary County Development Plan Area 2009 (as varied)
- North Tipperary County Development Plan Area 2010 (as varied)
- 10Km Buffer of Tipperary County Boundary
- Areas Unsuitable for New Wind Energy Development
- Areas Open for Consideration for New Wind Energy Development

Comhairle Contae Thiobraid Árann
Tipperary County Council

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