

Bridgend Local Development Plan

2006-2021

Cyngor Bwrdeistref Sirol



Renewable Energy Assessment

February 2011

Bridgend Local Development Plan 2006 – 2021

Renewable Energy Assessment

February 2011

**Development Planning
Regeneration and Development
Communities Directorate
Bridgend County Borough Council
Angel Street, Bridgend
CF31 4WB**

The text of this document draws largely on the *Pilot Study – Pembrokeshire County Council Renewable Energy Assessment*, July 2010, which was produced by AECOM for the Welsh Assembly Government as part of the *Planning for Renewable and Low Carbon Energy – A Toolkit for Planners* project.

This contribution is acknowledged; however all evidence, data sources and target information, for the REA are relevant to Bridgend County Borough and have been produced by Bridgend County Borough in this regard to inform the Bridgend Local Development Plan.

Contents	3
Executive Summary	5
1. Introduction	7
Background and Purpose of the Renewable Energy Assessment Planning Policy Wider Corporate Role Scope of the Renewable Energy Assessment Explanation of energy terms	
2. Policy Context and Drivers for Renewable Energy	13
Introduction UK and European Policy Context Wales Policy Context for Planning and Renewable Energy Wales Wider Policy Context Other UK Drivers for Renewable Energy	
3. How to Use this Renewable Energy Assessment	18
Structure of the Renewable Energy Assessment Who as developed this REA?	
4. Bridgend County Borough Area Wide Renewable Energy Assessment	19
Calculating existing and future energy baseline Existing and proposed LZX energy technologies Wind Energy Resource Wind Farm Potential and SSAs Biomass Energy Resource Energy from Waste Anaerobic Digestion Hydropower Energy Resource	
5. Buildings Integrated Renewable Uptake Assessment	33
Introduction to BIR Modelling BIR – Overview	
6. Assessment Summary	37
Resource Summary Tables Additional Contributions from Bridgend County Borough LDP Policy Foramation	

Appendices

Appendix 1 – Notes from Internal Officer Workshop – 22nd December 2010

Executive Summary

The One Wales document sets out the Welsh Assembly's commitment to tackling climate change which include achieving annual carbon reduction-equivalent emissions reductions of 3% per year by 2011 in areas of devolved competence. The Assembly Government resolves that all will play the fullest part in reducing CO₂ emissions and is committed to developing a comprehensive energy strategy and a renewable energy route map to ensure understanding of what "playing a full part" will mean.

Considerable responsibility for delivery of a low carbon Bridgend County Borough rests with the various departments within the County Borough Council, with key roles in planning, waste management, land-ownership and energy procurement. Acknowledging this responsibility, a county borough-wide Renewable Energy Assessment (REA) has been prepared to assess the potential of the Bridgend County Borough area to contribute to national greenhouse gas emission reduction targets.

Bridgend County Borough Council is currently preparing its Local Development Plan (LDP). Changes to legislation require all local planning authorities to produce REAs as part of their wider evidence base in support of LDPs.

Renewable Energy Assessments will vary between local authorities dependent upon issues such as geography, land availability and also the priorities given by councils and communities to various policy objectives. This REA provides the results of a robust exercise, following the Welsh Assembly Government's Renewable Energy Assessment Toolkit for Planners, to establish the potential for renewable energy in the County Borough that would support a selection of policy objectives: many of which could also be addressed through corporate action.

The methodology used in the report follows the step-by-step guide contained in the 'toolkit' and calculates the potential renewable energy resource from the following sources: wind; wood fuel and energy crops (biomass); energy from waste; anaerobic digestion – (animal manure, food waste, poultry litter and sewage sludge); and hydropower. It also estimates Buildings Integrated Renewables (BIR) uptake.

It is noted that for Bridgend, the percentage of renewable electricity generation greatly exceeds the UK-wide target. However heat demand potentially met by renewable energy sources is substantially below the 12% target. LDP policies could therefore be formulated to encourage investigation and implementation of renewable energy generation by prospective developers on future development sites. This will need to be balanced against the cost of implementing such schemes and the impact on development viability this will bring.

Delivering some of the potential identified in this REA is likely to require considerable cooperation between the Council and other public sector bodies, and between public and private sector. The greatest challenge to this cooperation may arise in attempting to reduce the carbon emissions of existing

building stock, potentially though linking to Heat Networks or larger scale renewable electricity generating technologies.

The public sector, tasked with a leadership role, should be pro-active in identifying cost effective approaches to contributing to meeting targets and facilitating the success of others. Bridgend County Borough Council, through this REA, is fulfilling this role in identifying some of these potential opportunities within its area.

1. Introduction

Background and Purpose of the Renewable Energy Assessment

- 1.1 The Welsh Assembly Government, through its Climate Change Strategy has resolved that all will play the fullest possible part in meeting statutory UK and EU targets on greenhouse gas emission reduction.
- 1.2 Climate change and energy security are key priorities of both the UK and Welsh Assembly Governments. The use of fossil fuels is seen as a major contributor to greenhouse gas emissions, a major cause of global climate change and moving towards a low carbon energy based economy to tackle the causes of climate change and improve energy security are a Government priority. The generation and use of renewable and low carbon energy sources has a key role to play in this and the UK Government is committed to meeting the EU target of 15 percent of energy from renewable sources by 2020. Modelling undertaken by the UK Department for Energy and Climate Change (DECC) suggests that by 2020, this could mean:
- More than 30% electricity generated to come from renewable energy sources
 - 12% of our heat generated from renewable energy sources
 - 10% of transport energy from renewable energy sources

The Climate Change Act 2008 introduces a legally binding target of at least a 34 percent cut in greenhouse gas emissions by 2020, and at least an 80 percent cut by 2050, against a 1990 baseline.

- 1.3 In terms of the land use planning system the Assembly Government has produced policy guidance in Planning Policy Wales and the associated Technical Advice Note 8 on renewable energy. In its “One Wales” commitments the Assembly Government has stated that “following the production of the Energy Route Map and an Energy Strategy, it will review TAN 8, revising upwards the targets from renewable energy, drawn from a variety of sources”.
- 1.4 Local Authorities have several key roles to play that can facilitate the use and generation of renewable and low carbon energy. These include:
1. Developing Planning – preparing planning policies (including Supplementary Planning Guidance) and allocating land in their Local Development Plans (LDPs)
 2. Development management – taking decisions on planning applications submitted to the local planning authority for development; as well as preparing Local Impact Assessments for schemes which are determined by the Infrastructure Planning Commission

3. Corporate – taking action at a council wide level to achieve a low carbon economy.
4. Leadership – taking forward wider community action and communicating the need to increase the uptake of renewable energy.
- 1.5 This REA has been prepared by Bridgend County Borough to inform the first of these. This REA constitutes an evidence base to underpin LDP policies that can support and facilitate the deployment of renewable and low carbon energy systems.
- 1.6 **The REA consists of an assessment of the potential for renewable and low carbon energy generation at the County Borough scale. It does not assess the potential for generation for individual sites.**
- 1.7 In terms of development management, this REA, in the case of wind developments, can assist officers in understanding why a developer has chosen a particular location to develop a scheme.
- 1.8 However, as well as supporting the Council with the LDP, the intention is that the renewable energy opportunities identified will also be useful in assisting local authorities to fulfil the third and fourth roles identified above.

Planning Policy

- 1.9 This Renewable Energy Assessment can assist Bridgend County Borough Council to deliver national planning policy expectations as set out in Planning Policy Wales, namely the requirement that “*local planning authorities [LPA’s] should undertake an assessment of the potential for all renewable energy resources, renewable energy technologies, energy efficiency, and conservation measures, and to include appropriate policies in LDPs*”.
- 1.10 In order to achieve higher standards, it is highly likely that at some point some form of renewable or low carbon energy generation will be required: this REA has employed the method detailed in ‘Renewable Energy: A Toolkit for Planners’ for identifying and assessing potential.

Wider Corporate Role

- 1.11 In terms of wider roles, all local authorities including Bridgend County Borough Council have objectives or requirements in relation to tackling climate change that they need to meet. This REA enables the Council to identify specific opportunities for taking forward renewable and low carbon energy generation.

Scope of the Renewable Energy Assessment

Planning

- 1.12 The REA focuses on planning policy, rather than development management. As explained above, this assessment has been developed primarily for Bridgend County Borough Council, as an evidence base to support renewable and low carbon energy policies in the LDP.
- 1.13 The spatial elements of this REA are not intended for use by development management officers to assess individual planning applications for either strategic new development sites that are incorporating renewable energy, or for stand-alone renewable energy generating systems. However it may be used to inform an assessment of need for these facilities.

Technology

- 1.14 This Assessment is not meant to be an exhaustive guide to the different renewable and low carbon energy technologies that are available. Technical Advice Note 8 provides an introduction to a range of renewable and low carbon technologies and should be first point of reference. Others include The Department for Energy and Climate Change and the Energy Saving Trust

Energy Hierarchy

- 1.15 The REA focuses on renewable and low carbon energy generation, and the opportunities for promoting this through the Local Development Plan (LDP), rather than on improving energy efficiency in new or existing buildings. It is not covered in this REA, partly to keep the document to a manageable size, but also because there is only a limited amount, if anything, that planning policy for new developments can contribute in this area, over and above the existing sustainable buildings standards in Wales, and future changes to part L of the Building Regulations.

Transport

- 1.16 The REA covers the potential for generating renewable electricity or heat (for use in buildings or processes) but does not include an assessment of the potential for renewable or low carbon fuels for transport.

On-shore

- 1.17 Potential has only been assessed for on-shore renewable energy. It does not cover the potential for offshore renewable energy, such as wave, offshore wind and tidal. This is because, apart from the cable footfall onshore, offshore renewable energy schemes / projects are not within the planning jurisdiction of local planning authorities, but are the responsibility of the Crown Estate.

Large Scale On-shore Wind

- 1.18 The REA is not intended to duplicate the analysis carried out in TAN 8, which identified Strategic Search Areas (SSAs) for large scale on-shore wind power, nor the subsequent refinement exercise carried out by Arup. Rather, in the case of wind power, it has identified smaller scale opportunities. The relationship between these is outlined further in the appropriate section.

Policy Wording

- 1.19 The REA provides an evidence base to support relevant policies for potential inclusion in the LDP, rather than giving detailed guidance on how policies should be worded. The latter is the role of the *Planning Policy Wales* and supporting guidance in TAN 8.

Defining Renewable Energy and Low Carbon Energy

Renewable Energy

- 1.20 There are many definitions of renewable energy. The definition employed in paragraph 12.8.7 of Planning Policy Wales is as follows:

“Renewable energy is the term used to cover those sources of energy, other than fossil fuels or nuclear fuel, which are continuously and sustainably available in our environment. This includes wind, water, solar, geothermal energy and plant material often referred to as biomass.”

- 1.21 Important characteristic of renewable energy, which will be explained in more detail below, is that unlike fossil fuels, it produces little or no **net** carbon dioxide [CO₂] – which is one of the main greenhouse gases.
- 1.22 Most forms of renewable energy stem directly or indirectly from the sun. The direct ones include, obviously, solar water heating, and photovoltaic. This also includes ground source and air source heat pumps, which make use of solar energy stored in the ground. The indirect forms are: wind power, as wind is caused by differential warming of the earth’s surface by the sun; hydropower, as rainfall is driven by the sun causing evaporation of the oceans; and biomass energy [from burning organic matter], as all plants photosynthesise sunlight in order to fix carbon and grow.
- 1.23 The combustion of biomass fuel is carbon neutral, because although the combustion releases CO₂, the same amount of CO₂ was taken out of the atmosphere when the biomass was growing. Research informing Planning Policy Wales confirms *“Biomass is generally regarded as fuel [other than fossil fuel], at least 98 per cent of the energy content of which is derived organically from plant or animal matter. This includes agricultural, forestry or wood waste or residues, sewage and energy crops”*.

- 1.24 The other two forms of renewable energy are tidal power, which relies on the gravitational pull of both the sun and the moon, and geothermal energy, which taps into the heat generated in the Earth's core.
- 1.25 Of all these, perhaps the most complex and multi-faceted is biomass energy, as it can take so many forms. It can include: burning of forestry residues and crops (especially miscanthus) ; anaerobic digestion of animal manures and food wastes; combustion of straw and other agricultural residues and products. It also includes the methane produced from the anaerobic digestion of biodegradable matter in landfill sites [i.e. landfill gas], as well as any energy generated from the biodegradable element of waste going into an energy from waste plant.
- 1.26 This REA does not cover the resource for all renewable energy options. It is focused on onshore renewable energy options only. It also does not cover renewable energy options that are unlikely to be generally accessible at a local authority level such as geothermal energy, or tidal barrages. It covers the renewable energy technologies [considering both electricity and heat] outlined in Table 1.1 below.

<p>Wind energy On-shore wind and community scale development</p>
<p>Biomass energy Forestry residues, bio-crops (miscanthus), short rotation coppice and straw</p>
<p>Energy from Waste Waste wood; municipal waste; and industrial and commercial waste</p>
<p>Centralised Anaerobic Digestion Food waste; agricultural wastes; and sewage sludge</p>
<p>Hydropower energy</p>
<p>Building Integrated Renewables [BIR], Biomass boilers; air and ground source heat pumps, solar power (photovoltaics); small and micro wind power.</p>

Table 1.1: Renewable energy technologies covered by the REA

Low Carbon Energy Options

- 1.27 Low carbon energy options cover a range of energy sources that are not renewable (and therefore not covered by this assessment), but can still produce less carbon than use of the conventional electricity grid or gas network, and are therefore considered an important part of decarbonising the energy supply. These options include:

- Waste heat, e.g. from power stations, or industrial processes;
- Gas engine or gas turbine Combined Heat and Power [CHP], or fuel cell CHP, where the heat is usefully used; and
- The non-biodegradable fraction of the output from energy from waste plants

Explanation of Energy Terms

Power vs. Energy Output

- 1.28 In the context of this Renewable Energy Assessment, power is measured in either kiloWatts [kW], or MegaWatts [MW], which is a thousand kW, or gigaWatts [GW], which is a thousand MW. A terawatt (TW) is a thousand GW. It is a measure of the electricity or heat output being generated [or used] at any given moment in time. The maximum output of a generator, when it is running at full power, is referred to as its installed capacity or rated power output.
- 1.29 Energy, on the other hand, is the product of power and time. It has the units of kWh [the h stands for “hour”] or MWh, or GWh. As an example, if a 2MW wind turbine ran at full power for 1 hour, it would have generated $2 \times 1 = 2\text{MWh}$ of energy. If it ran at full power for one day [24 hours], it would have generated $2 \times 24 = 48\text{MWh}$.
- 1.30 This distinction is important, because in carrying out the renewable energy resource assessment, certain assumptions have been made to calculate both the potential installed capacity [or maximum power output] of different technologies, as well as the potential annual energy output.

Electricity vs. Heat Output

- 1.31 In terms of the units used, to avoid confusion, it can be important to distinguish between whether a generator is producing electricity or heat. This is because some renewable energy fuels [i.e. biomass] can be used to produce either heat only, or power and heat simultaneously when used in a Combined Heat & Power [CHP] plant.
- 1.32 It is also important to be able to distinguish between renewable electricity targets and renewable heat targets. To do this, the suffix “e” is added in this toolkit to denote electricity power or energy output, e.g. MWe, or MWhe, whilst for heat, the suffix “t” is used [for “thermal”], to denote heat output, e.g. MWt, or MWht

2. Policy context and drivers for renewable energy

Introduction

2.1 In 'One Wales', the programme for government, the Welsh Assembly Government set out a commitment to reduce greenhouse gas emissions in Wales, with an aim to achieve annual carbon reduction-equivalent emission reductions of 3% per year by 2011 in areas of devolved competence, including actions on diversified renewable energy generation. The Assembly Government has reiterated the recognition that climate change is the greatest threat facing humanity and is committed to ensuring that Wales plays a full part in meeting the challenges which this presents.

2.2 The Assembly Government has a legal obligation to promote Sustainable Development and has embarked on an ambitious and long-term programme of cross cutting policy initiatives to address these issues. This is contained in *One Wales: One Planet* [2009] which sets out a vision where within the lifetime of a generation we want to see Wales using only its fair share of the earth's resources. Renewable energy plays an integral part in achieving this vision. The Climate Change Strategy set out a vision for Wales in 2050. Within this vision it states

"The energy intensity of society has decreased significantly. There has been a consistent drop in energy and water demand. There has been a major increase in renewable energy generation, offshore and onshore"

2.3 Moving towards a low carbon energy based economy is a national priority. The UK Government is committed to meeting the EU target of 15 percent of energy from renewable sources by 2020, and the Welsh Assembly Government will deliver its fair share towards these targets as set out in the Climate Change Strategy.

UK and European Policy Context

2.4 EU Renewable Energy Directive: The UK has signed up to the Directive, agreeing to legally binding targets of 15% of energy from renewable sources by 2020. Modelling undertaken on behalf of the Department for Energy and Climate Change suggests that by 2020, this could mean:

- More than 30% of our electricity generated from renewable energy sources
- 12% of our heat generated from renewable energy sources
- 10% of transport energy from renewable energy sources

2.5 The UK Renewable Energy Strategy [2009] sets out how the UK will increase the use of renewable electricity, heat and transport to meet this target and address the urgent challenges of climate change and national security of energy supply

Wales Policy Context for Planning and Renewable Energy

- 2.6 Planning's wider role in shaping places with lower carbon emissions and resilience to climate change is set out in Planning Policy Wales. The Assembly Government has revised Planning Policy Wales and Technical Advice Note [TAN] 8 on renewable energy. In its "One Wales" commitments the Welsh Assembly Government has stated that "following the production of the Energy Route Map and an Energy Strategy it will review TAN 8, revising upwards the targets from renewable energy, drawn from a variety of sources".
- 2.7 In September 2009 changes were made to 'permitted development' rights to make provision for the installation of certain types of micro-generation by householders without the need for planning permission, namely solar photovoltaic and solar thermal panels, ground and water source heat pumps and flues for biomass heating.
- 2.8 The Assembly Government will be consulting on further proposals on the appropriate extension of the permitted development rights in relation to micro-generation, which should encourage greater domestic and non-domestic take-up of these technologies.
- 2.9 The Planning and Energy Act, 2008, enables local planning authorities in Wales to set reasonable requirements in the LDP for the generation of energy from local renewable sources and low carbon energy and for energy efficiency. The Act is complemented by the policies contained in PPW that cover such issues and provides a legal basis for the implementation of LDP policies against the national framework.

Wales Wider Policy Context

The Renewable Energy Route Map for Wales

- 2.10 The Renewable Energy Route Map for Wales sets out proposals for moving Wales towards self-sufficiency in renewable electricity in a generation whilst at the same time driving towards increased energy efficiency and a greater level of heating requirements being supplied from renewable sources. The route map envisages that micro-generation and other small scale technologies can play a significant role in delivering these proposals, as supported by the Micro-generation Action Plan for Wales [2007]. This is supported by the actions in One Wales: One Planet and the Climate Change Strategy to remove barriers to the installation of micro-generation.

Wales Low Carbon Energy Statement

- 2.11 In March 2010, the Assembly Government published a low carbon energy policy statement that provides the sustainable development framework for the acceleration, in Wales, of the transition to an efficient low carbon

energy based economy. The successful delivery of this will depend on the facilitation of all forms of renewable energy across Wales.

National Energy Efficiency Savings Plan

- 2.12 This proposes practical short term actions that aim to reduce greenhouse gas emissions, tackle fuel poverty in Wales with a particular emphasis on improving the energy efficiency of the most inefficient homes in Wales, and support 'green' jobs and development of the supply chain for energy efficiency and micro-generation technologies. The Plan will sit below the Energy Statement which will provide the overall framework for energy policy in Wales.

The Bioenergy Action Plan

- 2.13 This proposes targets of 5TWh of electricity and 2.5TWh of usable heat energy from renewable biomass by 2020.

Other UK Drivers for Renewable Energy

Building Regulations and Zero Carbon

- 2.14 Changes to the Building Regulations in 2010, 2013 and 2016 are expected to bring in challenging dwelling [CO₂] emissions rate targets for residential development and for commercial development by 2019. By 2016, new homes will need to achieve a 70% reduction in CO₂ emissions on or near site from energy efficiency and the use of Low and Zero Carbon [LZC] energy options. For large sites, district heating [DH] from a low carbon source is likely to be one of the most cost-effective ways of achieving this.
- 2.15 Developers will then have to deal with their residual carbon emissions through the use of Allowable Solutions [AS]. One AS proposed would allow credit for carbon emissions where heat is exported from the site to nearby existing buildings via a District Heat Network. The power to make Building Regulations for buildings in Wales will be transferred to the Welsh Ministers on 31st December, 2011.

Feed in Tariffs [FITs]

- 2.16 The 2008 Energy Act contains powers for the introduction of FITs in Great Britain to incentivise renewable electricity installations up to a maximum capacity of 5 MW. The impact of FITs will be to significantly increase revenue for small-scale generators of renewable electricity, such as photovoltaic systems or small wind turbines. The FITs may also make it easier to obtain finance for such projects as it provides a guaranteed price for the electricity generated.

Renewable Heat Incentive [RHI]

- 2.17 The Energy Act 2008 also allows for the setting up of a Renewable Heat Incentive [RHI], which would provide financial assistance to generators of renewable heat and to some producers of renewable heat, such as producers of biomethane. The Government aims to have this in place by April 2011. The incentive payments will be funded by a levy on suppliers of fossil fuels for heat. The proposal is that the RHI will cover a wide range of technologies including biomass, solar hot water, air and ground source heat pumps, biomass CHP, biogas produced from anaerobic digestion and injection of biomethane into the gas grid.
- 2.18 The impact of the RHI is that it will make generation of renewable heat more financially viable than it is currently.

The Renewables Obligation [RO]

- 2.19 The RO is the main current financial support scheme for renewable electricity in the UK, and is administered by Ofgem. It obliges electricity suppliers in the UK to source a proportion of their electricity from renewable supplies. They demonstrate this has been achieved by showing they have the required quantity of Renewable Obligation Certificates [ROCs], which renewable electricity generators are awarded for their output.
- 2.20 If suppliers fail to meet their target, they have to pay a fine and also the value of the fine “pot” is, on an annual basis, split among those suppliers who do meet their targets. This creates a market for the ROCs and means that generators of renewable electricity can sell the ROCs that they receive for significantly more than they receive for their electricity output.
- 2.21 The intention is that RO will continue to incentivise electricity generation from larger scale renewable energy installations, whilst the FIT will be aimed at smaller generators.

Welsh Assembly Government’s Community Scale Renewable Energy Generation Programme

- 2.22 The Welsh Assembly Government’s Community Scale Renewable Energy Generation Programme uses European Structural Funds to provide advice and grants to support the development of community-sized renewable energy schemes, through the Energy Saving Trust.

- 2.23 This support is available to social enterprises across Wales and consists of three different elements:

Technical Development Officers

- 2.24 A network of locally-based technical development officers is in place across Wales to help community groups develop projects and access the funding streams. The development officers can also help to develop the technical capacity of social enterprises and provide locally based advice on renewable energy.

Preparatory stage grants

- 2.25 Grant funding is available towards feasibility studies and other preparatory costs. Up to £30,000 is available to fund non-capital aspects of a project. These should be early stage activities without which the installations would not be able to go ahead, such as environmental surveys, planning applications and community engagement activity.

Capital grants

- 2.26 A grant of up to £300,000 is available towards the capital costs of a renewable energy project.

Wood Energy Business Scheme (WEBS)

- 2.27 Grants for Welsh SME businesses and community groups installing wood fuelled heating systems; plus support for setting up clean wood fuel supply businesses in Wales.
- 2.28 The Wood Energy Business Scheme (WEBS) is a £17 million pound capital grant scheme. It draws down its funding from European ERDF funds via the Welsh European Funding Office (WEFO), and will run until 2013. The funding is made up of £7.9 million pounds of ERDF funding; the remainder will be from various match funding sources.
- 2.29 This is a pan Wales project, although different levels of support apply in the Convergence and Competitiveness areas of Wales. Its prime aim is to provide capital grant support to micro-businesses, SMEs and social enterprises to further develop the sustainable and renewable wood heat market across Wales.
- 2.30 Three types of project are eligible for grant support:
- Wood fuel heating systems
 - Small scale electricity generation using wood - Combined Heat and Power (CHP)
 - Wood fuel supply businesses – Enabling high quality equipment and fuel supply chains to be developed

3. How to use this Renewable Energy Assessment

Structure of the Renewable Energy Assessment (REA)

- 3.1 This REA has primarily been developed to undertake an area wide assessment of the potential for renewable energy generation in Bridgend County Borough.
- 3.2 In developing each element of the assessment, a series of tasks have been completed as set out in “Renewable Energy: A Toolkit for Planners”. The start of this REA indicates the questions about the renewable or low carbon energy potential in the Bridgend County Borough that have been addressed by each element of the evidence base.

Who has developed this REA?

- 3.3 This REA has been developed by Bridgend County Borough Council based upon the pilot study for Pembrokeshire undertaken by AECOM as part of the Welsh Assembly Government’s ‘Renewable Energy: A toolkit for Planners’ project. The REA has been compiled using a Geographical Information Systems (GIS) approach and methods as set out in the above mentioned ‘toolkit’.
- 3.4 The identification of opportunities and the total potential resource have been informed by a wider officer stakeholder group. Further, any decision about the setting of enhanced development requirements for specific sites will require engagement with the wider public sector and community, and potentially developers and the private sector. It is envisaged that this element will be undertaken as part of the wider consultation on the deposit LDP.

4. Bridgend County Borough Area Wide Renewable Energy Assessment

4.1 This section details the 'accessible' renewable energy resources in Bridgend County Borough, the variation in technologies that may need to be employed to utilise such resources and the different outputs (electricity and / or heat) of each technology.

4.2 Issues and questions addressed by this element of the REA include:

Calculating existing and future energy baseline

- What is the current energy demand in Bridgend County Borough?
- What will be the energy demand in Bridgend County Borough in 2020?

Existing and proposed LZC energy technologies

- What is the existing capacity of low and zero carbon energy technologies in Bridgend County Borough?
- Are any low and zero carbon energy technology installations being proposed in Bridgend County Borough?

Wind energy resource

- What is the potential for medium and large scale wind in Bridgend County Borough?
- What are the potential sites for stand-alone renewable energy development in Bridgend County Borough?

Biomass energy resource

- What is the potential energy from biomass in the Bridgend County Borough?

Energy from Waste

- What is the potential energy from municipal solid waste in Bridgend County Borough?
- What is the potential energy from commercial and industrial waste in Bridgend County Borough?
- What is the potential energy from energy from food waste in Bridgend County Borough?

- What is the potential energy from energy from animal manure and poultry litter in Bridgend County Borough?
- What is the potential energy from digestion of sewage sludge in Bridgend County Borough?

Hydropower Energy Resource

- What is the potential energy from hydropower in Bridgend County Borough?

Calculating Existing and Future Energy Baseline

- 4.3 The method employed for base-lining the Bridgend County Borough energy consumption was as detailed in 'Renewable energy: A toolkit for planners'.
- 4.4 The method relies upon:
- Predicted future energy demand as indicated in the UK Renewable Energy Strategy
 - WAG derived data and statistics currently published by DECC.
- 4.5 Table 4.1 below shows the split between electricity and heat for the UK, Wales and for Bridgend County Borough for 2006. Table 4.2 below shows the predicted electricity and heat demand for Bridgend County Borough for 2020. The decrease in demand is due to increased energy efficiency through improved public awareness and insulation projects etc.

Total Energy 2006 (GWh)			
Sector	UK	Wales	Bridgend
Electricity	328,393	17,394	693
Heat	898,287	55,489	2,515

Table 4.1 Total DECC Energy (GWh) data reported by UK RES energy sector for Bridgend

Sector	Total	Energy 2006 (GWh)	Predicted % change to 2020	Total energy 2020 (GWh)
Electricity		693	-0.3	691
Heat		2,515	-15.8	2,118

Table 4.2 Total DECC Energy (GWh) data reported by UK RES energy sector for Bridgend

Existing and Proposed LZC Energy Technologies

- 4.6 To demonstrate the progress being made and establish a baseline of installed capacity to inform future potential and target setting, the capacity of Low and Zero Carbon [LZC] technologies already installed in Bridgend County Borough has been established. Where LZC energy technologies already exist, the installed capacities [measured in MW] were recorded and incorporated as a contribution to overall final targets.
- 4.7 This assessment of existing capacity covers electricity and heat generation, and large scale as well as 'Building Integrated Renewables' (BIR) generation. For larger schemes, it also includes those that have received planning consent, but are not yet built.

Identifying existing smaller scale and micro-generation capacity.

- 4.8 Data has been collected at the local authority level on installed renewable heating capacity, and small scale electricity generation.
- 4.9 Table 4.3 outlines existing renewable electricity capacity in the County Borough.

Name of Scheme	Tech	nology	Capacity (MWe)	Status	Source
Llynfi Biomass		Biomass	10.00	Consented	REStats
Tythegston Landfill		Landfill Gas	1.17	Consented	REStats
Tythegston Landfill		Energy from Waste	4.00	Consented	BCBC
Cenin (Stormy Down)		Biogas / AD	1.00	Consented	BCBC
Fforch Nest Wind Farm		Onshore Wind	10.00	Consented (s106)	REStats
Pant-y-Wal		Onshore Wind	25.00	Consented (s106)	REStats
Penybont CHP WTW		Sewage Gas	0.35	Operational	Ofgem
Photovoltaic (Household)		Solar	0.006	Grant Supported	DECC
TOTAL			51.526		

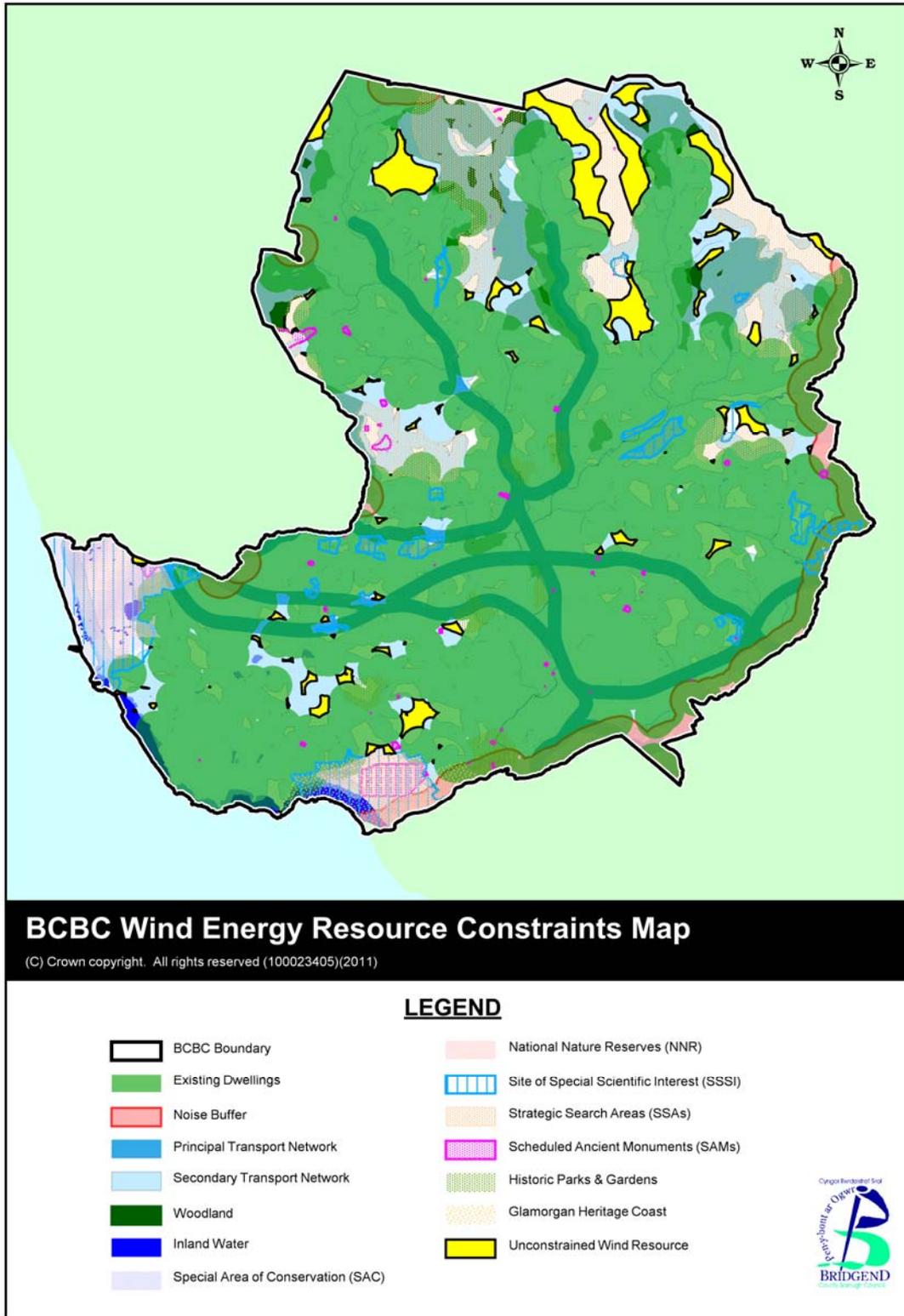
Table 4.3 Existing renewable electricity capacity

- 4.10 Details of smaller-scale schemes on Bridgend County Borough Council sites were unavailable at the time of publication of this report. Should this information become available it will be published as an addendum to the report.

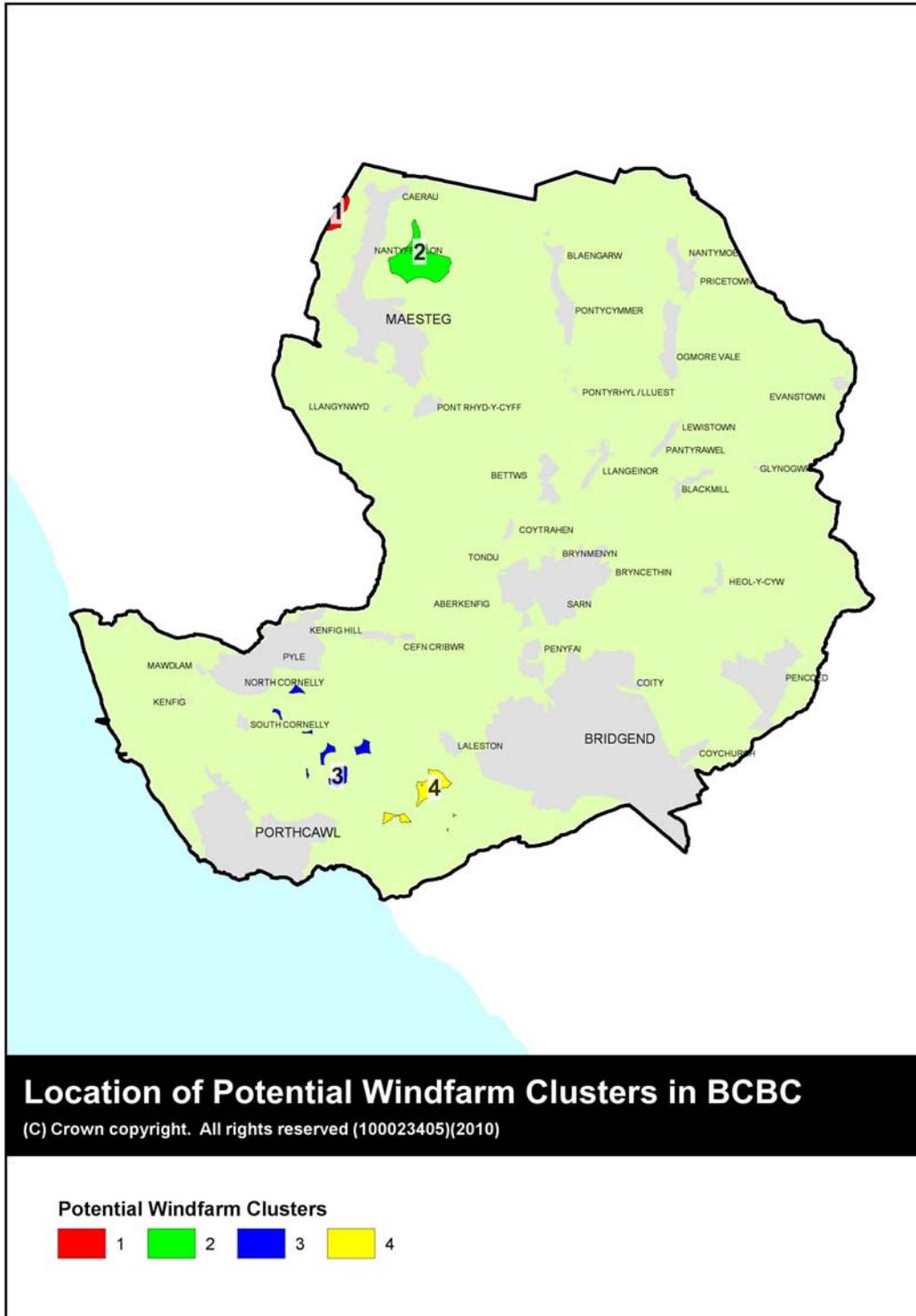
Wind Energy Resource

- 4.11 The focus of this REA is on establishing the potential wind resource and therefore this exercise has not therefore been constrained by current TAN8 guidance (see below).
- 4.12 For the purposes of planning policy in Wales large scale wind power has been defined in TAN 8 as wind farms of between 25MW and 50MW. Those above 50MW are the responsibility of the Independent Planning Commission under the Electricity Act. TAN8 provides details of 'Strategic Search Areas', [SSAs] sites identified as suitable and potential locations for large scale wind. These have not been investigated as part of this evidence base. TAN8 states that 'outside of SSAs wind farms are allowed up to 25MW capacity on urban brown field sites and less than 5MW elsewhere'.
- 4.13 Further constraints to onshore wind development not considered within this REA include (and this is not meant to be an exhaustive list) the practical access to sites required for development, landowner willingness for development to go ahead, political will, the time to complete planning procedures and an economic distance to the nearest appropriate electricity grid connection.
- 4.14 Wind farms, by nature, are most usually situated in rural settings away from residential development and where the wind resource is least constrained. This can mean that there is often no opportunity to utilise on-site the outputs from wind farms leaving export of electricity to grid as the only option. This REA has not utilised national grid data but the local authority may wish to investigate overlaying GIS layers of the energy networks data available to them. Also, the impact of wind farms on landscape character was not taken into account.
- 4.15 Onshore wind capacity is derived from wind speed data across the County Borough. Areas experiencing averages of 6 metres a second or more are deemed the most suitable. From these areas a number of constraints are excluded from further assessment. These are national environmental and heritage constraints; transport infrastructure; dwellings and noise and aviation and radar constraints.
- 4.16 The result of the GIS-based mapping exercise gives areas of the County Borough that could be seen as acceptable (in power generation terms) for wind turbine developments (although individual schemes would need to take into account other factors such as landscape protection etc.). From these areas a potential generation from wind power can be calculated.

- 4.17 In undertaking the assessment the following wind turbine dimensions are assumed:
- | | |
|------------------|----------------------------------|
| Rated Output: | 2MW |
| Hub Height: | 80m |
| Rotor Diameter: | 80m |
| Tip Height: | 120m |
| Turbine Density: | 5 turbines into 1km ² |
- 4.18 Once this initial constraints assessment had been carried out Map 1 below was produced. The yellow areas highlighted indicate the unconstrained areas suitable for wind energy generation taking into account the constraints listed above.
- 4.19 Subsequent to this, the toolkit advocates taking into account cumulative visual impact with existing or consented wind farms. It recommends a 7km minimum separation buffer be applied to these developments. The outcome of this is that many unconstrained areas in the east of the County Borough are excluded from further assessment due to the operational Taff-Ely wind farm and the consented Pant-y-Wal development.
- 4.20 Once this additional factor is taken into account, the unconstrained areas are then grouped together in terms of their proximity. From this 4 'potential wind energy area clusters areas have been identified to carry out the final wind energy assessment. These are displayed in Map 2.
- 4.21 Each of the four clusters is then classified into one of 6 priority areas characterised by the wind speed and potential disruption to National Air Traffic Service. Each of the 4 areas in Bridgend County Borough are classed as Priority 1 areas as they have high wind speed (>6.5 m/s) and have low impact on the air traffic service.



Map 1 Wind Energy Resource Constraints Map



Map 2 Potential Wind Farm Clusters – priority areas of least constraint

Wind Resource Priority	Unconstrained Area Sq Km	Pontential Energy Generated (MWh)	Potential Capacity (MW)
Priority 1	2.50	59,211	25.03

Table 4.5 Unconstrained wind resource output for Bridgend County Borough

Potential Wind Energy Area	Area Sq Km	Pontential Energy Generated (MWh)	Potential Capacity (MW)
1	0.24	5,595	2.36
2	1.29	30,561	12.92
3	0.43	10,214	4.32
4	0.54	12,842	5.43
TOTAL	2.50	59,211	25.03

Table 4.6 Potential wind farms across Bridgend County Borough

Wind Energy Potential and SSAs

4.22 It is acknowledged that parts of Bridgend County Borough lie within the Strategic Search Area (SSA) F for large scale wind energy projects outlined in TAN8. As part of a consortium, Bridgend County Borough Council carried out a refinement exercise of these areas in 2006.

4.23 The refinement, carried out by Ove Arup and Partners, calculated the generation capacity of parcels of land included in the SSA. For those areas of the SSA in Bridgend County Borough the capacity was calculated as follows:

Zone 20	North East of Maesteg	19MW
Zones 31 – 34	North of Evanstown	31MW

In Zones 31 – 34 Bridgend County Borough Council has consented the Pant Y Wal and Ffoch Nest wind farms totalling 35MW, thereby exceeding this capacity.

4.24 Zone 20 was excluded from the refined SSA by Ove Arup Study. However it is also acknowledged that, should a large wind farm be consented in Zone 20, the provisions of the REA would mean that assessed wind energy from areas 1 and 2 would be automatically excluded under the 7km buffer included in the methodology. This would then reduce the assessed capacity by 15.28MW (the potential of areas 1 and 2).

4.25 However, given the fact that the refinement exercise has excluded Zone 20 it is considered that the best approach would be to opt for the conservative, lower figure of 15.28MW, potentially representing the theoretical capacity of the wider area.

Biomass Energy Resource

4.26 The focus of this REA is on establishing the potential biomass resource. The resource is defined as:

- Wood fuel resource
- Energy crops

- 4.27 Although areas of land have been indicated as having potential for the growing of energy crops, further detailed studies are required prior to action. Furthermore, market demand is likely to play a key role in what, and how much is planted.
- 4.28 Even where there is local demand for a biomass supply, constraints, not considered within this REA, include (and this is not meant to be an exhaustive list) the proximity of plant / technology and practical access to sites required for preparation and delivery of fuel.
- 4.29 In terms of plant / technology, landowner willingness, political will, the time to complete planning procedures and an economic distance to the nearest appropriate electricity grid connection will all be key considerations but are not included within this assessment.
- 4.30 Biomass energy generation (whether generating heat, power or both), by nature, is most usually situated a small distance away from residential development (though close enough to supply heat), where there is room for the development including fuel storage and access for large delivery vehicles.
- 4.31 Unlike wind farms, biomass can be utilised for the generation of both electricity and heat. The use of energy crops, forestry residues and recycled wood waste for energy generation can have a number of advantages:
- Provide opportunities for agricultural diversification
 - Encourage increased management of woodland
 - Can have positive effects on biodiversity
 - Remove biodegradable elements from the waste stream
 - CO₂ savings if replanting occurs and long distance transportation is avoided
- 4.32 There is no consideration of the utilisation of straw as an energy source as Wales is a net importer.
- 4.33 Wood fuel and energy crop resource is calculated using agricultural land quality (for growing energy crops) and forestry plantation land areas (for wood fuel). More specifically, this concerns the resource that is available from the management of existing woodland, by the extraction of “thinnings” and the residues produced from the extraction of timber trees, the so-called “lop and top” (i.e. tips and branches).

Outputs	Energy Crops	Woodland	Total
Available Area (Ha)	8,421	3,577	11,998
Percentage of area that can be used	10%	n/a	-
Usable area (Ha)	842	3,557	4,399
Yield (oven dried tonnes (odt) per Ha)	12	0.6	-
Yield (odt)	10,104	2,134	12,238
Electricity			
Required odt per MWe	6,000	n/a	-
Potential installed capacity (MWe)	1.68	n/a	1.68
Heat from CHP			
Required odt per 1MWt	3000	n/a	-
Potential installed capacity (MWt)	3.36	n/a	3.36
Heat-only option			
Required odt per MWt	n/a	660	-
Potential installed capacity (MWt) from boilers	n/a	3.23	3.23

Table 4.7 Potential available biomass resource for Bridgend County Borough

Energy from Waste

- 4.34 Bridgend County Borough Council has signed a partnership agreement with Neath Port Talbot Borough Council to process landfill waste at a waste treatment plant, known as a Materials Recovery and Energy Centre (MREC). The MREC at Crymlyn Burrows near Swansea is a waste management facility that assists Bridgend and Neath Port Talbot Councils in diverting a large percentage of waste away from landfill.
- 4.35 All of the landfill black bag waste collected from the kerbside in Bridgend is taken to the MREC. At this facility metals are removed mechanically for recycling and some of the remaining waste is processed to produce refuse derived fuel that generates energy for use by the facility. Any surplus energy is exported to the National Grid. Other waste from the black bags is used in cement kilns as a substitute for non renewable natural resources such as fossil fuel (coal, oil and natural gas). As a result of these processes the amount of waste going to landfill is significantly reduced.
- 4.36 Less is known about the plans of commercial waste operators to treat commercial and industrial waste streams. Organisations involved in such activity should be fully engaged to ensure that opportunities to utilise energy are not lost.
- 4.37 Further guidance should be sought from the Welsh Assembly Government in relation to whether energy from waste (EfW) from some or all EfW technologies is, or will be, considered to be 'renewable' energy and, where it is confirmed to be 'renewable', for what proportion of the residual waste stream (the proportion usually refers to the proportion of residual waste deemed to be the biodegradable [BD] element).

- 4.38 In order to comply with Welsh Assembly Government requirements contained in the National Waste Strategy: *Towards Zero Waste*, at least 70% of all main waste streams should be recycled by 2025. Landfilling of all wastes will be phased out as far as possible by this time.
- 4.39 Other targets for consideration include a maximum level of 30% energy being created from waste by 2024/25; a maximum of 150 kilograms (kg) of residual household waste collected per person per annum by 2025; and that Wales should achieve zero waste by 2050.
- 4.40 The energy from waste potential is calculated using data on Municipal, Commercial and Industrial waste arisings. Data used in these calculations has been collected from Bridgend County Borough Council Street Scene department and the Environment Agency Wales. Growth projections to 2021 have been calculated assuming the levels predicted in the South West Wales Regional Waste Plan (1st Review),

Outputs	Municipal Solid Waste	Commercial & Industrial Waste	Total
Total Waste (tonnes)	72,403	127,472	199,875
Total residual (30%)	21,721	38,242	59,963
Total Biodegradable (renewable) element (35%)	7,602	13,385	20,987
Electricity			
Required wet tonnes per MWe	10,320	10,320	-
Potential installed capacity (MWe)	0.74	1.30	2.04
Heat			
Required wet tonnes per MWt	1,790	1,790	-
Potential installed capacity (MWt)	4.25	7.48	11.73

Table 4.8 Potential energy from waste resource for Bridgend County Borough

Anaerobic Digestion

- 4.41 Additional potential energy sources derived from waste as reported on in the Bioenergy Action Plan for Wales include:
- Food waste
 - Agricultural wastes
 - Animal manure
 - Poultry litter
 - Sewage sludge
- 4.42 There is no output table for Bridgend County Borough for landfill gas as no capacity, additional to what is already installed, has been identified. With policy in place to prevent further biodegradable material being sent for landfill, no further opportunities for energy from landfill gas are anticipated.
- 4.43 Data has been obtained from: WAGs Small Area Agricultural Statistics; Bridgend County Borough Council's Street Scene department; Environment Agency Wales and the Bioenergy Action Plan for Wales.

Food Waste

- 4.44 Municipal food waste projections for 2020 have been calculated using the projection for 2011 supplied by the Street Scene department. A calculation per household in 2011 was derived and this was applied to the 2021 household projection to give an approximate figure.

Municipal Food Waste	Predicted tonners per annum (2020)
Total Waste (tonnes)	6,635
Electricity	
Required tonnes per MW	32,000
Potential installed capacity (MW)	0.2
Heat	
Potential installed capacity (MWt)	0.3

Table 4.9 Potential energy from food waste in Bridgend County Borough

Animal Manure

- 4.45 Animal manure resource is calculated using current agricultural statistics supplied by WAG. Figures assume that 50% of farms in Bridgend use a slurry based systems.

Livestock	Number	Available resource per head/yr (t)
Cattle	6,865	1.5
Pigs	60	0.15
Electricity		
Required wet tonnes per MWe		225,000
Potential installed capacity (MWe)		0.05
Heat from CHP		
Required wet tonnes per MWt		150,000
Potential installed capacity (MWt)		0.07

Table 4.10 Potential energy from livestock manure in Bridgend County Borough

Poultry Litter

- 4.46 No farms in Bridgend County Borough accommodate birds exceeding 10,000 and therefore it is considered that the resource generated from this resource would be minimal and certainly not sufficient enough to support a dedicated litter energy plant. It is therefore not considered relevant to include this data in the assessment.

Sewage Sludge

- 4.47 Data from the sewage sludge resource is derived from data in the Bioenergy Action Plan for Wales.

Sewage Sludge	Predicted tonnes per annum
Total sewage sludge	4,503
Electricity	
Required dry sold (tonnes) per MWe	13,000
Potential installed capacity (MWe)	0.35
Heat	
Required tonnes per MWt	8,667
Potential installed capacity (MWt)	0.52

Table 4.11 Potential energy from sewage sludge in Bridgend County Borough

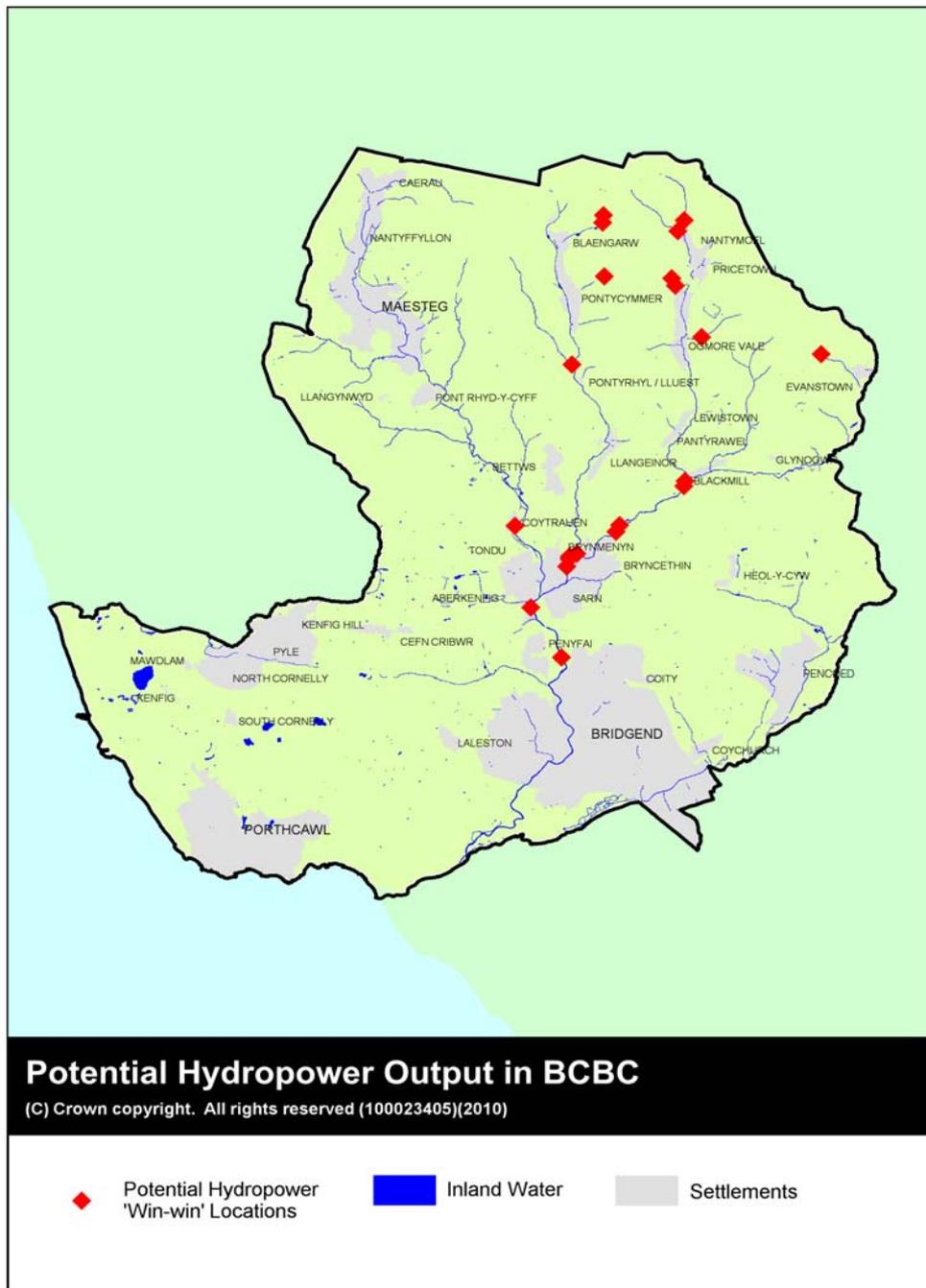
- 4.48 Interestingly, the assessed installed capacity for electricity generation matches that already being generated from the Penybont CHP Waste Treatment Works. Therefore the potential for further generation from this resource will be limited.

Hydropower Energy Resource

- 4.49 This REA has sought to assess the accessible resource of hydro sites [under 10MW] and potential micro-hydro schemes, through the identification of existing feasibility studies.
- 4.50 This REA does not provide guidance in relation to wave power, tidal stream or tidal barrage. Constraints upon the use of sites for hydropower schemes include the seasonality of water flows, financial viability of projects, the willingness of landowners and riparian rights of owners to advance projects. However, the major constraint is environmental issues and the need for Environment Agency acceptance and permitting.
- 4.51 Hydropower resource opportunities have been identified by the Environment Agency in "*Opportunity and environmental sensitivity mapping for hydropower in England and Wales*". The results for Bridgend County Borough are shown below. 62 'barriers' were identified in the area, these are structures within rivers that could provide a hydropower opportunity but are also barriers to fish movement
- 4.52 Removing a barrier is usually the best thing to do to improve the ability of fish to move around a river and fulfill their lifecycle, but this is not always possible. The next best option is to introduce a fish pass. 'Win-win' opportunities are schemes that provide both a good hydropower opportunity, and could, through incorporation of a fish pass, improve the ecological status of the associated fish population.
- 4.53 Those areas defined by the Environment Agency as 'Win-Win' locations are sites with the potential to generate over 10Kw that is designated as heavily modified under the Water Framework Directive. 22 such sites were identified in Bridgend County Borough with the potential to generate 0.9MW.

Authority	Number of barriers	Total power potential /MW	% of power potential classified as high sensitivity	% of power potential classified as potential win-win	Total power potential classified as potential win-win / MW
Bridgend	62	1.86Mw	95%	48%	0.9

Table 4.12 Potential energy from hydropower in Bridgend County Borough



Map 3 Potential Hydropower 'Win-Win' locations

5 Building Integrated Renewables (BIR) Uptake Assessment

5.1 This section provides a summary assessment of the potential building integrated renewable [BIR] energy technology uptake in Bridgend County Borough. The assessment is based on the method detailed in 'Renewable Energy: A Toolkit for Planners'. The following indicates the issues, research and questions associated with this element of the evidence base.

Issues

- What is the role of micro-generation in the energy mix of Wales?
- How is 'micro-generation' defined in this REA?
- What is the difference between 'micro-generation' and 'building integrated renewables'?
- How much energy is generated from BIR currently installed in Bridgend County Borough?
- What is the potential energy generated by building integrated renewable energy technologies in Bridgend County Borough in 2020?

Introduction to BIR

5.2 The Welsh Assembly Government has set out its Renewable Energy Route Map which envisages a significant role for micro-generation in the energy mix of Wales. There is likely to be an increasing emphasis on the uptake of Micro-generation technologies. Micro-generation in Bridgend County Borough could play an important part in any area wide renewable energy assessment. It is considered that micro-generation technologies, for the most part, can be installed on a variety of buildings, but unlike the other renewable energy technology types highlighted in this report it is demand led, rather than supply led. Therefore predictions have been made on the take-up of micro-generation technologies in Bridgend County Borough.

5.3 The official definition of micro-generation is given in the Energy Act 2004 as electricity generating capacity of 50kW or less, and heat generating capacity of 45kW or less. However, for the purposes of this REA, and the uptake modelling, we are using the broader term Building Integrated Renewables [BIR]. BIR can include systems that are larger than micro-generation, such as biomass boilers for schools, which can be up to 500kW of heat output or more. However, BIR technologies are still linking to existing or new buildings and are therefore distinct, in terms of how their potential can be modelled, from the larger scale stand alone technologies that are covered elsewhere in this REA.

5.4 The term BIR also excludes those micro-generation technologies that are not renewable, such as fuel cells [where the hydrogen is produced from mains gas] and small scale CHP, using mains gas as the fuel source. This is because, for the potential purpose of assessing renewable energy potential, we are only interested in the potential uptake of those micro-generation technologies that are renewable.

5.5 BIR are taken to cover the following technologies:

- Solar photovoltaic [PV] panels
- Solar hot water panels
- Micro building-mounted wind turbines
- Small free standing wind turbines
- Micro scale biomass heating [i.e. wood chip or pellet boilers or stoves]
- Ground source heat pumps
- Air source heat pumps

Modelling BIR Uptake – Overview

5.6 Two key sectors have been considered in modelling the uptake of BIR technologies, and each, through necessity has been modelled differently owing to different factors influencing the level of uptake.

5.7 The first sector is that of future new buildings, both residential and non-residential. For this sector, uptake is likely to be predominantly driven by future Building Regulations and planning policies, requiring new buildings to reduce carbon dioxide emissions. In particular, and until Assembly Government consults on unilateral changes to devolved Welsh Building Regulations, this will be driven by the UK trajectory towards zero carbon dwellings by 2016 and for zero carbon non-domestic buildings by 2019. The key factors affecting uptake of any particular technology for this sector are likely to be the combination of technical viability, carbon savings, and the level of capital cost to a developer.

5.8 The second sector is that of existing buildings, both residential and non-residential. For this sector, the uptake is likely to be driven more by how financially attractive installing a system would be to a building owner or occupier and how easy they perceive it would be to install such a system, i.e. it has a significant dependence on consumer attitudes and willingness to adopt new technology.

5.9 Informing 'Renewable Energy: A Toolkit for Planners' and therefore also the Pembrokeshire County Council Renewable Energy Assessment pilot study, AECOM developed its own discrete choice model based on the survey coefficients from Element Energy's 2008 report.

5.10 For Bridgend, the Simplified Method for modelling Building Integrated Renewable uptake has been used. The method is based on simply scaling the uptake results for Pembrokeshire for renewable energy BIR for heat and electricity, on a pro-rata basis depending on the level of existing and projected new build development in Bridgend County Borough compared to that assumed for Pembrokeshire.

Row No.			Units
1	Existing dwellings and non-residential buildings		
2	No. of existing dwellings in Pembrokeshire	55,942	
3	No. of existing dwellings in Bridgend CB	58,629	
4	Calculate EDR (divide row 3 by row 2)	1.05	
5	Predicted RE electricity capacity for Pembrokeshire by 2020	2.2	MWe
6	Predicted RE electricity capacity for Bridgend CB by 2020 (multiple row 5 by row 4)	2.3	MWe
7	Future Dwellings		
8	No. of average net annual completions assumed for Pembrokeshire	585	
9	No. of average net annual completions planned for Bridgend CB	600	
10	Calculate NDR (divide row 9 by row 8)	1.03	
11	Predicted RE electricity capacity for Pembrokeshire by 2020	4.3	MWe
12	Predicted RE electricity capacity for Bridgend CB by 2020 (multiple row 11 by row 10)	4.4	MWe
13	Future non-residential buildings		
14	Future new non-residential average annual new floor area assumed for Pembrokeshire by 2020	56,000	m2 GIFA
15	Future new non-residential average annual new floor area assumed for Bridgend CB by 2020	33,200	m2 GIFA
16	Calculate FNR (divide row 15 by row 14)	0.59	
17	Predicted RE electricity capacity for Pembrokeshire by 2020	6.32	MWe
18	Predicted RE electricity capacity for Bridgend CB by 2020 (multiply row 17 by row 16)	3.73	MWe
	TOTALS		
19	Total predicted new BIR RE electricity capacity for Bridgend CB by 2020 (sum of rows 6, 12, 18)	10.43	MWe
20	Existing BIR electricity capacity in Bridgend CB (see table 1 above)	0.006	MWe
21	Total predicted new and existing BIR RE electricity capacity for Bridgend CB by 2020 (sum of rows 6, 12, 18)	10.436	MWe

Table 5.1 Potential energy from BIR renewable electricity sources in Bridgend County Borough

- 5.11 Data from the LDP has been considered against WAG household estimates for BIR contributions from domestic sources. For new non-residential development, a total requirement of approximately 332,000 sq m until the end of the Plan period has been derived using the estimates in table 5.2.

Development	Floorspace sq m	Assumptions	Source
Comparison Retailing	26,000	Comparison Retailing Need (Ratio 65:100 – Net: Gross)	CACI Retail Need Report
Bulky Comparison Retailing	18,000	Comparison Retailing Need (Ratio 90:100 – Net: Gross)	CACI Retail Need Report
Convenience Retailing	6,000	Porthcawl Supermarket	Porthcawl Regeneration Development Framework
Employment Development	252,000	10 years of 6.3ha pa at ratio of 4,000 sq m of development to ha	Employment Land Review
Community Facilities Development	30,000	Assumes 4 x Primary Schools at 3000 sq m Assumes 6 x Community Centres at 300 sq m Assumes 5 x Health Centres at 600 sq m Assumes 2 x Senior Schools at 6,500 sq m	Potential LDP allocations
TOTAL	332,000	Annual Requirement over 10 years:	33,200 sq m

Table 5.2 Data used for future non-residential development

Row No.			Units
1	Existing dwellings and non-residential buildings		
2	No. of existing dwellings in Pembrokeshire	55,592	
3	No. of existing dwellings in Bridgend CB	58,629	
4	Calculate EDR (divide row 3 by row 2)	1.05	
5	Predicted RE heat capacity for Pembrokeshire by 2020	3.7	MWt
6	Predicted RE heat capacity for Bridgend CB by 2020 (multiple row 5 by row 4)	3.9	MWt
7	Future Dwellings		
8	No. of average net annual completions assumed for Pembrokeshire	585	
9	No. of average net annual completions planned for Bridgend CB	600	
10	Calculate NDR (divide row 9 by row 8)	1.03	
11	Predicted RE heat capacity for Pembrokeshire by 2020	4.3	MWt
12	Predicted RE heat capacity for Bridgend CB by 2020 (multiple row 11 by row 10)	4.4	MWt
13	Future non-residential buildings		
14	Future new non-residential average annual new floor area assumed for Pembrokeshire by 2020	56,200	m2 GIFA
15	Future new non-residential average annual new floor area assumed for Bridgend CB by 2020	32,200	m2 GIFA
16	Calculate FNR (divide row 15 by row 14)	0.59	
17	Predicted RE heat capacity for Pembrokeshire by 2020	1.23	MWt
18	Predicted RE heat capacity for Bridgend CB by 2020 (multiply row 17 by row 16)	0.73	MWt
19	Total predicted new BIR RE heat capacity for Bridgend CB by 2020 (sum of rows 6, 12, 18)	9.03	MWt
20	Existing BIR heat capacity in Bridgend CB (see paragraph 4.9 above)	Unknown	MWt
21	Total predicted new and existing BIR RE heatcapacity for Bridgend CB by 2020 (sum of rows 6, 12, 18)	9.03	MWt

Table 5.3 Potential energy from BIR renewable heat sources in Bridgend County Borough

6. Assessment Summary

6.1 For each renewable energy technology, the extent to which the maximum accessible resource can be delivered by a target date [e.g. 2020] is likely to be determined by a combination of the following:

- Technical maturity, covering both the extent to which new technologies prove to be viable, as well as the extent to which capital costs are expected to fall over time
- Commercial viability, driven by future energy prices, and levels of Government subsidy and financial incentives, and other Government support
- Extent of institutional and infrastructural support, covering the likelihood of securing planning consent [i.e. issues of political and social acceptability], as well as the availability of suitable grid infrastructure, transport infrastructure and so on

6.2 Clearly, trying to predict the impact of these different variables is not a precise science, and trying to make such predictions will involve a combination of expert knowledge of the technologies and the policy context they operate in, together with detailed local knowledge of the local politics, infrastructure and projects in the pipeline.

6.3 Two sets of summary tables have been produced, one for renewable heat and the other for renewable electricity.

Resource Summary Tables

Energy Technology	Capacity Factor	Accessible Resource		Current installed capacity		Total (Accessible + Current)		
		MWe	GWh/yr	MWe	GWh/yr	MWe	GWh/yr	
Onshore wind	0.27	25.03	59.2	35	82.8	60.03	142	
Energy crops	0.9	1.68	13.2	10	78.8	11.68	92	
Energy from Waste	0.9	2.04	16.1	4	31.5	6.04	47.6	
Landfill gas	0.6	-	-	1.17	6.1	1.17	6.1	
AD (animal/food)	0.9	0.25	2.0	1	7.9	1.25	9.9	
Sewage	0.42	0.35	1.3	0.35	1.3	0.7	2.6	
Hydropower	0.37	0.9	2.9	0	0.0	0.9	2.9	
BIR	0.1	10.43	9.1	0.006	0.005	10.436	9.105	
TOTAL	-	40.68	103.8	51.526	208.5	92.206	312.205	
Local authority projected electricity demand in 2020							691	
Percentage electricity demand in 2020 potentially met by renewable energy resource							45%	

Table 6.1 Resource summary for potential renewable electricity in Bridgend County Borough

Energy Technology	Capacity Factor	Accessible Resource		Current installed capacity		Total (Accessible + Current)		
		MWt	GWh/yr	MWt	GWh/yr	MWt	GWh/yr	
Biomass CHP or large scale heat only (energy from crops)	0.5	3.36	14.7	0	0	3.36	14.7	
Heat from energy from waste (CHP or heat only)	0.5	11.73	51.4	0	0	11.73	51.4	
BIR	0.2	9.03	15.8	0	0	9.03	15.8	
TOTAL	-	24.12	81.9	0	0	24.12	81.9	
Local authority projected heat demand in 2020							2,118	
Percentage heat demand in 2020 potentially met by renewable energy resource							3.9%	

Table 6.2 Resource summary for potential renewable heat in Bridgend County Borough

6.10 In order to assist in the calculation of a realistic assessment of potential energy generation, an internal officer workshop was held on the 11th January 2011, notes of this meeting are included at Appendix 1. The workshop contributed to the development of the Renewable Energy Assessment in the following ways:

- Additional existing and consented schemes were added to Table 4.3
- Clarification was given on the relationship between the REA and the planning process. Namely that the spatial areas identified as being potentially suitable for developments did not change policy. The development control process would include other material considerations which would need to be taken into account.
- Further information was requested on the assumptions used in calculating the biomass potential. Particularly the fact that woodland potential only assumes thinning and “lopping and topping” of existing areas and not commercial intensive cultivation.
- Information on the County Borough’s current municipal waste contract with the MREC facility at Crymlyn Burrows, which extends beyond 2020/21, means the potential from this resource would be zero.
- Similarly, a new Anaerobic Digestion Facility is being planned in conjunction with neighbouring authorities which may be located outside of the County Borough. Given this, assessment from food waste would be zero.
- Food waste projections have been revised to assume 2kg per house per week. Table 4.9 has been updated.
- More qualitative information be included in the REA and subsequent monitoring on the contribution that initiatives and organisations in Bridgend County Borough make towards

renewable energy generation and energy efficiency. This is included below.

- The potential for corporate use of the REA and the subsequent proposed Energy Opportunities Plan.

6.10 Following information supplied in the stakeholder engagement, which has also included an opportunity for comment on the REA as a whole. The following preferred assessment totals have been chosen:

	Accessible Resource		Current installed capacity		Preferred Assessment Total	
	MWe	GWh/yr	MWe	GWh/yr	MWe	GWh/yr
TOTAL	38.39	85.7	51.526	208.5	89.916	294.2
Local authority projected electricity demand in 2020						691
Percentage electricity demand in 2020 potentially met by renewable energy resource						42.5%
	MWt	GWh/yr	MWt	GWh/yr	MWt	GWh/yr
TOTAL	12.39	30.5	0	0.00	12.39	30.5
Local authority projected heat demand in 2020						2,118
Percentage heat demand in 2020 potentially met by renewable energy resource						1.4%

Table 6.3 Preferred assessment totals for renewable energy in Bridgend County Borough

LDP Policy Formulation

6.11 A comparison between the energy generation potential identified in tables 6.1 and 6.2 against the UK Renewable Energy Strategy scenario (paragraph 1.2 above refers) to meet the EU Renewable Energy Directive is contained in table 6.4 below.

	Bridgend Energy Generation Potential (%)	UK Scenario to meet EU Directive (%)
Electricity	42.5	>30
Heat	1.4	12.0

Table 6.4 Bridgend energy potential and UK preferred scenario

6.12 It is noted that for Bridgend, the percentage of renewable electricity generation greatly exceeds the UK-wide target. However heat demand potentially met by renewable energy sources is substantially below the 12% target. LDP policies could therefore be formulated to encourage investigation and implementation of renewable energy generation by prospective developers on future development sites. This will need to be balanced against the cost of implementing such schemes and the impact on development viability this will bring.

- 6.15 Consideration can also be given to the formulation of an Energy Opportunities Plan as supplementary guidance to the LDP. This would identify potential sources for renewable energy generation, and would also highlight possible receptors (particularly public sector buildings) of heat energy generation.

Additional Contributions from Bridgend County Borough

- 6.16 Stakeholders were concerned to note that initiatives in Bridgend County Borough which contributed towards energy efficiency and / or the generation of renewable energy outside of the County Borough were not taken into account in the REA.
- 6.17 However for the purposes of monitoring the renewable energy uptake, the following qualitative issues should also be noted:
- That the current municipal waste contract Bridgend County Borough Council holds with the MREC facility at Crymlyn Burrows contributes towards the generation of renewable energy.
 - That the future proposed Anaerobic Digestion facility will use food waste from Bridgend County Borough and will contribute towards the generation of renewable energy.
 - Rockwool Limited is based in Bridgend County Borough and is the UK's leading supplier of mineral wool insulation. This significantly reduces the energy consumption of buildings across the country.
 - Bridgend County Borough Council has become one of the first local authorities in Wales to achieve the highest level of the Green Dragon environmental standard. Level five, the highest, is equivalent to the international standard ISO 14001 and the European standard EMAS. It has been presented to Bridgend County Borough Council for its latest efforts to reduce the amount of energy that the authority uses.

Appendix 1 – Notes from Internal Officer Workshop – 11th January 2011

BRIDGEND RENEWABLE ENERGY ASSESSMENT INTERNAL STAKEHOLDER WORKSHOP

11th JANUARY 2011

Present:

Huw Jenkins	(HJ)	Group Manager – Streetworks
Susan Jones	(SJ)	Development Planning Manager
David C Davies	(DCD)	Development Control Manager
Nick Lloyd	(N JL)	Team Leader – Development Planning
Jonathan Parsons	(JDP)	Team Leader – Development Control
Julie Jenkins	(JEJ)	Team Leader – Development Control
Stuart Ingram	(SAI)	Principal Planning Officer – Development Planning
Stephen Bool	(SJB)	Principal Planning Officer – Minerals & Waste
Will Thomas	(WT)	Principal Mechanical & Electrical Engineer (Energy)
Mike Jenkins	(MJ)	Principal Sustainable Development Officer
Helen Williams	(HW)	Senior Environmental Health Officer
Kath Carter	(KC)	Planning Assistant – Development

Apologies:

David Llewellyn	Group Manager - Development
Lee Jones	Group Manager – Public Protection
Christopher Jones	Energy Manager

1. Welcome and Introductions

SJ welcomed everyone to the meeting and stated that the reason for the meeting was to discuss the Bridgend Renewable Energy Assessment.

2. Background to Renewable Energy Assessment

SAI explained that in early 2011 it is anticipated that the Welsh Assembly Government (WAG) will require Local Planning Authorities to include targets for renewable energy generation within their Local Development Plans (LDPs). This policy change is expected to occur with the publication of an amendment to Section 12.8: *Planning for Renewable Energy of Planning Policy Wales*.

[This policy requirement was not included in the revised version of Planning Policy Wales when published in March 2011]

In order to assist in the formulation of meaningful targets in LDPs, WAG has also issued *Practice Guidance: Planning for Renewable and Low Carbon Energy – A Toolkit for Planners* which has been formulated by AECOM. This toolkit gives a step by step instruction for planners to undertake an in-house assessment of the renewable energy resource from the following sources: wind; wood fuel and energy crops (biomass); energy from waste; anaerobic digestion – (animal manure, food Waste, poultry Litter and sewage sludge); and hydropower. The

toolkit also includes models to estimate Buildings Integrated Renewables (BIR) uptakes.

The purpose of this meeting is to go through the initial assessment and test the assumptions used in the methodology with those present; as well as discussing implications for delivery of renewable energy projects in the County Borough.

3. Renewable energy technologies

HJ queried if BCBC are expected to have land available for waste treatment facilities and if it was for municipal waste only.

SAI explained that the LDP will allocate waste sites.

SJB explained that BCBC was in a joint venture with Neath Port Talbot Council and used the facility at the MREC in Neath Port Talbot which has about 15 years left on the contract. However, it was noted that any renewable energy figure from this site could not be included as it was out of the Borough.

HJ explained that there is a contract due to go out to tender for an Anaerobic Digestion Facility with may be located outside of the County Borough. SAI explained that due to these facts it was likely that the potential assessment from municipal waste and food waste would be zero up to 2020.

MJ enquired if figures from historic/existing waste sites were used e.g. Tythegston. SAI explained that landfill gas was included.

It was noted that solar arrays were not included as it was difficult to devise a methodology to predict contributions from this source. However, solar power is included in Building Integrated Renewables assessment.

4. Baseline: Existing and consented schemes / data

SAI referred the meeting to data giving existing renewable electricity and energy in the County Borough and asked those present if it had any additions or amendments.

DCD advised the group of several schemes at Tythegston, Stormy Down and Kenfig NNR. SAI stated that he would add these to the tables.

WT advised that various schools and other BCBC buildings were using biomass plants. SAI enquired with WT if he could provide figures relating to these installations. WT advised that he would forward figures to SAI.

It was noted that the new Roman Catholic School, Brackla had achieved the BREEAM standard without using a Biomass Boiler.

SJ requested an update on Fforch Nest Windfarm. JDP advised that the BCBC side of the windfarm is reaching the signing of the S106 agreement stage and that the RCT side of the development would probably go to appeal.

5. Data / Assumptions used in assessment

SAI stated the next stage was to go through each renewable technology to discuss the methodology and assumptions used.

- **Wind Energy**

SAI gave a brief outline on the methodology used to assess the potential from wind.

Four areas have been identified in the Borough: One on the border with Neath Port Talbot, one east of Nantyffyllon, one at Stormy Down and one South/South West of Laleston

JDP advised that BCBC had received a number of queries and screening/scoping requests with regard to small scale wind turbine development and commented as to whether this would result in a greater visual / amenity impact than that created by a single large scale wind farm.

It was noted that these sites would not form part of the LDP as they were to assess potential only. Planning applications would need to take into account more detailed information such as the potential for noise and impact on the landscape etc. There may also be suitable areas outside of those identified for different sizes of turbine.

The size of the wind turbines, noise impact and the buffer zones used in the methodology were discussed and agreed by the group.

- **Biomass Energy**

SAI gave a brief outline on the methodology used to assess the potential from biomass.

HW advised the group on emissions and cumulative impacts and that permits would be necessary for certain sized installations and that it should be noted that there would be higher levels of Nitrous Oxides with biomass.

It was discussed whether the 100% of wood used for biomass energy was good for the environment.

(SAI subsequently advised the group that the wood sourced was from lopping and crown reduction only thereby leaving the trees intact. This was assumed in the generation potential. This would be made explicit in the final report)

- **Energy for Waste**

SAI gave a brief outline on the methodology used to assess the potential from waste.

Municipal Waste

HJ advised the group that the growth in waste arisings was dropping due to the new recycling scheme in place in Bridgend County Borough. DCD suggested that if waste is slowing down, more up to date figures are needed. SAI stated the waste projections were taken from the Regional Waste Plan (RWP). HJ advised that more up-to-date projections may be available in the new WAG Waste Strategy. SAI advised that he would check the figures.

(SAI subsequently advised the group that the figures contained in the WAG Waste Strategy were target projections. It is advisable to use data in the RWP as this would give a consistent approach between municipal and commercial and industrial waste)

As discussed earlier, it was noted that existing contracts concerning municipal waste mean the potential from this source will be zero until at least the end of the study period.

Commercial and Industrial Waste

HJ stated that he was not aware of any developments to handle commercial and industrial waste coming forward in the County Borough. However, many waste disposal firms may use existing facilities which also deal with municipal waste.

- **Anaerobic Digestion (AD)**

Food Waste

SAI gave a brief outline on the methodology used to assess the potential from food waste.

HJ stated that he thought the current projection seemed to low and that a figure of 2kg per household per week was considered to be average. SAI stated that he would revise the figure by applying this figure to the LDP household projection.

As discussed earlier, it was noted that the Council and its neighbours are currently examining sites for an AD plant which may be located outside the County Borough. This would mean the potential from this source will be zero.

Agricultural Waste (Animal Manure and Poultry Litter)

SAI gave a brief outline on the methodology used to assess the potential from agricultural sources.

The group agreed that the figures used seemed realistic.

Sewage Sludge

SAI stated that information on Sewage Sludge had been provided directly from the toolkit. It was noted that the potential from this source matched the existing generation at Penybont Waste Treatment Works.

- **Hydropower Energy**

SAI gave a brief overview on the methodology used to calculate the capacity for Hydropower Energy in the County Borough. This information had come from the Environment Agency.

- **Buildings Integrated Renewables (BIR)**

SAI explained that there are two models in the toolkit to calculate the potential from BIR sources. The model used in Bridgend had been that which up scaled the Pembrokeshire figures for Bridgend.

WT noted that in Pembrokeshire there may be more of an incentive for households to investigate micro-generation schemes as many are not connected to the gas network. This would have implications for the Bridgend target where the majority of households are.

6. Developing area wide targets for Bridgend LDP

[Although part of the original discussion; setting a target in LDPs for renewable energy is not a requirement of national planning policy]

SAI gave a brief outline on developing area wide targets for Bridgend LDP. He stated that the low and high scenarios given in the toolkit tables were a guide only and that the figure for each technology should not be seen as an individual target. However, the likelihood of certain types of technology coming forward would contribute towards the overall figure.

A discussion took place on the merits of having low and high targets for each technology.

The impact of building regulations and national policy was discussed; which would see more development proposals seeking to utilise these types of technologies.

HJ asked if it was possible to take into account the resources from Bridgend (ie waste) that was being taken elsewhere to generate energy. DCD also queried the presence of Rockwool Ltd in the County Borough which manufactured insulation products which were used all over the world.

SJB stated that as this was land-use study it could not be taken into account. SAI suggested that these issues should still be highlighted in the final assessment report and at the monitoring stage of the LDP.

7. Policies and approach for Bridgend LDP

SAI briefed the group that officers were considering policies in the LDP which promoted renewable energy and required major development to assess the potential to both generate renewable energy and share that energy with nearby receptors.

This would be assisted by an Energy Opportunities Plan (which is also included as part of the toolkit) which highlights areas of potential renewable energy generation and buildings within the County Borough which could also use the energy.

8. Corporate promotion of REA

SAI stated the corporate promotion of the REA was a key component of the toolkit. It was agreed by the group that the Energy Opportunities Plan would be very useful document for the Council in identifying potential for further public-sector investment in renewable energy.

SAI thanked the group for its contribution to the project to date and that a draft copy of the REA would be circulated to them for comment.

SJ thanked officers for attending the meeting.