Outline Document

Vale of Glamorgan Local Development Plan

Renewable Energy

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Executive Summary

The Vale of Glamorgan Local Development Plan (LDP) policies for renewable energy have to be driven, in common with all planning policy, by the hierarchy of International, National and Regional policies on climate change, renewable energy and building design.

It is now accepted that climate change is an extremely serious issue, and a reduction in carbon emissions in the short and medium terms is imperative.

International, UK Government and Welsh Assembly policies to address climate change are only just emerging, and these have to be reflected in the Vale of Glamorgan LDP. In many cases, the overarching policy framework is still largely aspirational or in formulation (beyond the policies formulated giving reduction targets for 2010) at the time of the LDP process and its subsequent adoption. The indication from this review of the policy framework is that carbon emission reduction targets are likely to ramp up in future, with much stronger policies to ensure that these targets are met. In view of the uncertainty regarding the wider policy context, the Vale of Glamorgan LDP should:

1. Address the emerging policy drivers, but regard them as being the *minimum* requirement for carbon emission reductions

2. Anticipate that the policy drivers will become stronger in the future, and therefore be sufficiently flexible to be augmented by Supplementary Planning Guidance or other instruments to reflect the rapid changes that are expected

A review of renewable commercial energy generation opportunities concludes that the potential for such developments within the Vale of Glamorgan is relatively low, being restricted either by lack of resource or by other land-use, technical and environmental constraints.

With one exception, the Vale has limited capacity for the development of large renewable technologies. There is potential for four or five small wind clusters (below 5MW) with an expectation that perhaps 10MW of capacity would be realistically consented. Even this would require a potentially expensive technical solution to radar interference issues. The resource for small hydro is extremely limited.

Biomass energy does present opportunities at all scales.

- Small scale installations are appropriate for individual homes and buildings (particularly for off-gas areas).
- Two areas, Barry Waterfront and Llandow Industrial Estate, have been identified as suitable for medium scale district heating
- One development, DTA St Athan, has been identified as suitable for the utilisation of heat from generation at Aberthaw

Additionally biomass networks should be a consideration for residential and mixed development at any scale over 25 units or so and would be particularly appropriate for high density brownfield sites.

A review of domestic scale 'microgeneration' indicates reasonable potential for retro-fit installations to existing dwellings. In combination these small scale renewables have the potential to more than halve carbon emissions from existing dwellings in the Vale.

There are clear planning policy frameworks for commercial scale and domestic renewable energy, and accordingly clear recommendations and guidance have been provided to enable the Vale of Glamorgan LDP to define and facilitate appropriate development.

The emerging policy framework also encourages the Vale of Glamorgan to strongly and pro-actively promote low carbon measures and renewable energy installations. It is clear that a significant expansion to the scope of LDP policies will be required in relation to carbon reduction for all new development, however the detail of this expectation is currently under-developed (and in places contradictory).

Nonetheless, there is significant scope for the Vale of Glamorgan to make a meaningful contribution to carbon reduction through policies to promote renewable energy in the built environment, and further low carbon building design, and energy conservation.

It is difficult to embed these in one set of policies on renewable energy: a more cross cutting approach is required, encompassing as number of policy areas.

Carbon savings resulting from planning obligations will be additional to those required by building regulations. Accordingly, the scale of potential carbon saving due to LDP policies in this area cannot be determined until the content and timescale of the wider building regulatory framework is established. This is currently a work in progress.

In order to provide an appropriate planning policy framework whilst retaining flexibility as to quantitative carbon reduction targets for new development it is recommended that Vale of Glamorgan LDP policies should set out:

1. The basic logic of the Vale of Glamorgan's approach to carbon reduction expressed as an 'Energy Hierarchy'

2. The requirement for developers to provide a design statement and energy assessment of proposed developments which demonstrates the steps taken to apply the principles of the Energy Hierarchy

3. The Vale of Glamorgan's requirement for major development to achieve CO_2 reductions beyond those required by building regulations and/or a proportion of energy needs via on site renewables.

4. Clarification of the robust approach to energy assessments (specific and quantified) which developers must adopt within design statements

5. A criteria based (minimum standards) approach is most appropriate to minor development

6. A 'percentage beyond benchmark' carbon reduction / renewables requirement is most appropriate for major development

7. A site specific 'minimum feasible carbon' approach is appropriate for very large development

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Tables and Figures

1 General Introduction and Background

The Planning and Compulsory Purchase Act 2004 and The Town and Country Planning (Local Development Plan) (Wales) Regulations 2005 place a statutory duty on all Unitary Authorities in Wales to prepare and adopt a Local Development Plan (LDP) for their administrative areas.

In January 2007, the Vale of Glamorgan Council formally commenced work on its LDP, which once adopted will replace the Vale of Glamorgan Adopted Unitary Development Plan 1996 - 2011. The LDP will set out the Council's land use strategy and policies for planning and development in the Vale of Glamorgan from 2011 to 2026.

The imperatives of Climate Change adaptation and mitigation are generally acknowledged to require significant changes to the 'business as usual' process of policy development, including LDP development. The urgent objective of achieving major greenhouse gas reductions within a short timescale is increasingly resulting in Climate Change and Energy policy frameworks which cut across traditional frames of reference and which require rapid implementation and delivery.

More than two thirds of the world's carbon dioxide emissions result from the way we use energy. Energy Policy is obviously central to any climate change strategy, however because of the far reaching implications of Climate Change sustainable energy considerations are increasingly important components of planning policies at all levels. Climate Change mitigation therefore provides the context for requirements and incentives to support renewable energy and energy efficiency.

Within the context of a wider Energy Strategy the Welsh Assembly Government has established specific renewable energy production targets for Wales of 4TWh per annum by 2010 and 7TWh per annum by 2020. The planning process is integral to the achievement of these targets.

The Renewable Energy Ministerial Interim Planning Policy Statement (MIPPS) 01/2005 requires local planning authorities to undertake an assessment of all potential renewable energy resources, renewable energy technologies, energy efficiency and energy conservation measures. The MIPPS also states that Local Planning Authorities (LPAs) should facilitate the development of all forms of renewable energy, energy efficiency and energy conservation measures within a sustainable development framework.

The Council has appointed Dulas Ltd to examine the opportunities and constraints to the development of renewable energy and energy efficiency within the Vale of Glamorgan, and to provide the evidence base to inform decision making regarding policies on renewable energy for the Local Development Plan.

2 Policy Context

The following documents have been identified as likely to affect or influence the emerging Vale of Glamorgan LDP in relation to sustainable energy.

Document Name	Identified
UK Policies and Documents	
UK Sustainable Development Strategy 2005	SA
UK Climate Change Programme (2000/2006)	SA
Energy White Paper: Our energy future – creating a low carbon economy (DTI 2003)	SA
Meeting the Energy Challenge: A White Paper on Energy (DTI 2007)	D
Microgeneration Strategy (2006)	D
UK Waste Strategy (Defra 2000)	SA
Welsh Policies and Documents	
Starting to Live Differently - The Sustainable Development Scheme of the National Assembly for Wales (2004)	SA
The Sustainable Development Action Plan of the Welsh Assembly Government 2004-2007	SA
The Welsh Assembly Government Environment Strategy for Wales (2006)	SA
Energy Wales: A Routemap to a Clean, Low-Carbon and More Competitive Energy Future for Wales – Consultation Document (2005)	SA
The Welsh Microgeneration Action Plan (2007)	D
Wise about Waste -The National Waste Strategy for Wales (2002)	SA
Planning Policies and Documents	
Planning White Paper Planning for A Sustainable Future (2007 (draft))	D
Planning Policy Wales (2002)	SA
TAN 8: Planning for Renewable Energy (2005)	SA
Tan 12: Design (2002)	D
Planning for Climate Change Consultation Document – Welsh Assembly Government (2006)	D

Table 1 Policies likely to influence the emerging Vale of Glamorgan LDP in relation to sustainable energy

Documents labelled 'SA' are included within the Vale of Glamorgan Sustainability Assessment report. Documents labelled 'D' have been identified by Dulas.

The above documents are reviewed in detail within Part 1 of the detailed report on which this outline summary is based.

3 Summary of Climate Change and Energy Policy Implications

Local Development Plans should have reference to relevant emerging policies. In the case of energy and carbon emissions these policies form part of rapidly emerging Climate Change and Energy frameworks based on headline targets.

- UK CO_2 reduction of 12.5% (on 1990 levels) by 2010 (Kyoto)
- UK CO_2 reduction of between 26 & 32% by 2020 (proposed, climate change bill)
- UK CO_2 reduction of 60% (on 1990 levels) by 2050 (proposed, climate change bill)
- Welsh CO_2 reduction of 20% (on 2000 levels) by 2020 (Environment Strategy)
- Welsh renewable electricity target of 4TWhr/annum by 2010
- Welsh renewable electricity target of 7TWhr/annum by 2020

The UK policy development trend indicates that even to achieve current targets much more robust intervention will be required alongside an expansion of the carbon reduction role for local authorities and LDPs.

The Welsh Assembly Government has adopted targets on a similar scale so the expectation is for similar measures (although a couple of years behind) to UK policy.

It is already clear as to how energy policy and renewable energy targets are to be transmitted to Welsh planning policy (this is reflected in the TAN 8 summary in the main document).

In setting out the requirement for renewable energy UK energy policy makes the responsibility of all Local Planning Authorities explicit in the 'Statement of Need on Renewable Energy' within the 2006 Energy Review and 2007 White Paper.

The Welsh Environment Strategy identifies that a process of policy development will be needed to achieve effective carbon reductions. A re-evaluation of the role of land use planning is singled out in particular, which is discussed in the Planning for Climate Change Consultation Summary discussed in the following section.

Government is also acting to ensure that local planning policy ceases to be a barrier to the installation of small scale renewables. As outlined in the Environment and Microgeneration strategies, retrofit microgeneration is scheduled to be largely removed from the scope of planning permission through amendment to the permitted development criteria (in fact guidelines for most domestic scale technologies have been firm for some years, but this has often been overlooked in practice).

The further requirements set out in the emerging framework, particularly the Climate Change Bill and the Energy White Paper 2007, will be filtered down to LPAs through Planning Policy to be developed 'in due course' by the Welsh Assembly Government (WAG).

The complication is that it is not clear in policy or practice how these targets are to be devolved to local authorities via WAG, therefore it is unclear what the scope of the LDP should be in this respect

For wider carbon reduction, and particularly for the achievement of low carbon, development policy is in the process of formation, particularly in Wales due to the delays inherent in the devolution settlement and the filtering of energy policy responsibilities into planning policy.

In planning for a 2011 adoption date the conclusion must be that the Vale of Glamorgan should reference framework climate change and energy policy to predict the future direction of planning policy and the likely scale and nature of energy developments and proposals.

The energy and climate change policies framed by national governments will determine the scale, nature and economic viability of energy and infrastructure development. The role of the LPD will be to facilitate such development based on an assumption that low and zero carbon technologies (and practical measures such as development co-location) will be massively more prevalent during the plan period and increasingly driven by a policy framework which requires their adoption through regulation, legislation and market mechanisms.

In terms of carbon reduction for non-energy development the LDP scope must be broader and the requirements to be made of developers will need to be much firmer than set out within the current UDP. At a Wales level the emerging (but incomplete) policy framework indicates a key role for local planning authorities in the development of carbon neutral developments and the promotion of on-site renewable energy. Energy and carbon considerations will be a core consideration within land use planning, and will become much more closely integrated with Waste policy as ambitious targets require that increasing volumes of waste are diverted from landfill.

In conclusion the scale of targets and the expanding scope of policy indicate that LDPs will need to be constructed with future refinement in mind.

4 Summary of Planning Policy Implications

The wider climate change and energy policy framework (outlined within Part One of the detailed report on which this outline summary) prioritises carbon emissions reduction and the promotion of renewable energy. Extremely challenging targets have been set in both cases and a clear trend towards greater intervention, even greater targets and more robust policy development is evident.

The planning system is considered to be a pivotal mechanism for achieving carbon reduction and low carbon development; however there is also concern that the planning system as currently constituted does not respond to climate change imperatives in a manner and speed which are appropriate to the scale and timing of the requirement.

The planning policy framework is being reviewed at all levels in order to address this issue with major interventions proposed, from the highest level of strategic UK energy infrastructure to building control considerations concerning domestic microgeneration.

In the Welsh context proposed amendments to Planning Policy Wales explicitly set out to facilitate renewable energy, the realisation of carbon reductions and the achievement of low carbon development as key objectives for local planning authorities to address through LDP policy.

Planning Policy Wales requires that local development plan policies should be consistent with national and international carbon reduction targets and obligations, and should have regard to the emerging policy on the levels of renewable energy and carbon reduction measures required.

The planning policy framework in the UK and Wales is currently a ‘work in progress’, particularly with reference to energy and low carbon development. At the Welsh level the need to look again at the contribution that planning can make to tackling climate change was clearly signaled in the Environment Strategy for Wales 2006.

The latest mechanism for realising these changes is ‘Planning for Climate Change Consultation’ (which also summarises and references the key climate change issues for LDPs contained within PPW and MIPPS). The cross cutting ‘Planning for Climate Change’ framework has been proposed in order to fast track changes across the existing range of Welsh Planning Policies and relevant Technical Advice Notes. In the medium term it is noted that the whole of PPW is due for urgent review in the light of climate change requirements.

The framework for major infrastructure planning (including energy infrastructure) is emerging at a UK level. It is currently unclear how powers will be distributed under the Constitutional Settlement.

It is expected that the role of Local Planning Authorities will be further developed in forthcoming UK and Welsh guidance. The likely direction of such guidance is determined by the context of the wider emerging climate change and energy framework discussed within Part One of the detailed report.

4.1 Recent Ammendments and Alterations to PPW

Planning Policy Wales is due for wholesale revision in the period to 2010. Current policy already contains a requirement to encourage greenhouse gas reductions and renewable energy generation with regard to national and international targets and emerging policies.

The amendments to PPW set out within the Climate Change MIPPS update policy by specifically identifying the need to reduce carbon emissions as a key principle:

> "Contributing to the reduction of predicted CO_2 emissions towards the long term UK aim of a 60% reduction from the 1990 Kyoto baseline by 2050, which should be facilitated by applying the following staged approach to development allocations and proposals:
>
> - maximising design and location opportunities to reduce energy demand;
>
> - considering the use of energy efficient supply measures to meet the reduced demand; and
>
> - incorporating a proportion of on site renewable energy generation."

A Key policy objective is set out as:

> '"Contribute locally to global sustainability and address the causes and potential impacts of climate change by ensuring that development maximises the opportunity to:
>
> - reduce energy and water use, and to promote renewable energy and efficient energy and water supplies, and
>
> - ensure the causes and impacts of climate change are taken into account in the location of development allocations and design and siting of proposals." (see Sections 5.6 to 5.8 and 13.2 to 13.4)"

TAN 8 and the associated MIPPS require an energy assessment of LPA areas and the development of positive and supportive policies across the range of renewable energy technologies. The predominant TAN 8 policy relating to large scale onshore wind development is not directly relevant to the Vale of Glamorgan as there are no 'Strategic Areas of Search' within the Vale. Nonetheless positive policies are required for smaller wind development up to 5MW, and it will be for the Vale to specify an approach to the definition of 'community development' in such cases.

The approach to domestic scale renewables ('microgeneration' technologies in the DTI's phrase) will be simplified by a forthcoming expansion of the General Permitted Development Order, however the approach to design and on-site renewables within new low carbon development will be complicated by the Assembly Government's re-definition of design and the approach outlined in the Planning for Climate Change consultation.

TAN 8 raised the prospect of Energy Design Reports for larger development alongside powers to make technologies such as solar thermal a requirement for all appropriate applications. The draft MIPPS significantly strengthens the powers available to LPAs and emphasises planning as a key mechanism to mitigate climate change and deliver low/zero carbon development.

The amendments relating to infrastructure and services, the new definition of design and the role of design statements have particular implications for LPAs as below:

'Infrastructure and Services' (amendments to section 12.1 objectives paragraph 12.1.6):

'"to ensure every opportunity is taken to use energy efficient, low carbon supply measures to meet demand. Major development is expected to incorporate decentralised heating, cooling and power (CHP) networks, preferably powered by renewable energy sources, or to connect to existing CHP (and CCHP) or communal/district heating networks.
- to ensure every opportunity is taken to maximise the provision of renewable energy generation from microgeneration equipment in new and existing development, including allowing for future inclusion as part of the design of buildings where it is not being incorporated.'

'Promoting Sustainability through Good Design' (additions to section):

"2.9.1 Design is taken to mean the relationship between all elements of the natural and built environment. To create sustainable development, design must go beyond aesthetics and include the social, environmental and economic aspects of the development, its construction, and its relationship to its surroundings.

2.9.4 The design process should also ensure that development contributes to tackling the causes of climate change by reducing greenhouse gas emissions and to effective adaptation to impacts. An integrated framework for and staged approach to climate responsive development, including location, density, layout, built form and ensuring in-built flexibility for varying uses over the lifetime of the development will be an appropriate way of contributing to the achievement of sustainable development. This will need to be demonstrated in design statements (see new Section 2.2.1).

2.9.12 In preparing design and access statements which should include energy advice reports where relevant (as described in TAN 8: Renewable Energy), applicants should take an integrated and inclusive approach to sustainable design, proportionate to the scale and type of development proposal. They should deal with all relevant aspects of design, clearly state the comprehensive design principles adopted and include illustrative material in plan elevation and section where relevant."

This approach provides the context for the amendment to the TAN 8 MIPPS Section 12.9 Development plans and sustainable energy:

> "Local planning authorities should include within development plans a policy requiring major developments to reduce their predicted CO_2 emissions by a minimum of 10% (from the current baseline required by building regulations) through improvements to the energy performance of buildings, efficient supply of heat, cooling and power and/or on site renewable energy. The scale of development for the application of the policy and the percentage reduction selected will need to be determined locally, based on sound evidence and the need for planning policy to interact effectively with developing building control requirements."

The compendium approach attempts to provide a kind of tool kit for LDP development. It is something of an interim measure and provides numerous references and examples of possible policy mechanisms and approaches. In particular the following issues are left open to LPA definition and innovation:

- The detail of the 'staged approach'
- The percentage carbon reduction to be required for new development (beyond current building regulation)
- The definition of major development
- The interpretation of, and relationship between, policies to reduce demand, achieve energy efficient supply and promote on-site renewable energy
- The development of policies to take advantage of specific local opportunities

The weaknesses of current policy lie in the fact that policies and information are only partially developed and are, and will be, subject to review before the introduction of the LDP. PPW is to be overhauled, TAN 8 is to be reviewed, and LPAs do not yet have reliable carbon benchmarks at a local level.

Arguably there is a fairly clear requirement for LDP policies relating to larger renewable energy generation, and the retrofit of smaller technologies within the built environment. It is also clear that the Assembly Government sees a much greater role for LPAs in delivering low/zero carbon development. This involves much scope for variation and positive intervention but also introduces the potential for much greater complexity, particularly in establishing how planning is to interface with building regulations and the proliferation of building and residential environmental performance standards on offer.

It is possible that in relation to new low/zero carbon development the most sensible approach is to ensure that the LDP framework takes account of the new powers and responsibilities (ie provides a sufficiently robust basis on which to address the scale and scope of the likely requirement) and to expect that the detail of requirements for design statements, energy assessments and percentage reductions will be dealt with primarily through more flexible SPG.

Existing Vale of Glamorgan policies have been overtaken by the new policy requirements to the extent that a totally fresh, cross cutting approach is more appropriate than an attempt to update the UDP policies.

5 Summary of Energy Assessment

Within the physical boundary of the Vale all other individual and collective sources of carbon emissions are dwarfed by Aberthaw's output of 5.1 M tones of CO_2. Aberthaw also accounts for the largest proportion of renewable energy generation (0.16TWh e although unfortunately biomass co-firing with coal is not an effective long term method of reducing carbon emissions), and by far the largest surplus heat source.

It is recognised that current statistical data does not support local authorities in establishing and monitoring realistic carbon reduction targets at a local level.

The Department for the Environment, Food and Rural Affairs (DEFRA) and the (former) Department of Trade and Industry have been working to produce estimated carbon dioxide emission statistics at a local authority level, however the methodology of data collection and aggregation is not yet established and accordingly the government is keen to stress that these statistics are to be regarded as 'experimental' and therefore to be used with caution.

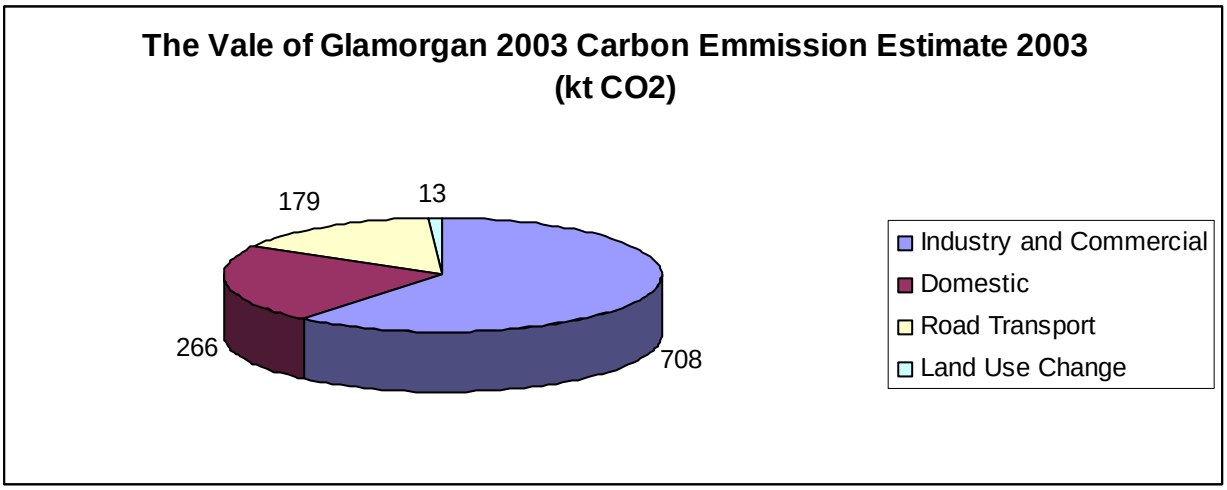

Figure 1 Illustration of 2003 Carbon Emissions (DEFRA Experimental data)

The experimental data indicates that in 2003 the Vale of Glamorgan itself was responsible for somewhere in the region of 1.16 M tonnes of $C0_2$. Aberthaw supplies power to a much larger area than the Vale of Glamorgan and accordingly only part of the resulting carbon emissions are allocated to the Vale.

Based on an assumed population of 121,000 the data also indicates a per capita CO_2 figure of 9.6 tonnes and a domestic per capita figure of 2.2 tonnes. A report based on this 2003 data arrived at an estimate of 4622kg CO_2 per dwelling within the Vale of Glamorgan.

The Carbon Trust have indicated a willingness to assist LPAs in establishing robust baselines for carbon emmisions in each local authority area and should be contacted if the Council wishes to establish a performance benchmark.

5.1 Renewable Energy

5.1.1 Wind

With the exception of biomass the Vale has limited capacity for the development of large renewable technologies. There is potential for four or five small wind clusters (below 5MW) with an expectation that perhaps 10MW of capacity would be realistically consented. Even this would require a potentially expensive technical solution to radar interference issues.

With a number of provisos , 4 areas have been identified where the indicated windspeeds are in excess of 6.5 m/s, and the distribution of dwellings indicated on the map would accommodate up to 3 turbines. The criteria used to identify the areas were:

- Windspeed in excess of 6.5 m/s
- No international or national planning designations
- Within 5 km of 33 kV grid

The four areas with the indicated windspeeds are set out below and shown on Map 1: Renewable Energy Potential.

	Location	**Windspeed at 45 m**	**Comments**
W1	South of St Donats	7.5	2-3 turbines, good access
W2	Colwinston	6.8	2-3 turbines, good access
W3	South of Corntown	6.6	3 turbines
W4	East of Wick	7.4	3-4 turbines, good access, less constrained by property. Could be constrained by RAF St Athan

Table 2 Areas identified for wind energy

As part of the current LDP process, land at the Port of Barry (Barry Waterfront) has been submitted as a candidate site, with a proposal that the land is allocated as a brownfield site suitable for wind energy within the LDP. The indicated windspeed at that location is 6.4 m/s, and the area may be constrained due to the proximity to Cardiff Airport.

For the purpose of this study it is assumed that if radar interference solutions were in place at Cardiff airport and RAF St Athan and all five of the sites identified above were submitted to the planning authority, only 2 of these sites would get permission. This would equate to 10MW of wind energy, based on an indicative maximum size of 5MW per site in line with TAN8 policy.

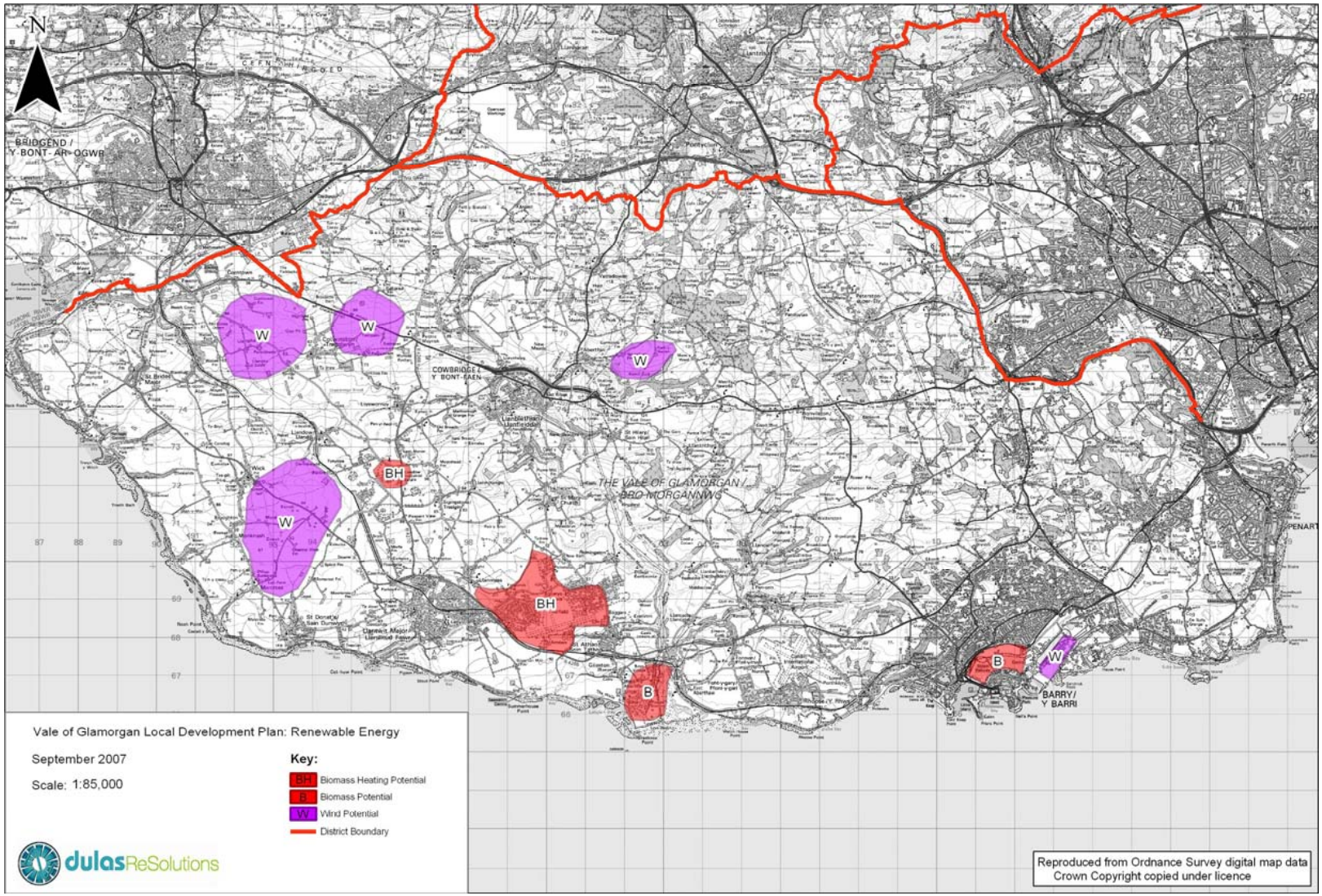

Figure 2 Areas of Renewable Energy Potential (Wind and Biomass)

5.1.2 Biomass

Biomass technology does present opportunities at all scales.

- Small scale installations are appropriate for individual homes and buildings (particularly for off-gas areas).
- Two areas, Barry Waterfront and Llandow Industrial Estate, have been identified as suitable for medium scale district heating
- One development, DTA St Athan, has been identified as suitable for the utilisation of heat from generation at Aberthaw Power Station.

The areas suitable for large scale installation are illustrated on the map above. Additionally biomass networks should be a consideration for residential and mixed development at any scale over 25 units or so and would be particularly appropriate for high density brownfield sites.

5.1.3 Microgeneration

In terms of building linked renewable energy there is considerable scope for contribution from retro-fit microgeneration, however in this case the LDP role is largely limited to removing barriers in line with the aims of the proposed GPDO.

There is more scope for practical intervention in relation to new low and zero carbon development using the new powers available. Particular attention should be paid to developments of a scale to justify infrastructure investment, and care should be taken to balance the carbon savings available from fossil fuel based solutions against the alternative of renewable (biomass) provision.

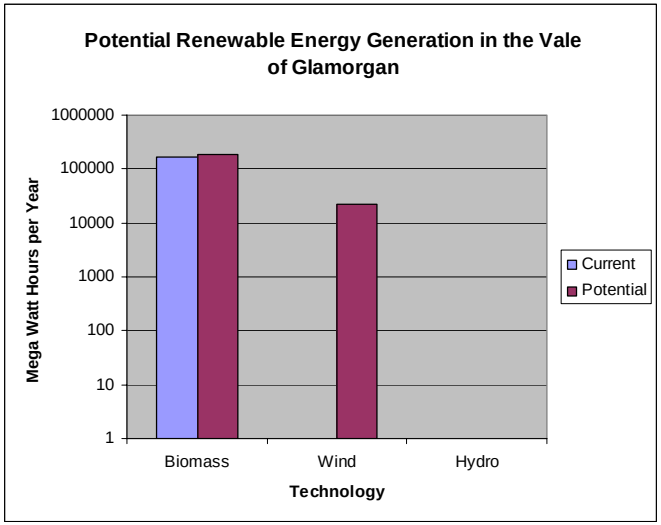

Figure 3 Current and potential renewable energy capacity

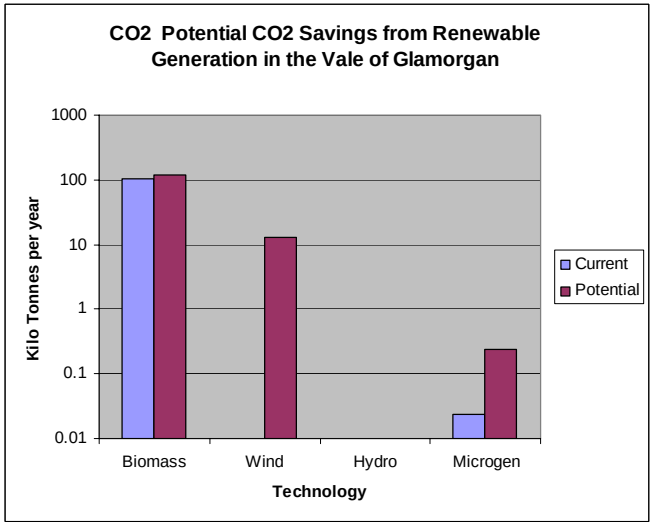

Figure 4 Current and potential carbon reduction from renewable energy

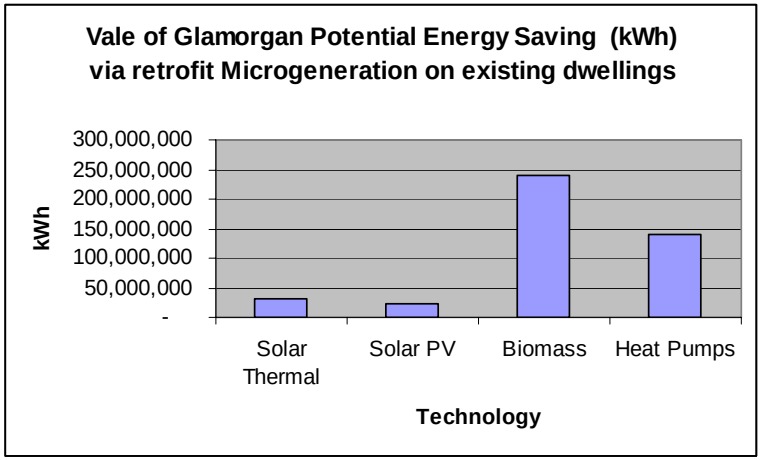

Figure 5 Potential energy saving retrofit microgeneration

6 Conclusions and Recommendations for the Vale of Glamorgan LDP

6.1 Broad Conclusions

The wider climate change and energy policy framework prioritises carbon emission reduction and the promotion of renewable energy.

The planning system is considered to be a mechanism for achieving carbon reduction and low carbon development, however there is also concern that the planning system as currently constituted does not respond to climate change imperatives in a manner and speed which are appropriate to the scale of the requirement.

- **The emerging policy framework makes it very clear that in relation to energy the key objective of LDP should be to contribute to carbon reduction.**

The energy and climate change policy framework is still in a process of rapid development, and the Council will need to be guided by the direction of the evolving framework development as much as by the detail of current policy (much of which is likely to be replaced by the plan period).

Unsurprisingly, since it relates directly to wider energy and climate change policy, planning policy in relation to energy is in an even earlier stage of development, resulting in considerable uncertainty for LPAs in developing appropriate LDP policies and frameworks.

It is worth summarising the current position at 3 distinct levels:

1) Major infrastructure and generation above 50MW capacity – decided at UK level. A centralised fast track process is under development (draft Planning White Paper 2007)
2) Distributed generation and commercial scale renewables - Welsh planning powers. Policy set out in TAN 8 with particular emphasis on wind - due for review before 2010
3) Microgeneration, on- site generation design and energy efficiency – Welsh planning powers and refinement to the general permitted development order is proposed

In the Welsh context proposed amendments to Planning Policy Wales explicitly set the facilitation of renewable energy, the realisation of carbon reductions and the achievement of low carbon development as key objectives for LPAs to address through LDP policy.

Headline carbon targets have been set for Wales, however at the local regional level only 'experimental' statistics are officially available. The carbon consumption statistics should be viewed as providing LDP policy context rather than used to set a performance benchmark. With these caveats stated it is noted that the 'experimental' data indicates a Vale of Glamorgan carbon emission figure of 1.16 million tonnes of CO_2 – and therefore indicates a requirement to displace in the region of 0.7 million tonnes of CO_2 in order to meet a 60% reduction target.

- **It is understood that the Council have been working with the Carbon Trust to develop a wider 'Vale of Glamorgan Carbon Management Strategic Implementation Plan' which is scheduled for adoption in April 2008.**
- **The Carbon Trust have been working to establish robust carbon emission baselines for Wales and it is recommended that the Council should continue to work with the Carbon Trust to establish robust carbon emission figures at Vale of Glamorgan level.**

Scope of LDP opportunity

In reality the implementation of the majority of carbon reduction measures fall outside the powers available to local planning authorities.

Development applications to the Vale are likely to concern either proposals for new energy generation (commercial below 50MW electrical or serving existing development) or proposals for developments requiring energy services.

The Vale of Glamorgan LDP can facilitate and encourage appropriate renewable energy generation in line with the requirements of TAN8, however the energy assessment (Part 3) indicates that below 50MW capacity there is relatively little opportunity for commercial scale generation. Despite this limited capacity the action to be taken by the Vale is relatively clear and firm conclusions and recommendations are provided

The LDP can minimise planning barriers to the installation of small scale renewable energy in line with TAN 8 and the proposed amendments to permitted development rights. In itself this positive step will have little direct impact on levels of uptake, however the action to be taken by the Council is relatively clear and firm conclusions and recommendations are provided.

Finally, the LDP may set out the Vale of Glamorgan's requirements for low carbon development of all types. These will achieve carbon reductions to the extent that they replace more carbon intensive existing development and infrastructure (additional development means additional carbon). This pro-active approach to carbon reduction is relatively new and emerging 'fast track' planning policy ventures into uncharted territory and suggests that the route to achieving low and zero carbon development should be defined through an iterative process of policy development between LPAs and the Welsh Assembly Government.

It is considered that in this area the Vale of Glamorgan can have the largest positive impact on carbon emissions. Unfortunately, at this stage in the development of national policy concerning low carbon development it is not possible to provide detailed guidance and recommendations simply because the information available at this early stage simply does not allow us to separate the potential impact of enhanced local planning role from the impact of an enhanced building regulatory function.

Context of Recommendations

We have provided recommendations to support LDP which are intend to enable the Council to clearly set out the context in which low carbon development is required and make it clear what will be expected of developers with reference to a clear energy hierarchy and the requirement for an energy design statement.

At this stage what cannot be included is a recommendation as to the specific quantified requirement couched in terms of % beyond building regulations or % renewable contribution.

It is recommended that policy development proceeds with the expectation of introducing a specific requirement via SPG once the parameters of the building regulation framework are known. The trend of policy development indicates that the ability to be flexible and to review and potentially strengthen requirements within a relatively short timeframe will be a positive advantage.

6.2 Structure and Approach

As detailed within Part 2 it is considered that existing Vale of Glamorgan policies have been overtaken by the new policy requirements to the extent that a totally fresh, cross cutting approach is more appropriate than an attempt to update the UDP policies.

Policies in support of renewable energy generation (with reference to TAN 8) can be largely addressed within a specific Energy chapter of the emerging Vale of Glamorgan LDP. As previously noted, the policy guidance in relation to remote and retrofit renewable generation is relatively clear, whilst that relating to low carbon development remains open for debate and consultation

However, to address the need to minimise carbon emission to the full extent possible (with reference to the current proposed amendments to PPW) it is considered that the Vale of Glamorgan will need to adopt a cross cutting approach to carbon reduction in new development which runs through every policy and strand of the LDP.

The importance attached to promoting energy conservation and renewable energy generation could be reflected in appropriately formulated strategic aims within the LDP designed to clearly convey

i) The intention to encourage appropriate renewable energy generation (inc heat)
ii) The intention to promote energy efficiency, energy conservation and renewable energy in relation to all developments

On the basis of these stated aims the Vale of Glamorgan LDP could incorporate a clear and concise strategic policy statement on energy conservation and generation.

EXAMPLE POLICY - ENERGY CONSERVATION & GENERATION

A. ALL DEVELOPMENTS SHOULD DEMONSTRATE THAT ENERGY CONSERVATION, EFFICIENCY, AND RENEWABLE ENERGY MEASURES HAVE BEEN CONSIDERED AND, WHERE PRACTICABLE, INCORPORATED.

B. APPROPRIATE PROPOSALS FOR ENERGY GENERATION FROM RENEWABLE SOURCES WILL BE APPROVED PROVIDING THAT THEY MEET THE LANDSCAPE, ENVIRONMENTAL, AMENITY AND OTHER REQUIREMENTS SET OUT IN THE OTHER POLICIES OF THIS PLAN.

Figure 6 Example policy based upon Powys County Council UDP 2001-2016 Deposit Draft, 2004

This suggested structure has two distinct parts:

Part A serves as the basis for detailed policy within a specific energy chapter. Within a LDP such a section would typically outlines the legislative and environmental background before moving on to policies largely related to specific technology and types of generation.

Part B serves to outline energy conservation and efficiency as a cross cutting policy theme to be incorporated across the development plan. Accordingly, energy issues are a component part of generic policies, environment policies, housing, economy, retail and commerce,

transport and tourism, recreation and leisure, community services, minerals and waste and general development policies.

6.3 Energy and CO_2 in New Development

In order to make clear the scope and scale of the Vale of Glamorgan's requirement for carbon reduction in new development, it is recommended that the Vale of Glamorgan adopts headline policies which set out:

1. **The basic logic of the Vale of Glamorgan's Approach to carbon reduction expressed as an 'Energy Hierarchy'**
2. **The requirement for developers to provide a design statement and energy assessment of proposed developments which demonstrates the steps taken to apply the principles of the Energy Hierarchy**
3. **The Vale of Glamorgan's requirement for major development to achieve CO_2 reductions beyond those required by building regulations and/or a proportion of energy needs via on site renewables.**
4. **Clarification of the robust approach to energy assessments (specific and quantified) which developers must adopt within design statements**

On the basis of current information we do not consider that it is possible to specify a 'percentage beyond benchmark' carbon reduction/ renewables requirement for major development during the period 2011-2026. This is because the scope and scale of the (non planning) regulatory requirement is currently unknown.

The Vale of Glamorgan LDP is expected to make specific energy requirements proportionate to the scale and type of development. We suggest that on the basis of current guidance:

5. **A criteria based (minimum standards) approach is most appropriate to minor development**
6. **A 'percentage beyond benchmark' carbon reduction/ renewables requirement is most appropriate for major development**
7. **A site specific 'minimum feasible carbon' approach is appropriate for very large development**

Headline polices should provide a robust framework for these requirements, however it is recommended that the specific requirements are detailed within SPG.

6.4 Strategic/Headline Policies

6.4.1 Energy Hierarchies and the staged approach

The Climate Change compendium recommends that a staged approach is adopted which sets out an order of priority and context for supporting policies designed to achieve maximum levels of carbon reduction.

As outlined in the compendium document the draft MIPPS gives significant flexibility to LPAs in setting policies to reduce demand, achieve efficient supply and encourage on-site generation.

In the context of Welsh Assembly aspiration to achieve zero carbon development towards the beginning of the plan period it is recommended that the Vale of Glamorgan adopt the following order of priority:

Stage 1: Use Less Energy
Stage 2: Use available Heat
Stage 3: Use renewable energy
Stage 4: Supply Energy Efficiently

This formulation specifically prioritises zero carbon renewables over the energy efficient supply of fossil fuel based energy (via CHP and district heating for example). This is considered more appropriate to 'step-change' in approach to carbon reduction required within the timescale 2011-2026.

In specific and exceptional circumstances it may be preferable for a development to take advantage of an existing fossil fuel based heat resource (which may otherwise be wasted) than to consume a resource such as biomass. The Vale of Glamorgan will need to ensure that underlying policies relating to specific requirements for development are flexible enough to take account of co-location with existing fossil fuel generation.

The logic behind this recommendation is that whilst more efficient fossil fuel based (district heating/ CHP and CCHP) supply is obviously to be preferred to inefficient centralised generation – the scale of carbon reduction is limited by definition for the lifetime of the infrastructure (perhaps 20 years).

6.4.2 Design Statements

Emerging guidance and legislation require that the LPD adopts a much more robust approach to promoting low carbon development through design requirements. Design statements should now be central to Vale of Glamorgan Council consideration of energy and carbon reduction policy for new development.

We have had reference to the London Plan Policy 4A.8 and the Powys policy 'Designing Energy Efficient developments' (IDCG) and would recommend that the Vale of Glamorgan consider a set of headline policies similar to the examples below:

All developments will be required to provide an assessment of the energy demand of the proposed development, which should also demonstrate the steps taken to apply the Vale of Glamorgan's energy hierarchy

Minor development will be required to address minimum standards criteria set out within (refer to SPG).

Major developments will be required to show that development would:
a) Reduce CO_2 emissions below the current baseline required by building regulations
b) Generate a proportion of the site's electricity or heat needs from renewables, wherever feasible, to the extent required within (refer to SPG).

Development proposals which do not demonstrate, through the design statement, how appropriate energy conservation, energy efficiency, and renewable energy measures have been considered and incorporated into the design, will be refused by the Local Planning Authority.

Design statements should include an assessment of the energy demand and carbon dioxide emissions from proposed major developments, which should demonstrate the expected energy and carbon dioxide emission savings from the energy efficiency and renewable energy measures incorporated in the development, including the feasibility of renewable energy CHP/CCHP and community heating systems.

The assessment should include:

- Calculation of the baseline energy demand and carbon dioxide emissions;
- Proposals for the reduction of energy demand and carbon dioxide emissions from heating cooling and electrical power
- Proposals for meeting the residual energy demands through sustainable energy measures (including the use of surplus heat wherever practicable)
- Calculation of the remaining energy demand and carbon dioxide emissions.

6.5 Specific Energy Requirements – Energy and CO_2 in new development

Planning policy guidance supports local planning authorities in seeking to achieve carbon reduction via specific energy requirements.

TAN 8 supports LPAs in setting out minimum standards such as the requirement for particular renewable technologies for particular development types. Amendments to PPW suggest that requirements should be proportionate to the scale and type of development.

The [draft] MIPPS on Climate Change (12.9.1) provides a tool for setting specific carbon reduction requirements for major development:-

"Local planning authorities should include within development plans a policy requiring major developments to reduce their predicted CO_2 emissions by a minimum of 10% (from the current baseline required by building regulations) through improvements to the energy performance of buildings, efficient supply of heat, cooling and power and/or on site renewable energy. The scale of development for the application of the policy and the percentage reduction selected will need to be determined locally, based on sound evidence and the need for planning policy to interact effectively with developing building control requirements."

Amendments to Chapter 12 of PPW 'Infrastructure and Services' are set out within paragraph 12.1.6 of the draft MIPPS. LPAs are instructed as follows:

"to ensure every opportunity is taken to use energy efficient, low carbon supply measures to meet demand. Major development is expected to incorporate decentralised heating, cooling and power (CHP) networks, preferably powered by renewable energy sources, or to connect to existing CHP (and CCHP) or communal/district heating networks

"to ensure every opportunity is taken to maximise the provision of renewable energy generation from microgeneration equipment in new and existing development, including allowing for future inclusion as part of the design of buildings where it is not being incorporated …"

(Draft Climate Change MIPPS amendments to section 12.1 objectives paragraph 12.1.6)

It is suggested that with currently available information the Vale of Glamorgan can best accommodate specific energy requirements through an approach which sets out:

- **A criteria based (minimum standards) approach for minor development**
- **A 'percentage beyond benchmark' carbon reduction/ renewables requirement for major development**
- **A site specific 'minimum feasible carbon' approach very large development**

Planning policy guidance enables LPAs to define what constitutes 'major development' – our recommendations assume that the Vale of Glamorgan will adopt a conventional definition close to that of the TCPI (10 houses or 1000m^2).

It is recommended that within SPG the Council develops a stack of policies with a sliding scale of requirement - minimum standards for all development, a higher blanket requirement for major development, and zero carbon infrastructure requirements for very large development.

In terms of cost effective carbon saving potential the largest developments should be targeted – the objective should be to achieve the infrastructure required for a zero carbon development.

It is recommended that the Council seeks to address the major carbon saving opportunities of very large developments with long term planning requirements at the earliest possible date. The process to be adopted is almost identical to that recommended for general major development, however the emphasis should be on the justified expectation that low carbon infrastructure should be proportional to the scale of development.

In view of the Assembly Governments 2011 zero carbon building aspiration the Vale of Glamorgan should be confident that it is entirely reasonable to expect that such development should achieve zero carbon status or as near as is practicable. In the case of DTA St Athan or other developments with significant public sector leverage the council, acting in partnership with the Assembly Government, should seek to make this requirement very clear from the earliest possible opportunity.

6.5.1 Minor Development (Minimum Standards recommendation)

There is no practical reason why a percentage renewable energy policy should not apply to minor development of a single dwelling and above. Equally there is no particular reason why *at the present time* a % beyond building regulations policy could not be applied).

In practice the MIPPS policy relating to this requirement specifies its application to 'major development'.

To avoid complexity it is recommended that a minimum criteria approach is adopted for minor development. This should include a requirement, justified against TAN 8, that solar thermal should be installed as part of all developments at all scales wherever it is practicable. An example of such a policy is provided below:

> The incorporation of solar water heating schemes in proposals is required where it is practicable to do so. Any scheme not incorporating solar hot water must provide justification for no doing so in the design statement accompanying that planning application, such a justification may for instance include reasoning that the technology is not required since the buildings hot water is generated from another, more suitable renewable technology.
>
> 'Designing Energy Efficient Development' Powys County Council IDCG

The provision within TAN 8 is reinforced within the Climate Change Compendium worked example, which also suggests that LPAs should adopt policies requiring that development proposals should demonstrate that PV has been installed where appropriate and that all developments should identify how design is adaptable to the future integration of micro generation.

It is recommended that the Council adopts policies similar to the examples provided within the compendium document. The examples reproduced below could be incorporated in policies outlining the requirement for energy assessment and design statements.

> *All development proposals to demonstrate how the provision of appropriate microgeneration equipment has been installed, in particular solar water heating and where appropriate solar PV.*

> *All developments to identify how building design is adaptable to future installation of micro generation equipment*

The reasonable expectation of the Vale of Glamorgan in relation to minor development could be usefully presented in a matrix which sets a checklist of appropriate technologies against development type.

It is recommended that the Vale of Glamorgan adopt an approach similar to that set out as Powys Interim Development Control Guidance. This matrix is reproduced below:

7 Matrix of appropriate energy efficient measures against development types

The matrix below must be used by those preparing planning applications; it will be used as a checklist by planning officers in scrutinising development proposals and design statements.

R Required, compulsory where practicable – Planning applications not incorporating these technologies will be refused unless the non-incorporation is fully justified in the design statement.

I Investigate, these measures should be included where investigations show that such measures are practicable, fit with the site context and are appropriate to the integrated design solution.

N Not considered necessary for an application to investigate or include this measure.

Development type

A Essential Rural Workers dwellings in the open countryside, rural building conversions outside development limits, isolated building redevelopment, affordable housing for local needs in rural settlements

B Small sites / redevelopments of <5 inside development limits and rural exception schemes of <5

C Allocated / windfall / redevelopment and exceptions sites of 5 or more dwellings

D Householder applications

E Non residential buildings development / redevelopment <1000sqm

F Buildings >1000sqm

Measure	**Development Type**					
	A	**B**	**C**	**D**	**E**	**F**
Site layout and orientation, passive solar design & water management. (Water management considered in separate IDCG)	**R**	**R**	**R**	**R**	**R**	**R**
Solar thermal systems (Solar Hot Water)	**R**	**R**	**R**	**R**	**R**	**R**
Green roofs	**I**	**I**	**I**	**I**	**I**	**I**
Community heating / heat and power	**N**	**N**	**I**	**N**	**I**	**I**
Biomass fuel	**I**	**I**	**I**	**I**	**I**	**I**
Solar electric (Electricity)	**I**	**I**	**I**	**I**	**I**	**I**
Micro hydro power	**I**	**I**	**I**	**I**	**I**	**I**
Heat pump technology	**I**	**I**	**I**	**I**	**I**	**I**
Micro Combined heat and power	**I**	**I**	**I**	**N**	**I**	**I**
Small scale wind energy	**I**	**I**	**I**	**I**	**I**	**I**

The Powys IDCG has been out to consultation and is now nearing adoption. The only substantive objection to the document came from the Home Builders Federation. Unfortunately no formally adopted policies of this type have been identified elsewhere in Wales.

6.6 Major Development (percentage beyond benchmark conclusions)

The area where policies set out within the Vale of Glamorgan could have the greatest direct impact on predicted carbon emissions is also the area with the newest and least established guidance as to how carbon savings are to be achieved.

The MIPPS amendments to PPW Ch12 (Infrastructure and Services) make it clear that in the case of major development it is reasonable for a Local Planning Authority to require that issues of low carbon infrastructure, co-location and connection to heat and power networks to be addressed within design statements and adopted where practicable.

The policy direction set out within Planning for Climate Change could be characterised as 'experimental'. In arriving at policy recommendations for this area it is particularly important to have reference to the emerging national policy and regulation framework, and to the criteria of environmental build standards such as the Code for Sustainable Homes and the (as yet unpublished) Code for Sustainable Buildings. These standards provide the building standard 'benchmark'.

The status of the Code for Sustainable Homes provides an example of the current complexity of the situation. In terms of energy the Code is directly linked to building regulation standards and calculation methodologies. It is intended to serve as a 'route-map' setting out the requirements of a progressive tightening of building regulations relating to heat and power cumulating in a requirement for 'zero carbon' homes in 2016.

The Welsh Assembly has set itself an extremely challenging target of achieving 'zero carbon' homes by 2011 and has announced that it is seeking the devolution of building regulations effective from 2008. The Assembly Government has not yet confirmed that it will be adopting the Code as a standard in Wales.

It is recommended that the Council reconsider the specific requirement for major development when this information becomes available.

At this stage planned LDP policies in relation to energy in new build development should be structured so as to provide a robust basis for whatever specific requirement, or combination of requirements, may be considered most appropriate.

The '*Structure and Approach*' section (6.2) provides an example how headline LDP policies alongside a clearly stated energy hierarchy/ staged approach could provide a clear structure, order of priority and context for energy in new development.

It is recommended that the headline LDP policy clearly sets out the requirement for and expectations of a development design statement, however to provide flexibility it is recommended that the specific detail of requirement(s) for development(s) is set in SPG.

Unfortunately, with the information currently available it is not possible to provide recommendations on the percentage targets which may be appropriate and feasible within the plan period. It is recommended that this is addressed through SPG as and when the framework and timescale for regulation towards zero carbon development become known.

Informal discussion with Welsh Assembly Government representatives suggests that changes to the final Planning for Climate Change document are likely to clarify this position. The implication is that this document will only be released following the decision regarding devolution of building regulation powers and the announcement of a routemap and timescale for the achievement of low carbon buildings. At this point it will be possible for the Vale of Glamorgan to consider specific carbon requirements on the basis of a more certain benchmark.

It will be for the Council to adopt a position regarding what is considered practicable in relation to energy and carbon emissions for major development proposals.

Developers are likely to argue that initial capital cost renders infrastructure investment economically impractical, however the Vale should have reference to the experience of the London Plan in defining (and defending) a position on what is deemed practicable.

Further, it is almost inevitable that within the timescale of the Vale LDP (2011-2026) that the regulation towards zero carbon development will have prompted major expansion of combined utility infrastructure and service companies (Energy Service Companies or ESCo).

For the domestic sector initial studies such as the cost review of the Code for Sustainable Homes estimate that beyond a 44% reduction below 2006 building regulations carbon emissions district heating is the sensible economic choice, and an ESCo arrangement the most efficient means of financing such infrastructure.

It is recommended that within design statements major developments are required to demonstrate that the most carbon efficient energy efficient supply has been adopted wherever feasible.

In the case of known sites for very large proposed development this requirement could form part of SPG or master planning. As general policy for areas not currently identified the Vale of Glamorgan may want to consider inserting additional design and energy requirements for developments which are:

a) within urban areas of high density
b) of a sufficient scale to merit consideration of specific energy infrastructure
c) located close to a source of surplus heat or additional capacity
d) In an area served by an existing or proposed heat and/or power network

In both cases, given the likely timescale for LDP implementation it should be clearly communicated to developers that the Vale of Glamorgan's expectation is that such developments should achieve at least carbon neutral status, and should investigate the potential for the complementary supply of zero carbon infrastructure to adjacent areas.

Except where 'waste' heat can be utilised it is generally preferable, in carbon terms, to promote renewable heat and electricity generation over fossil fuelled CHP or district heating. This consideration should inform the adoption and ordering of a policy outlining a 'staged approach' or energy hierarchy.

It may be that under policies adopted by the council the installation of fossil fuel heat and/or power networks represents the largest currently achievable carbon saving. In this case, wherever possible it is recommended that the council should require that provision is made for the future incorporation of renewable technology. In the case of Biomass heat and/or power this requirement would be for the provision of suitable space and access for boiler plant, fuel deliveries and storage.

6.7 Prescriptive requirements to reduce carbon emissions

There are numerous ways in which policies to encourage on-site renewables can complement or be combined with policies on reducing energy demand.

In developing major development policies based upon the 'minimum of 10%' policy within the draft MIPPS a whole range of options are open to the LPA. For example it would be possible to:

- specify a higher percentage beyond building regulations carbon reduction (as illustrated by the CSH level 3 scenario equivalent to over 20% beyond current 2006 building regs),
- specify a percentage beyond building regulations **and** an on-site renewable energy requirement
- provide a weighted option requiring **either** a (higher) percentage beyond building regulations to be achieved through energy efficiency **or** a (lesser) percentage from on-site renewable energy
- Provide a weighted option requiring either a (higher) percentage beyond building regulations or a (lesser) percentage subject to installing specific measures (such as provision for future connection to a planned district heat main)

The 2011 baseline regulatory carbon requirement for residential and non-residential development in Wales is currently undefined, and this makes it impossible to recommend an appropriate formulation and percentage requirement. Rather we have recommended that the Vale adopts headline policies within the LDP which are capable of accommodating a variety of specific targets (likely to vary over time) within SPG, and that these targets are developed when the regulatory requirement for the beginning of the plan period is known.

If the Council wishes to examine the current economics of promoting particular combinations of renewables versus other measures we would recommend reference to the London renewable tool kit (all development) and the cost review of the code for sustainable homes report.

It is recommended that due to the potential complexity of the formulation, and the variability of outcome in carbon terms, the Vale of Glamorgan should seek to work closely with development control in the development of policy and should seek to model the carbon impact of proposed formulations.

We note that on-site renewables become much more commercially attractive as the carbon requirements of building regulations / Code for Sustainable Homes get tighter, and we would also refer to the Government's stated intention to put an increasingly higher cost on carbon over the period of the plan.

6.7.1 Cardiff Rule versus Merton Rule

Within the Planning for Climate Change compendium document a number of English policies are referenced which require that a minimum of 10% of the predicted CO_2 requirement of development should be delivered through on-site renewables (the policy originated with the London Borough of Merton, hence the descriptor 'Merton Rule').

The Cardiff Rule policy set out in the draft MIPPS uses building regulation carbon requirements as a benchmark and empowers LPAs to require that developments reduce their predicted CO_2 emissions by a minimum of 10% beyond current building regulations.

This apparently minor difference creates a host of issues and we consider that the use of the building regulations as a carbon target is inherently problematic for the development of future LDP policies.

Merton Rule policies are based on the total predicted CO_2 requirement of development. This includes a benchmark allowance for energy use within building which is not captured by building regulations which, by definition, focus on the energy performance of buildings themselves. For residential development the use of various electrical appliances would account for this additional energy. In non-residential development it could be anything from computer usage to industrial process heating or machinery (in practice predicted requirements are based on established development type benchmarks) and in many cases constitutes a very significant proportion of total predicted CO_2.

It is this energy use not accounted for by building regulations which makes the minimum CO_2 savings which result from a Merton rule 10% renewable policy greater than the Cardiff rule 10% beyond building regulations policy.

At present, due to the additional cost of renewables Merton style policies currently have the advantage of providing an inbuilt economic incentive to improve energy efficiency beyond building regulations in order to reduce the proportion of total energy attributable carbon to be offset through on-site renewables. A Cardiff rule policy would not have this effect since building regulations are themselves the benchmark.

This problem intensifies as the carbon requirements of building regulations are tightened with subsequent revisions. At the point at which building regulations specify a 100% improvement over building regulations for homes (ie a zero Dwelling Energy Requirement) the Cardiff rule becomes obsolete simply because any percentage beyond zero remains zero.

Under the current distribution of powers building regulations set by Whitehall seem likely to require a zero DER at some point between 2014 and 2016 (which the government has announced as the target date for the achievement of completely zero carbon homes).

The Welsh Assembly Government is seeking building regulation powers and has announced an aspiration to achieve zero carbon buildings (as yet undefined) by 2011, presumably through building regulations. In theory this means at the point at which the Vale of Glamorgan LDP is scheduled to come into full force the Cardiff Rule policy could cease to have any practical effect.

For this reason we consider that it would be more appropriate for the Vale of Glamorgan to adopt policies and carbon benchmarks based on predicted total building carbon emissions. We recognise that this formulation differs from that set out within the draft MIPPS.

Within the Planning for Climate Change consultation document the Assembly Government pledges to remain open to innovative evidence based policy. Paragraph 8 of the introduction to the draft Climate Change Compendium states that:

'The Assembly Government will expect LPAs to provide climate change policies in their LDPs using the examples outlined in this document. Innovation in this field has been led by LPAs and new LDP policies or processes not covered in this document that address climate change will be encouraged assuming evidence/justification is provided to support them.

Accordingly we have developed appropriate policy wording for major residential and non residential development. We would recommend that the formulation of policy wording is discussed with the Planning Division and Sustainable Buildings Project Manager of the Welsh Assembly Government.

All new residential developments of over 20 dwellings shall incorporate on-site renewable energy installation/s or additional energy efficiency measures. Such installations and/or measures should be sufficient to reduce emissions of carbon dioxide associated with the heating, lighting and use of the building (ie including cooking and appliances) by a minimum figure that shall be determined by the Council and incorporated into Supplementary Planning Guidance. Such installations and/or measures shall always be in addition to any that are installed in order to comply with the Building Regulations in force at the time.

All new non-residential buildings of over 1,000 sq m total floor area should incorporate on-site renewable energy installation/s (or where appropriate high quality gas fired combined heat and power). Such installations should be sufficient to reduce emissions of carbon dioxide associated with all activities to be undertaken within the building (including heating and lighting) by a minimum figure that shall be determined by the Council and incorporated into Supplementary Planning Guidance. In exceptional circumstances where the development is to be used for purposes that require particularly high quantities of electrical energy and on-site generation is not practical, this may be sourced from off-site renewable energy installations. This policy shall also apply to any building where a change of use entails an increase in anticipated emissions of carbon dioxide by 10% or more over the previous use.

6.8 Very Large Development

Opportunities to develop renewable supply infrastructure have been identified in relation to a number of sites where district heating/ cooling /CHP may be particularly appropriate. The most notable sites are Barry Waterfront, Llandow Industrial Estate and DTA St Athan.

In each case a detailed assessment will be required to establish the feasibility of such infrastructure. It is recommended that the Council adopts policies which require such an assessment as a component part of the design statement.

In terms of the costs of carbon reduction there is a tipping point after which a major developer may as well be required in to achieve very low or zero carbon development (in the case of housing anything above code level 4 essentially requires biomass heating). A combination of building regulation and commercial motives (linked to an increased cost of carbon) will increasingly encourage very low and zero carbon infrastructure. This process will be well underway (complete if the WAG zero carbon building aspiration is met) at the onset of the plan period in 2011.

In view of the potential for the cost effective achievement of major carbon reduction we would strongly suggest that in such cases the Vale of Glamorgan Council should be expecting the achievement of zero carbon (or even carbon negative) development, achieved through major investment in infrastructure.

This expectation should be communicated to developers at the earliest possible stage in the process.

In the case of the St Athans Defence Training Academy development it is recommended that the Vale of Glamorgan co-ordinate an approach to development with the Welsh Assembly Government Department for Economy and Transport who are understood to be handling the site disposal process with input from Energy Wales and the Assembly Low Carbon Buildings team. Informal discussion with the Assembly indicates that there is a willingness to push for the lowest possible carbon impact in this case.

6.9 Heat and Major Generation

Aberthaw power station is one of Wales largest sources of carbon emissions and coal fired electricity generation at Aberthaw power station produces over four times the estimated total emissions for which the Vale of Glamorgan administrative area is otherwise responsible (calculated by end user).

Major generation is outside the current scope of LPA and WAG powers but a decision regarding replacement of Aberthaw is likely to be taken within the plan period. It is therefore recommended that Vale of Glamorgan adopts a clear position in its role as statutory consultee,

The Council has little direct control over major centralised energy generation within the Vale of Glamorgan, but the Council may wish to adopt a policy expressing support for renewable thermal power stations (ie Biomass) with a view to establishing a clear position as a statutory consultee prior to the replacement of the current coal fired plant.

In addition it is expected that the cost of carbon and carbon cap and trade policies adopted by UK government will increasingly encourage co-location and the use of heat distribution networks. The Vale of Glamorgan could facilitate such processes by seeking to identify areas surrounding the current Aberthaw site as allocated for industries with high heat requirement (such as food processing).

It is also recommended that the Council adopt a related policy concerning heat. Heat produced as a by-product of major generation is commonly used for low grade industrial applications and to feed district heat networks. With reference to the co-location remit set out within amended PPW the Council may wish to develop a land use policy allocating areas around the power station for developments with high heat requirements (such as food processing or commercial laundries).

6.10 Renewable Energy Recommendations

The Assembly Government has set clear targets for the generation of renewable electricity for 2010 and 2020. TAN 8, Planning Policy for renewable energy is clear that the majority of the 2010 target is to be met through large scale wind and in designating specific areas suitable for large scale development (strategic search areas) is fairly prescriptive regarding how this is to be achieved.

In practical terms the Vale of Glamorgan has very little capacity to reduce carbon emissions through the facilitation of commercial scale renewable energy (with the potential exception of biomass using imported fuel). Wind energy capacities, very small scale hydro power and energy from waste are options but are largely limited.

Nevertheless, despite limited potential it is clear that Vale of Glamorgan has an obligation to develop a suite of positive planning policies to encourage renewable energy technologies and it is worth bearing in mind that wider energy and climate change policies intending to raise the cost of carbon (so heat as well as electricity) are likely to transform the economics of renewable energy projects within the lifetime of the plan.

In line with the requirements of TAN 8 (and presumably its scheduled update before 2010) it is expected that The Vale of Glamorgan will look to develop a set of positive criteria based policies for the range of renewable technologies.

Detailed technical guidance relating to technologies is not considered appropriate to LDP level policies, but may be usefully addressed through SPG or Development Control guidance notes. The information contained within Annexe A ‘Technology Overview’ may be useful in this respect. In relation to domestic scale renewables it is relevant to note that the WAG plan to extend the provisions of the GPDO to cover micro-generation technologies and specify the exceptional circumstances under which planning permission may be considered necessary.

A number of general recommendations are discussed below together with possible criteria for each of the major technologies and a number of suggestions for a more robust approach in certain key sectors.

6.10.1 Retro- fit Microgeneration

The retro-fit installation of small scale renewables on all appropriate dwellings within the Vale could make a significant carbon reduction[1]. Whilst local authorities can have a measurable impact on microgeneration levels the large scale uptake of such installation will be largely dependent on UK (and potentially Welsh Assembly) government measures and economic incentives.

UK and Welsh microgeneration policy is to kick start a mass market by making small scale renewable energy a sensible economic choice for consumers. The implication is that within the LDP timeframe local planning policy will need to account for retro-fit microgeneration installations on a massive scale.

In accordance with the WAG policy direction set out in TAN8 and the draft document 'Lifting the Planning Barriers to Domestic Energy Micro-generation - Proposed Changes to Permitted Development Rights' (July 2007) the vast majority of microgeneration installations are expected to be deemed permitted development. Local planning policy will need to be sufficiently positive in relation to each technology (see guidance within section 4 and detail in appendix A) with a focus on removing unnecessary barriers to installation and clearly presenting the criteria for exceptional cases where planning permission will be required.

6.10.2 Biomass Combustion

In addition to environmental benefits linked to carbon neutrality, biomass installations can have a positive impact on the local economy and the supply of biomass fuel can secure a long term income for farmers, forestry owners, contractors and transport workers. The planning implications for large scale Biomass and biomass combined heat and power plants will differ from the limited implications of small scale (below 5MW) biomass schemes.

6.10.3 Small Scale Biomass

Within the LDP the council may wish to express strong support for small biomass heating schemes throughout the County Borough and indicate that such schemes will be supported and approved provided that the following criteria can be met:

i. Visual intrusion is reasonable, and does not have a critically damaging impact upon the environment
ii. The development does not have a critically damaging impact upon important archaeological, historic, ecological or conservation sites.
iii. Access to the site is reasonable in terms of the frequency and method of fuel delivery, and does not prejudice highway safety
iv. Development does not significantly impact on the amenity of residents in terms of noise, dust, smell or fumes
v. Emissions to the air, ground or water are acceptable

[1] Whilst it is possible to estimate renewable capacity for housing stock on the basis of 'typical dwelling' assumptions linked to census data this is not possible for existing commercial and business premises.

With reference to criteria set out in the proposed permitted development rights for Wales, small scale biomass would be classed as permitted development in normal buildings as long as the flue height is no more than 1m above the ridge. No special provision would be given for storage/plant buildings.

6.10.4 Large Scale Biomass

Within the LDP the council may wish to express support for larger (in excess of 1MW) biomass schemes, provided that:

i. Visual intrusion is reasonable, and does not have a critically damaging impact upon the environment.
ii. The development does not have a critically damaging impact upon important archaeological, historic, ecological or conservation sites.
iii. Noise from traffic and plant operations accords complies with relevant standards (BS 4142 – industrial development may be appropriate).
iv. Traffic to and from the site is acceptable and appropriate to the area and does not prejudice highway safety. Development does not significantly impact on the amenity of residents in terms of noise, dust, smell or fumes.
v. Emissions to the air, ground or water are acceptable.
vi. Additional weight should be given to developments that are able to demonstrate that heat energy is utilised in addition to the generation of electricity.

6.10.5 Very Large Scale Biomass

The Energy Assessment noted the significant potential for very large scale biomass at a site on or close to the existing Aberthaw coal fired power station.

The power station at Aberthaw will reach the end of its effective life during the plan period. Decisions concerning very large scale biomass (above 50 MW electrical) fall outside of the powers of local planning authorities and the Welsh Assembly Government under the current Electricity Act. The Vale of Glamorgan may only be a statutory consultee in the decision making process concerning the replacement of Aberthaw however, in this capacity it is recommended that a general policy is adopted expressing support for a new renewable (biomass) thermal power station.

Very large thermal generation also provides opportunities for the Vale of Glamorgan to strongly encourage co-location of development with high heat loads and complementary infrastructure requirements. This issue is dealt with in more detail in section 6.8 *Very Large Development* .

6.10.6 Anaerobic Digestion

Anaerobic Digestion can provide a convenient method of waste treatment for some materials. Animal waste, sewage sludge and agricultural, household and industrial residues can all be used as feedstock.

Within the LDP the council may wish to indicate that AD facilities will be supported and approved provided that:

i. That the installation is visually acceptable and appropriate to its setting.
ii. That there is a road network of a standard appropriate to the anticipated nature and scale of traffic
iii. That there is a suitable means of vehicular access to the site.
iv. That noise from on-site operations would not exceed prescribed limits (BS4142 may provide appropriate standards)
v. That measures are in place to ensure that there is no significantly adverse impact by reason of dust, odour or fumes at any nearby sensitive properties (such as schools, residential or hotel properties)
vi. That any dumping of heat into the environment is fully justified and that it can be demonstrated that there is no practical alternative.

6.10.7 Solar Photovoltaics (PV)

TAN 8 indicates that local planning authorities will need to 'very clearly justify any refusal of planning permission for PV installations'. In general terms PV installations should be supported other than in circumstances where visual impact is considered critically damaging. In most cases PV installations should be considered to fall within the category of permitted development. Criteria within the consultation document on permitted development state that Solar on the roof and walls of buildings should be classed as permitted development if it protrudes less than 150mm from the roof/wall plan. However, on flats it would not be permitted development on walls or above the highest part of the roof excluding the chimney. Under the same guidance a standalone Solar system would be classed as permitted development providing that it was less than 4 metres in height, at least 5 metres to any boundary and a maximum panel dimension of 3m x 3m.

There is scope for Vale of Glamorgan to clarify criteria for possible refusal by specifying reasons with reference to listed buildings, ancient monuments or conservation area vistas.

6.10.8 Solar Thermal

TAN8 is strongly supportive of solar water heating, stating that 'Other than in circumstances where visual impact is critically damaging to a listed building, ancient monument or a conservation area vista, proposals for appropriately designed solar water heating should be supported'. In most cases SWH installations may be considered to fall within the category of permitted development. Criteria for solar thermal within the consultation document on permitted development in Wales are the same as that stated above for Solar Photovoltaics.

i. There is scope for Council to clarify criteria for possible refusal by specifying reasons with reference to listed buildings, ancient monuments or conservation area vistas.
ii. There is scope for the Council to require solar thermal in all appropriate development

6.10.9 Small Hydro

Small Hydro power is the most site specific of the small renewable energy technologies. Planning officers are likely to operate in close co-operation with the Environment Agency and conservation bodies. There will be a considerable amount of shared interest and responsibility and therefore a highly co-operative approach from an early stage is likely to be beneficial to all parties.

Within the LDP the Council may wish to express strong support for small hydro development provided that Environment Agency requirements are met. In practice the Environment Agency is likely to take a lead on the identification and assessment of technical and environmental criteria, although planning officers may lead in regard to issues including:

i) Noise
ii) Recreation and public access
iii) Disruption due to construction and operational procedures
iv) Visual impact in terms of siting and landscape considerations

Criteria set out within the proposed changes to Permitted Development states that there would be no change to hydro – that it will require planning permission.

6.10.10 Heat Pumps and Geothermal

Heat pumps have limited planning implications, and with the partial exception of external air source heat pumps, very little noise or visual impact. In most cases heat pump installations may be considered to fall within the category of permitted development.

i. There is scope for Vale of Glamorgan to clarify criteria for possible refusal by specifying reasons with reference to listed buildings, ancient monuments

Criteria within the proposed changes permitted development rights states that ground source heat pumps would be classed as permitted development. Air source heat pumps would be classed as permitted development, but depending on noise emissions, both internally and externally.

Vale of Glamorgan Local Development Plan

Renewable Energy

Vale of Glamorgan Local Development Plan

Renewable Energy

November 2007

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Executive Summary

The Vale of Glamorgan Local Development Plan (LDP) policies for renewable energy have to be driven, in common with all planning policy, by the hierarchy of International, National and Regional policies on climate change, renewable energy and building design.

It is now accepted that climate change is an extremely serious issue, and a reduction in carbon emissions in the short and medium terms is imperative.

International, UK Government and Welsh Assembly policies to address climate change are only just emerging, and these have to be reflected in the Vale of Glamorgan LDP. In many cases, the overarching policy framework is still largely aspirational or in formulation (beyond the policies formulated giving reduction targets for 2010) at the time of the LDP process and its subsequent adoption. The indication from this review of the policy framework is that carbon emission reduction targets are likely to ramp up in future, with much stronger policies to ensure that these targets are met. In view of the uncertainty regarding the wider policy context, the Vale of Glamorgan LDP should:

1. Address the emerging policy drivers, but regard them as being the *minimum* requirement for carbon emission reductions

2. Anticipate that the policy drivers will become stronger in the future, and therefore be sufficiently flexible to be augmented by Supplementary Planning Guidance or other instruments to reflect the rapid changes that are expected

A review of renewable commercial energy generation opportunities concludes that the potential for such developments within the Vale of Glamorgan is relatively low, being restricted either by lack of resource or by other land-use, technical and environmental constraints.

With one exception, the Vale has limited capacity for the development of large renewable technologies. There is potential for four or five small wind clusters (below 5MW) with an expectation that perhaps 10MW of capacity would be realistically consented. Even this would require a potentially expensive technical solution to radar interference issues. The resource for small hydro is extremely limited.

Biomass energy does present opportunities at all scales.

- Small scale installations are appropriate for individual homes and buildings (particularly for off-gas areas).
- Two areas, Barry Waterfront and Llandow Industrial Estate, have been identified as suitable for medium scale district heating
- One development, DTA St Athan, has been identified as suitable for the utilisation of heat from generation at Aberthaw

Additionally biomass networks should be a consideration for residential and mixed development at any scale over 25 units or so and would be particularly appropriate for high density brownfield sites.

A review of domestic scale ‘microgeneration’ indicates reasonable potential for retro-fit installations to existing dwellings. In combination these small scale renewables have the potential to more than halve carbon emissions from existing dwellings in the Vale.

There are clear planning policy frameworks for commercial scale and domestic renewable energy, and accordingly clear recommendations and guidance have been provided to enable the Vale of Glamorgan LDP to define and facilitate appropriate development.

The emerging policy framework also encourages the Vale of Glamorgan to strongly and pro-actively promote low carbon measures and renewable energy installations. It is clear that a significant expansion to the scope of LDP policies will be required in relation to carbon reduction for all new development, however the detail of this expectation is currently under-developed (and in places contradictory).

Nonetheless, there is significant scope for the Vale of Glamorgan to make a meaningful contribution to carbon reduction through policies to promote renewable energy in the built environment, and further low carbon building design, and energy conservation.

It is difficult to embed these in one set of policies on renewable energy: a more cross cutting approach is required, encompassing a number of policy areas.

Carbon savings resulting from planning obligations will be additional to those required by building regulations. Accordingly, the scale of potential carbon saving due to LDP policies in this area cannot be determined until the content and timescale of the wider building regulatory framework is established. This is currently a work in progress.

In order to provide an appropriate planning policy framework whilst retaining flexibility as to quantitative carbon reduction targets for new development it is recommended that Vale of Glamorgan LDP policies should set out:

1. The basic logic of the Vale of Glamorgan's approach to carbon reduction expressed as an 'Energy Hierarchy'

2. The requirement for developers to provide a design statement and energy assessment of proposed developments which demonstrates the steps taken to apply the principles of the Energy Hierarchy

3. The Vale of Glamorgan's requirement for major development to achieve CO_2 reductions beyond those required by building regulations and/or a proportion of energy needs via on site renewables.

4. Clarification of the robust approach to energy assessments (specific and quantified) which developers must adopt within design statements

5. A criteria based (minimum standards) approach is most appropriate to minor development

6. A 'percentage beyond benchmark' carbon reduction / renewables requirement is most appropriate for major development

7. A site specific 'minimum feasible carbon' approach is appropriate for very large development

1. General Introduction and Background

The Planning and Compulsory Purchase Act 2004 and The Town and Country Planning (Local Development Plan) (Wales) Regulations 2005 place a statutory duty on all Unitary Authorities in Wales to prepare and adopt a Local Development Plan (LDP) for their administrative areas.

In January 2007, the Vale of Glamorgan Council formally commenced work on its LDP, which once adopted will replace the Vale of Glamorgan Adopted Unitary Development Plan 1996 - 2011. The LDP will set out the Council's land use strategy and policies for planning and development in the Vale of Glamorgan from 2011 to 2026.

The imperatives of Climate Change adaptation and mitigation are generally acknowledged to require significant changes to the 'business as usual' process of policy development, including LDP development. The urgent objective of achieving major greenhouse gas reductions within a short timescale is increasingly resulting in Climate Change and Energy policy frameworks which cut across traditional frames of reference and which require rapid implementation and delivery.

More than two thirds of the world's carbon dioxide emissions result from the way we use energy. Energy Policy is obviously central to any climate change strategy, however because of the far reaching implications of Climate Change sustainable energy considerations are increasingly important components of planning policies at all levels. Climate Change mitigation therefore provides the context for requirements and incentives to support renewable energy and energy efficiency.

Within the context of a wider Energy Strategy the Welsh Assembly Government has established specific renewable energy production targets for Wales of 4TWh per annum by 2010 and 7TWh per annum by 2020. The planning process is integral to the achievement of these targets.

The Renewable Energy Ministerial Interim Planning Policy Statement (MIPPS) 01/2005 requires local planning authorities to undertake an assessment of all potential renewable energy resources, renewable energy technologies, energy efficiency and energy conservation measures. The MIPPS also states that Local Planning Authorities (LPA's) should facilitate the development of all forms of renewable energy, energy efficiency and energy conservation measures within a sustainable development framework.

The Council has appointed Dulas Ltd to examine the opportunities and constraints to the development of renewable energy and energy efficiency within the Vale of Glamorgan, and to provide the evidence base to inform decision making regarding policies on renewable energy for the Local Development Plan.

Part 1: Policy and Document Review

2. Policy Context

Climate change and energy issues increasingly tend to cut across traditional policy boundaries. For the purposes of this report the wider UK sustainable development framework has been interpreted to include broad Sustainable Development strategies, Climate Change policies plans and programmes with direct reference to Energy, and Energy Policy itself.

The objectives and targets set within this wider framework directly inform the content and development of planning policy guidance regarding renewables and low carbon development. The interlinked UK and developed nation framework structure is reflected in the reality of energy planning policy development in the UK and Wales.

Timescales and policy development processes are being rushed in order to address pressing targets, and the result is sometimes messy. Welsh policies are often a response to, and sometimes a reflection of, those of the UK.

Dulas has sought to identify and consider relevant UK and Wales based policies, plans and programmes relating to Renewable Energy and affecting or influencing the emerging Vale of Glamorgan LDP. The majority of these plans and policies are currently referenced within the LDP Sustainability Appraisal (SA) Scoping Report produced by the Council. This document seeks to identify and assesses the implications of a comprehensive range of policies, plans and programmes.

Dulas has identified the plans, policies and programmes contained within the SA which are considered directly relevant to the energy agenda (and therefore the scope of this report). In each case Dulas has provided additional commentary where it is considered that specific energy related objectives or implications for LDP require more detail.

Dulas has also identified and reviewed policies, plans and programmes which are not within the current scope/ timescale of the SA but which fall within the wider sustainability and planning framework and are considered relevant in terms of establishing context and the trend of policy development.

Please note that a number of new relevant policies are expected before the adoption of the Vale of Glamorgan LDP, not the least of which are the scheduled review of TAN 8 and the expected update of PPW, which will have bearing on the LDP process. However, importantly the matters addressed in this report address the context and general trend in policy direction relating to climate change and renewable energy.

The following documents have been identified as likely to affect or influence the emerging Vale of Glamorgan LDP in relation to sustainable energy.

Document Name	Identified
UK Policies and Documents	
UK Sustainable Development Strategy 2005	SA
UK Climate Change Programme (2000/2006)	SA
Energy White Paper: Our energy future – creating a low carbon economy (DTI 2003)	SA
Meeting the Energy Challenge: A White Paper on Energy (DTI 2007)	D
Microgeneration Strategy (2006)	D
UK Waste Strategy (Defra 2000)	SA
Welsh Policies and Documents	
Starting to Live Differently - The Sustainable Development Scheme of the National Assembly for Wales (2004)	SA
The Sustainable Development Action Plan of the Welsh Assembly Government 2004-2007	SA
The Welsh Assembly Government Environment Strategy for Wales (2006)	SA
Energy Wales: A Routemap to a Clean, Low-Carbon and More Competitive Energy Future for Wales – Consultation Document (2005)	SA
The Welsh Microgeneration Action Plan (2007)	D
Wise about Waste -The National Waste Strategy for Wales (2002)	SA
Planning Policies and Documents	
Planning White Paper Planning for A Sustainable Future (2007 (draft))	D
Planning Policy Wales (2002)	SA
TAN 8: Planning for Renewable Energy (2005)	SA
Tan 12: Design (2002)	D
Planning for Climate Change Consultation Document – Welsh Assembly Government (2006)	D

Table 1 Policies likely to influence the emerging Vale of Glamorgan LDP in relation to sustainable energy

NB. Documents labelled ‘SA’ are included within the Vale of Glamorgan Sustainability Assessment report. Documents labelled ‘D’ have been identified by Dulas.

3. UK Policies and Documents

The Climate Change and Energy Policy framework is a work in progress for the UK and Wales. At a headline level, the UK 'Climate Change Strategic Framework[1]' is currently being developed with the intention to establish in legislation the goal of transforming the UK to a low carbon economy, principally through the introduction of 5 year Carbon Budgets.

The UK Climate Change Bill is the central plank of the emerging legislative framework. In line with international commitments it proposes to establish a legal basis to UK commitments to reduce CO_2 emissions by 60% below 1990 levels by 2050 and by between 26% and 32% by 2020.

The UK government also intends to bring forward a series of policy measures through documents including the recent Energy White Paper, the UK Waste Strategy and the UK Planning White Paper. In due course the Welsh Assembly Government will produce complementary policies in each area of devolved responsibility.

In terms of Energy and Climate Change UK policy generally precedes the adoption of appropriate measures within Wales (usually linked to targets set at UK level). The UK context therefore provides guidance as to the predicted policy direction for Wales and an indication of what is likely to be in the pipeline for Welsh Local Planning Authorities and the Vale of Glamorgan in particular.

3.1. UK Sustainable Development Strategy 2005

The UK Government launched its strategy for sustainable development, 'Securing the Future', in conjunction with a Strategic Framework.

The strategy introduced a set of high-level indicators: the UK Framework Indicators to give an overview of sustainable development and the priority areas in the UK. The framework and indicators are appropriate for incorporating within local development plans, however the specific targets and indicators relevant to energy and climate change are drawn from the UK Climate Change Programme and Energy Policy.

Wales has adopted a similar framework and approach with targets and indicators which are more directly relevant to the development of the Vale of Glamorgan LDP.

3.2. UK Climate Change Programme (2000/2006)

The 2000 UK Climate Change Programme sets out policies and priorities for action both in the UK and internationally. In particular it details how the UK plans to deliver its Kyoto target to cut greenhouse gases by 12.5% (on 1990 levels) and move towards a domestic goal to cut carbon emissions by 20% below 1990 levels by 2010.

Specific aims are to:

- Improve business's use of energy, stimulate investment and cut costs;
- Stimulate new, more efficient sources of power generation;

[1] The UK Government has set out a broad summary of the Climate Change Strategic Framework at http://www.defra.gov.uk/environment/climatechange/uk/legislation/pdf/CCBill-Strategy.pdf . The document is intended to set the context for the proposed UK Climate Change Bill.

- Cut emissions from the transport sector;
- Promote better energy efficiency in the domestic sector;
- Improve energy efficiency requirements of the Building Regulations;
- Continue the fall in emissions form agriculture and forestry;
- Ensure the public sector takes a leading role.

The revised UK Climate Change Programme was published in 2006 and set out a package of new measures to take the UK towards the 2010 domestic carbon emissions target. These included new measures for reducing emissions arising from the energy, business, agriculture, domestic, transport and public sectors.

The 2006 programme reaffirmed local government responsibilities in the light of the 2003 Energy White Paper and specifically identified the role of land use policies in reducing emissions, especially in relation to the location, design, and construction of new buildings.

As detailed within the introduction to this section an updated and more ambitious Climate Change strategic framework centred on a Draft Climate Change Bill is currently under development.

3.3. Energy White Paper: Our energy future – creating a low carbon economy (DTI 2003)

The 2003 Energy White Paper contains quantified targets for a number of policies, including carbon emissions and electricity generation from renewable sources (a target of 10% by 2010, and an aspiration to reach 20% by 2020) and the industrial use of oil and gas.

The aims of the White Paper are stated as follows:

- To put ourselves on a path to cut the UK's carbon dioxide emissions - the main contributor to global warming - by some 60% by about 2050, as recommended by the Royal Commission on Environmental Protection, with real progress by 2020;
- To maintain the reliability of energy supplies;
- To promote competitive markets in the UK and beyond, helping to raise the rate of sustainable economic growth and to improve our productivity; and
- To ensure that every home is adequately and affordably heated.

The Sustainability Assessment summary states that 'Efficient use of natural resources is a key component of sustainability. The SA framework should include objectives for improving energy efficiency and the reduction of greenhouse gas emissions.'

The SA rightly notes that 'LDP policies should take account of the need to minimise the use of energy and to reduce greenhouse gas emissions, particular in regard to transport and access, building design and the increased use of renewable energy'.

3.4. Meeting the Energy Challenge: A White Paper on Energy (DTI 2007)

The UK government produced the Energy Review Report 'Our Energy Challenge: Securing Clean Affordable Energy for the Long Term' in July 2006 to propose measures needed to meeting the goals set out in the 2003 Energy White Paper.

With reference to the aims of the previous White Paper the strategy examined the following energy related issues:

- Carbon Reduction & Climate Change
- Energy Efficiency- Homes, Transport and Industry
- Renewable Energy- Winds, Solar, Wave, Biomass
- Nuclear Energy, Oil, Gas and Coal
- Fuel Poverty

Following consultation and clarification these measures were detailed in the 2007 White Paper. The Energy White paper set out the UK Governments international and domestic energy strategy to deliver the four policy aims outlined below:

- *to put ourselves on a path to cutting CO_2 emissions by some 60% by about 2050, with real progress by 2020;*
- *to maintain the reliability of energy supplies;*
- *to promote competitive markets in the UK and beyond;*
- *to ensure that every home is adequately and affordably heated.*

Referring to the consultation Review the SA report notes no specific targets and indicators relevant to the Vale of Glamorgan LDP and SA, but makes reference to the expectation that English LPAs should 'include policies in their development plans that require a percentage of the energy in new developments to come from on-site renewables, wherever viable.'

This expectation is strengthened in the 2007 White Paper, but again this is a requirement for English authorities and regions, the relevant planning powers being devolved matters. (In a recently issued draft MIPPS on Climate Change the Welsh Assembly Government have proposed a parallel policy based on a building regulations benchmark).

The current devolution settlement does not grant primary energy powers to the Welsh Assembly Government, however the White Paper is generally careful not to appear overly prescriptive in relation to the devolved administrations, stating only that

'It is expected that the Devolved Administrations will:

- *Want to consider in due course how to take forward their responsibilities that are relevant to energy policy.'*

As the position of the WAG in relation to energy policy is not dissimilar to that of the English Regional Assemblies it may be relevant to outline the roles and responsibilities of these bodies (and associated Regional Development Agencies (RDAs) identified by the White Paper) in the expectation that the Welsh Assembly Government may consider adopting similar (or greater) measures in order to meet its responsibilities.

Key points:

9.7 As part of their role in delivering the priorities identified in this White Paper at a regional level, RDAs have committed to:

- *set carbon reduction targets in their corporate plans; publish an estimate of the carbon they expect to save from their policies and programmes by 2010 and 2020; and update these estimates at least annually as they develop new programmes*

- *identify energy supply chain opportunities and set out priorities for promotion and support (by December 2007)*

- *work with Sector Skills Councils and Regional Skill Partnerships to develop programmes to support the development of key energy skills, including:*
  - *engineering, project management and heavy construction;*
  - *operation and maintenance;*
  - *key suppliers and service providers to the energy sector;*
  - *areas necessary to facilitate the move towards zero carbon development including sustainable construction, the installation of energy efficiency and microgeneration technologies, and the project management/legal skills necessary for the establishment of Energy Services Companies (ESCOs);*

- *ensure all regeneration projects (from December 2007) and other developments for which RDAs provide funding or land meet carbon emissions standards significantly in advance of those required by Building Regulations (e.g. at least 10 BRE Environmental Assessment Method (BREEAM) carbon credits). This includes commercial developments not covered by the Code for Sustainable Homes*

- *play a key role in advocacy for the development of critical energy infrastructure*

- *provide support through monitoring and advice on strategic proposals.*

9.8 With their detailed knowledge of existing and likely locations for new development in the regions, RDAs are ideally placed to identify opportunities to exploit the sustainable use of heat. They are key consultees in the revised guidance on CHP for developers considering proposals for new large-scale power stations under section 36 of the Electricity Act. New power station developers will be signposted to seek advice from RDAs on potential customers for heat when considering the viability of heat recovery in new power plants.

9.9 RDAs are also well placed to pilot focussed approaches to financing and managing the sustainable production and delivery of energy, for example, through local ESCOs.

9.10 Where appropriate, RDAs will develop Community Energy Solutions (CES) companies like those currently being piloted in the North East and Yorkshire and Humber. These develop and deliver projects that bring together gas network extensions, energy efficiency installations, advice on benefits and small-scale renewables in communities with a high incidence of fuel poverty.

In terms of implications for the LDP the SA report notes the England emphasis but suggests that 'the development of on site renewable energy and carbon neutral developments should also be considered within the LDP'.

The requirements on English local government which are set out above are a useful indication of the likely direction of Welsh policy. However there is at least one area where the Energy Review and the Energy White Paper does impact directly on the devolved powers of the Assembly

Government, with direct implications for Welsh local authorities is in relation to the context of planning policy for renewable energy.

The Energy White paper re-affirms the 'statement of need on renewable generation' published as part of the 2006 Energy review. The statement makes clear the over riding importance of addressing carbon reduction targets, and the role of renewable energy in achieving such reduction. Local Planning Authorities are instructed to consider take account of this need in determining local planning decisions and in developing local planning policy.

> *7.27 Government has decided to give greater clarity on the strategic issues relating to renewables. As such, we are publishing, as part of this report, a clear statement of need at annex D. This is to be used as a material consideration, alongside PPS22 in England and TAN8 in Wales*

The Statement of Need is reproduced as an Appendix.

3.5. Microgeneration Strategy (DTI 2006)

Microgeneration is defined as 'the production of heat and/or electricity on a small-scale from a low carbon source' the original DTI definition classified microgeneration as below 50kW electrical and/or 45kW thermal.

The UK Microgeneration policy is the sister document to the WAG 2006 Microgeneration Action Plan. The strategy and action plan aim to create conditions under which 'micro-generation' becomes a viable source of energy generation for homes, communities and businesses.

In relation to LDP development the UK strategy and Welsh Action Plan require that the planning regime (currently considered a barrier to uptake in many cases) should become more supportive – In particular the strategy announced a review of permitted development rights for householders in 2007 and consideration of other buildings thereafter. These measures are to be pursued through the planning policy framework.

Welsh LPAs, with reference to relevant planning polices (including forthcoming permitted development rights) will be expected to interpret such policy and guidance as positively as possible. In particular LDPs will need to include positive provision an avoid being unduly prescriptive concerning microgeneration.

3.6. UK Waste Strategy (Defra 2000)

This strategy describes the Governments vision for managing waste and resources better. The strategy contains the following headline statements:

- Changing the way we manage waste and resources can make an important contribution to improving our quality of life.
- To tackle the amount of waste produced, breaking the link between economic growth and increased waste.
- Where waste is produced, we must put it to good use, through re-use, recycling, composting and recovering energy.

The strategy contains the following key targets:

- by 2005 to reduce the amount of industrial and commercial waste sent to landfill to 85% of that landfilled in 1998
- to recover value from 40% of municipal waste by 2005
- to recover value from 45% of municipal waste by 2010
- to recover value from 67% of municipal waste by 2015
- to recycle or compost at least 25% of household waste by 2005
- to recycle or compost at least 30% of household waste by 2010
- to recycle or compost at least 33% of household waste by 2015

(Also see WAG targets contained within Wise about Waste Strategy (June 2002))

The SA states that '*This strategy is relevant to the LDP in that planning policies may affect the delivery of the UK's waste strategy.*' However the implications for the Plan are rather understated in that there needs to be a very significant investment in waste management facilities in order to achieve the landfill diversion targets. This issue is discussed further in relation to Welsh Waste policy.

4. Welsh Policies and Documents

The relationship between the policy framework and energy related planning policy development is somewhat complicated by the constitutional settlement in Wales. The need to respond rapidly to UK set policies and targets occasionally leads to planning policy 'jumping the gun' in relation to the Welsh policy framework.

In particular the reliance on planning policy to deliver Welsh energy policy by proxy (in the absence of devolved energy powers over major generation) and the delays in translating UK policy objectives to the Welsh framework can be expected to cause additional difficulty for Welsh Planning Authorities seeking to develop long term LDP policies.

Nonetheless, the Welsh climate change and sustainability framework sets out the context and key objectives which are subsequently addressed through planning policy. In particular Welsh targets for renewable energy and carbon reduction are inevitably reflected in planning policy.

The section below highlights the most relevant documents constituting this framework.

4.1. Starting to Live Differently - The Sustainable Development Scheme of the National Assembly for Wales (2004)

The National Assembly for Wales has a duty under section 121 of the Government of Wales Act 1998 to promote sustainable development in the exercise of its functions.

The Scheme is the National Assembly's overarching strategic framework and sets out the vision of a sustainable future for all of Wales, where action for social, economic and environmental improvement work together to create positive change:

- *Action in our built and natural environment that enhances pride in the community, promotes biodiversity, promotes local employment and minimises waste generation, energy, water and transport demands;*

The Sustainable Development scheme outlines a requirement for LPAs to ensure that LDP policies are consistent with national sustainability objectives and targets, and provides a framework against which measures and policies can be assessed.

4.2. The Sustainable Development Action Plan of the Welsh Assembly Government 2004 – 07

The Action Plan sets out key actions that the Welsh Assembly Government believe will constitute a 'step change' in delivering sustainable development in Wales. The Action Plan contains various targets and indicators several of which are directly relevant to climate change and energy. The following themes are of particular relevance:

- Climate change
- Our Natural Environment
- Delivering with Local Government

The SA notes the 'Need to ensure that LDP Policies are consistent with national sustainability objectives and targets' and that 'SA principles should compliment the WAG's vision of sustainable development in Wales.'

4.3. The Welsh Assembly Government Environment Strategy for Wales, 2006

The Environment Strategy is the Assembly Government's long term strategy for the environment of Wales, setting the strategic direction for the next 20 years. It is therefore directly relevant to the Vale of Glamorgan LDP period 2011-2026.

The Environment Strategy and related Action Plan summarise the impacts of climate change and set out the Assembly Government's commitment to reducing greenhouse gas emissions, maintaining existing carbon stores and ensuring effective adaptation. This includes the key carbon reduction targets which can be expected to directly influence planning policy.

The first Environment Strategy Action Plan was published alongside the Strategy. It contains details of the specific, additional actions that will be taken to deliver the outcomes in the Environment Strategy.

4.4. Relevant Action Plan commitments

The Environment Strategy Action Plan commitments are as follows:

- Commitment to set ambitious greenhouse gas reduction targets (set at 20% by 2020 on 2000 baseline of 46.114 mega tonnes of CO_2.

- Calculate the carbon emissions, which current and proposed policies generate and use this information to adjust policies to deliver carbon savings.

- We will set out in our Energy Routemap an energy mix, where renewable and low carbon sources will have growing importance and which will deliver secure energy supplies that minimise carbon emissions and negative impacts on the environment (Publish Final Route Map Document by end 2006 Lead: WAG (EW)).

- We will consider how the installation of micro - renewable energy generation systems can be encouraged through using the planning system. (Complete consideration by end 2007 - Lead: WAG (Planning), Partner: WAG (EW), local authorities)
  Aim to publish Biomass energy strategy by end 2007 - Lead: WAG (EW) Partners: WAG (EDT), FCW
  Review progress of microgeneration action plan and future prospects by end 2007 - Lead: WAG (EW) Partners - CT/EST
  Review timescales and prospects for hydrogen in Wales by end 2007 - Lead: WAG (EDT) Partners: Universities

- We will examine how land use planning can contribute to addressing climate change. (Complete consideration by end Mar 2007 - Lead: WAG (Planning) Partners: WAG (other departments).

- We will evaluate the contribution of TAN 15 to climate change adaptation.

Start work on project by summer 2007 - (with completion 2008) Lead: WAG (Planning) Partners: EAW, Local authorities, CCW.

The first two action points will have the furthest reaching implications for planning policy and for local development plans – it is not yet clear what level of carbon savings are expected of LPAs or how the savings from LPA policies would fit into the proposed process of carbon calculation, review and adjustment.

In common with the UK as a whole Wales is currently at the start of a policy development process based on carbon targets. The scope of policies to be developed at a Welsh level is unknown due to the flexible constitutional settlement, however on current evidence there is still likely to be heavy reliance on planning as opposed to the devolution of primary energy powers and it is therefore likely that the requirements to be placed on LPAs will be at least as demanding as those set out for English local authorities within the 2007 Energy White Paper.

4.5. Energy Wales: A Routemap to a Clean, Low-Carbon and More Competitive Energy Future for Wales - Consultation Document (2005)

The draft Energy Routemap was the Welsh Assembly's consultation document produced following the 2003 Energy White Paper. The document is intended to provide a framework for improvements in energy supply, to promote clean energy production and energy efficiency.

Welsh energy policy currently has five important strands:

i. Securing 4 TWhr per annum of renewable electricity production by 2010 and 7TWhr by 2020.
ii. Much greater energy efficiency in all sectors, as is described in our 'Energy Savings Wales' energy efficiency action plan published in October 2004.
iii. More electricity generation from cleaner, higher efficiency fossil-fuel plants.
iv. Significant energy infrastructure improvements.
v. On a holistic basis, achieving measurable carbon dioxide emission reduction targets for 2020.

The Key objectives relevant to LPAs (the planning measures required to meet the 4TWhr target) were those set out in TAN8 rather than the draft Energy Routemap.

> *"The planning system is crucial to clean energy and associated infrastructure development. The innovative and strategic approach proposed with TAN 8 for onshore windfarms and other renewables will be key to meeting our renewable electricity aspirations."*

A final *Renewable* Energy Routemap was published in February 2008. An overarching Energy Routemap is now expected in late 2008.

4.6. Welsh Microgeneration Action Plan (WAG 2007)

The Welsh Microgeneration Action Plan is the sister document to the UK Microgeneration Strategy. The Plan sets out significant targets and identifies a number of key actions that need to be implemented to achieve results. These range from new training initiatives, planning guidance for

microgeneration systems and increased use of microgeneration technologies across the public sector.

The Action Plan concentrates on six key areas of which 'overcoming barriers' is most directly relevant to local plan development. The plan also sets out a WAG intention to 'provide advice and training to those involved with planning regulations'.

Key targets:

- Appropriate extension of existing permitted development rights (2007)
- Seek devolution of Building regulations- (decision in 2007)
- New Buildings in Wales to be Zero Carbon by 2011

The Plan targets for installing new micro systems are:

- 20,000 microgeneration heating units by 2012;
- Approximately 100,000 micro heating units installed by 2020;
- 10,000 micro electricity units installed by 2012;
- Circa 200,000 micro electricity units by 2020;
- 50 combined heat and power and/or district heating systems by 2020

The Microgeneration Action Plan consultation specifically set the prescriptive planning powers for microgeneration granted to English local authorities under PPS 22 against the more limited powers available to Welsh LPAs under TAN8. In the final document reference is made to the alternative powers proposed under planning for Climate Change Consultation.

4.7. Wise about Waste - The National Waste Strategy for Wales (2002)

The waste strategy sets out how the WAG intends to comply with the requirements of relevant European Council (EC) waste Directives and UK legislation.

The stated objective is to 'make Wales a model for sustainable waste management by adopting and implementing a sustainable, integrated approach to waste production, management and regulation (including litter and flytipping) which minimises the production of waste and its impact on the environment, maximises the use of unavoidable waste as a resource, and maximises where practicable, the use of energy from waste and landfill.

The SA notes that *'The Strategy is a material consideration, which the Vale of Glamorgan LDP must have regard to. Management of waste is an important SD issue that should be considered in the SA.'*

The strategy reflects the UK policy by specifying very demanding waste reduction and diversion from landfill targets. The scale of targets, and the increased costs associated with disposal, will make an increased utilisation of energy from waste inevitable.

Anaerobic Digestion will also benefit from a tightening of regulations relating to food waste. It is likely to become much more commercially attractive given higher gate fees for such waste. The Vale is therefore likely to see development applications for a range of energy from waste developments.

4.8. Summary of Implications for Local Development Plans

Local Development Plans should have reference to relevant emerging policies. In the case of energy and carbon emissions these policies form part of rapidly emerging Climate Change and Energy frameworks based on headline targets.

- UK CO_2 reduction of 12.5% (on 1990 levels) by 2010 (Kyoto)
- UK CO_2 reduction of between 26 & 32% by 2020 (proposed, climate change bill)
- UK CO_2 reduction of 60% (on 1990 levels) by 2050 (proposed, climate change bill)
- Welsh CO_2 reduction of 20% (on 2000 levels) by 2020 (Environment Strategy)
- Welsh renewable electricity target of 4TWhr/annum by 2010
- Welsh renewable electricity target of 7TWhr/annum by 2020

The UK policy development trend indicates that even to achieve current targets much more robust intervention will be required alongside an expansion of the carbon reduction role for local authorities and LPAs.

The Welsh Assembly Government has adopted targets on a similar scale so the expectation is for similar measures (although a couple of years behind) to UK policy.

It is already clear as to how energy policy and renewable energy targets are to be transmitted to Welsh planning policy (this is reflected in the TAN 8 summary in the following section).

In setting out the requirement for renewable energy UK energy policy makes the responsibility of all LPAs explicit in the 'Statement of Need on Renewable Energy'.

The Welsh Environment Strategy identifies that a process of policy development will be needed to achieve effective carbon reductions. A re-evaluation of the role of land use planning is singled out in particular, which is discussed in the Planning for Climate Change Consultation Summary discussed in the following section.

Government is also acting to ensure that local planning policy ceases to be a barrier to the installation of small scale renewables. As outlined in the Environment and Microgeneration strategies, retrofit microgeneration is scheduled to be largely removed from the scope of planning permission through amendment to the permitted development criteria (in fact guidelines for most domestic scale technologies have been firm for some years, but this has often been overlooked in practice).

The further requirements set out in the emerging framework, particularly the Climate Change Bill and the Energy White Paper 2007, will be filtered down to LPAs through Planning Policy to be developed 'in due course' by the Welsh Assembly Government.

The complication is that it is not clear in policy or practice how these targets are to be devolved to local authorities via WAG, therefore it is unclear what the scope of the LDP should be in this respect

For wider carbon reduction, and particularly for the achievement of low carbon, development policy is in the process of formation, particularly in Wales due to the delays inherent in the devolution settlement and the filtering of energy policy responsibilities into planning policy.

In planning for a 2011 adoption date the conclusion must be that the Vale of Glamorgan should reference framework climate change and energy policy to predict the future direction of planning policy and the likely scale and nature of energy developments and proposals.

The energy and climate change policies framed by national governments will determine the scale, nature and economic viability of energy and infrastructure development. The role of the LDP will be to facilitate such development based on an assumption that low and zero carbon technologies (and practical measures such as development co-location) will be massively more prevalent during the plan period and increasingly driven by a policy framework which requires their adoption through regulation, legislation and market mechanisms.

In terms of carbon reduction for non-energy development the LDP scope must be broader and the requirements to be made of developers will need to be much firmer than set out within the current Unitary Development Plan (UDP). At a Wales level the emerging (but incomplete) policy framework indicates a key role for local planning authorities in the development of carbon neutral developments and the promotion of on-site renewable energy. Energy and carbon considerations will be a core consideration within land use planning, and will become much more closely integrated with Waste policy as ambitious targets require that increasing volumes of waste are diverted from landfill.

In conclusion the scale of targets and the expanding scope of policy indicate that LDPs will need to be constructed with future refinement in mind.

Part 2: Planning Guidance and Policy Review

5. UK Planning Policy and Guidance

5.1. Introduction

National Planning Guidance reflects the aims of the wider sustainability policy framework. As previously noted, the scale and scope of action required to address Climate Change issues has resulted in cross cutting policy frameworks and initiatives to 'fast track' changes across the UK Planning system.

Planning is largely a devolved power; however energy powers including consenting for large generation and the setting of international obligations (such as multi-lateral carbon reduction targets) are retained at UK level.

In general Welsh Planning policies (only) are of direct relevance to the process of Welsh LDP development. However, it is noted that under, for example, the recent consultative draft of the Planning White Paper (2007) strategic powers for decision making on infrastructure and major projects are likely to be retained at UK level through a newly constituted, independent consenting body.

It is not clear at this point how such infrastructure decision making would be expected to operate in Wales, but the newly proposed decision making arrangements, when issued, will need to be reflected at the local level. This will have implications for LPAs within which key generation or infrastructure developments are likely within plan periods.

In the case of the Vale of Glamorgan the future of Aberthaw power station would be a salient case in point.

5.2. Planning White Paper, Planning for a Sustainable Future, Consultative Draft, 2007

The Planning White Paper sets out the UK Government's detailed proposals for the reform of the planning system. The intention is to build on the recommendations of the Barker Review published in late 2006 for improving the speed of, responsiveness to and efficiency in land use planning, and for moving ahead with proposals for the reform of major infrastructure planning.

The proposed reforms will be applicable to all consent regimes, including those for major energy, waste, waste-water and transport development, as well as the town and country planning system. Government aims to replace the multiple existing consent regimes for major infrastructure projects with a new system. Decisions are expected to be taken on such key national infrastructure projects by an independent body.

The key changes that could be expected are as follows:

For key national infrastructure development:

- National policy statements for key infrastructure sectors such as air transport and renewable energy
- Improve planning advice to developers and supporting planning application preparation
- Improving public engagement and consultation on projects

- Streamlining of procedures for such projects by rationalising the different consent regimes and improving Inquiry procedures
- Clarity the decision making process, separate out policy and decision making by creating an independent decision making commission

For the town and country planning system:

- Produce a national planning policy framework with PPS1 – Delivering Sustainable Development
- Publish a new Planning Policy Statement on promoting a strong, stable and productive economy
- Establish a new test for town centre planning policy
- Finalise the PPS on climate change and introduce legislation to establish the role of LPAs in tackling energy efficiency and climate change
- Set a timetable and put in place an action plan to deliver substantial reductions in carbon emissions from new commercial buildings
- Review and extend permitted development rights on microgeneration
- Introduce changes to local development frameworks to ensure a more streamlined and tailored process with more flexibility on plans, how they are produced and how to achieve more meaningful community involvement
- Introduce Planning Performance Agreements and provision of support for a properly resourced planning service

Within Wales many of these key changes are reflected in the development of parallel policy such as the Planning for Climate Change 'Compendium' (parallel PPS1) in relation to low carbon buildings, the Welsh permitted development rights consultation, and the forthcoming review of PPW as a whole.

6. Welsh Planning Policy and Guidance

6.1. Introduction

Welsh Planning Guidance reflects the aims of the wider UK and Welsh sustainability policy framework.

The scale and scope of action required to address Climate Change issues has resulted in cross cutting policy frameworks and initiatives to 'fast track' changes. The evolving constitutional settlement has complicated the way in which energy and climate change drivers and responsibilities are framed within Welsh planning policy.

It should be noted that Welsh Planning policy is in a period of transition. The current planning framework should be read in the context of the energy and climate change targets and policies set out in part one.

Planning Policy Wales is due for wholesale review to accommodate the UK/ Wales distribution of powers and the requirement to address climate change through land use planning. Policies such as the Wales Environment Strategy and consultation such as Planning for Climate Change indicate the likely direction of travel and potential implications for local planning authorities.

6.2. Planning Policy Wales 2002 (PPW)

PPW provides a comprehensive review of planning policy as it applies to Wales. It initially sets out the context of planning in Wales followed by the main policy objectives and a description of the planning system and procedures. It then considers a range of subjects and provides advice on how these should be treated both in the Development Plan process and in the context of development control.

Chapter 2 is entitled Planning for Sustainability and emphasises that this concept is one of the fundamental principles underpinning the planning system. Indeed, paragraph 2.1.3 advises that the Assembly government will place sustainability at the heart of its decision making process which will be achieved through its strategic policies, PPW being one of these.

Paragraph 2.2.1 sets out the Assembly Government's principles for planning policy for sustainable development which include among others:

- Taking a long term perspective to safeguard interests of future generations, whilst at the same time meeting the needs of people today;
- Respect for environmental limits, so that resources are not irrecoverably depleted or the environment irreversibly damaged. This means, for example, contribution to climate protection, protecting and enhancing biodiversity, minimising harmful emissions, and promoting sustainable use of natural resources;
- Using scientific knowledge to aid decision-making.

Paragraph 2.3.2 outlines the key policy objectives and advises that planning policies and proposals should, among other things, "…*contribute to climate protection by encouraging land uses that result in reduced emissions of greenhouse gases, in particular energy-efficient development, and promoting the use of energy from renewable resources*." and "*minimise the use of non-renewable resources, and, where it is judged necessary to use them, maximise efficiencies in their use. The*

use of renewable resources and of sustainably-produced materials from local sources should be encouraged."

Section 12.8 considers sustainable energy and this initially reviews the UK Government commitments to renewable energy. It states in paragraph 12.8.4 that the Assembly Government intends to encourage the development of the renewables sector, and promote energy efficiency and conservation in an economic, environmentally sound and socially acceptable way.

In paragraph 12.8.9 the Assembly Government advises that Local Planning authorities should facilitate the development of all forms of renewable energy where they are environmentally and socially acceptable. It emphasises that development control decisions should be "…*consistent with national and international climate change obligations, including contribution to renewable energy targets, having regard to emerging national and international policy of the levels of renewable energy required and on appropriate technologies… and …the environmental, economic and social opportunities that the use of renewable energy resources can make to wider planning goals and objectives and the delivery of renewable energy targets"* should be recognised. Notwithstanding this, PPW also seeks to "….*ensure that international and national statutory obligations to protect designated areas, species and habitats and the historic environment are protected from inappropriate development and ensure that environmental effects on local communities are minimised.*"

Section 12.9 looks at how sustainable energy should be incorporated into the UDPs and paragraph 12.9.4 considers wind energy specifically where it indicates, among other matters, that the large scale deployment of renewable energy may not be appropriate in nationally designated areas.

Paragraph 12.10.2 advises that "…*Whilst having regard to the contribution of renewable energy use to wider planning goals such as the diversification of the rural economy, local planning authorities should ensure that any environmental effects on local communities are minimised, to safeguard the quality of life for existing and future generations.*"

PPW is due for full review, and the Assembly Government has clearly communicated that climate change drivers require that carbon reduction and mitigation measures should be clearly and unambiguously prioritised.

Consistency with climate change obligations (including renewable energy targets) require that the balance originally set out in PPW should be weighted more heavily towards the facilitation of carbon reduction. Within the Planning for Climate Change consultation the draft MIPPS specifically amends all the key areas highlighted above.

Planning policy is specifically identified as a flagged as mechanism to achieve climate change mitigation and deliver low carbon development. LPAs are given a remit to pursue the aim of reducing CO_2 in line with targets, and a leading role in facilitating low carbon development centred on a redefinition of design.

The Planning for Climate Change consultation is discussed in detail in Section 7.

6.3. Technical Advice Note 8: Renewable Energy, 2005

TAN 8 was issued simultaneously with the Ministerial Interim Planning Policy Statement (MIPPS) in July 2005. The TAN refers to the 4TWh target expressed in the MIPPS and goes on to state that 20% of electricity should come from renewables by 2020, as outlined within the 2003 Energy White Paper.

However, the TAN has an expected time horizon of 2010 and identifies that, in order to meet the target in this time frame, the majority of renewable energy will come from established and scalable technologies, thus the TAN recognises that 80% of this will be derived from on-shore wind energy projects.

As a consequence, the Assembly engaged consultants to assess the spatial implications of wind energy development and identify suitable strategic zones in which wind energy schemes are more likely to be suitable. The spatial approach utilised a Geographic Information System (GIS) sieve mapping exercise which considered a range of constraints to wind energy development, both environmental (such as international and national nature conservation and landscape designations) and technical (including wind speed, gird infrastructure [existing and potentially planned], Ministry of Defence and civil air safeguarding). This process identified seven areas in Wales, known as Strategic Areas of Search (SSA), where these potential constraints were minimal for large scale projects (defined as 25MW or larger schemes in paragraph 32 and in the MIPPS).

In the case of the Vale of Glamorgan, none of the SSAs are located within or proximate to the administrative area governed by the Council. In this case the principal parameters and criteria that should be considered in the preparation of a Policy or Policies on wind energy are:

- The development of wind power should be encouraged for schemes up to 25MW within urban/industrial brownfield sites, where such developments do not conflict with statutory provisions and other Policies within an emerging LDP (para 2.11 of TAN8)
- The Council should encourage smaller community based wind farm schemes, to be generally less than 5MW. Local criteria against which proposals can be evaluated should be prepared, along with more definition on what is meant by ‘smaller’ and community based’ (para 2.12, TAN8). In addition, criteria should be established for ascertaining cumulative impacts between schemes (para 2.13) and that a policy or policies should be developed to restrict wind energy developments outside of urban/brownfield sites to less than 5MW (para 2.13).
- The Council should make clear in their LDP the scope of possible ‘planning contributions’ that would be construed as community benefits. Such contributions should be pro rata with the scale of development. It should be clearly set out that the provision of such contributions by a developer/applicant should not in themselves lead to the approval of a development proposal.
- Specification of the standard criteria (contained in and in Annex C, 2 of TAN8) for development control purposes against which application should be evaluated. This should include guidance on appropriate conditions for the decommissioning of wind farms or individual turbines and their restoration, as well as stating that financial bonds will be required through Section 106 agreement for the costs of decommissioning.

An additional element of this Policy or Policies should be the establishment of criteria that would engender the positive planning of onshore installations linked to offshore wind farms, if they arise (para 3.1 of TAN8).

Positive LDP policies are encouraged in the TAN8 in respect of the following technologies:

- **Anaerobic Digestion**: formulation of criteria based policies for biogas plants and Policies for larger sewage treatment facilities to include biogas facilities to utilised methane. Policy should also be prepared to encourage waste use for energy generation from units such as large poultry or pig units.
- **Biofuels**: TAN8 identifies that such developments will normally be attached to or incorporated within existing vehicle fuel refineries and therefore unlikely to require development plan policies.
- **CHP**: local authorities should actively seek to encourage the take up of CHP through LDP policy and development briefs. Such a technology is ideally suitable to new residential and commercial developments. Consequently, policies with the LDP relating to new development should encourage the incorporation of CHP as an energy and heat source, alongside policies for more carbon neutral building designs and microgeneration.
- **District Heating**: the TAN recommends that Policy and SPG should be developed to encourage community heating solutions using low carbon technologies such as biomass district heating.
- **Energy from Waste**: not relevant to TAN8 (reference is made to TAN21 and regional strategies).
- **Biomass**: local authorities are expected to encourage the use of woodfuel heating systems but no specific advice is given in the TAN. A brief technical explanation of the technology is given in Annex 3 but little detail of the locational criteria or fuel sources.
- **Hydropower**: the TAN guidance promotes only run of the river schemes, for which it is identified that typically such schemes are small and that acceptable solutions to associated ecological impacts are available. However, no mention is made of the use of small hydro plants in water treatment works and mills, which could be encouraged through the LDP, and it is also advised that the LDP should state that even small generating plant has a worthwhile contribution to make to climate change goals.
- **Methane**: not relevant.
- **Solar Thermal and PV**: local authorities are encouraged to interpret the provisions of the GPDO as constructively as possible and support the utilisation of solar technologies through local design guides and SPG.

Section 5 of TAN 8 (Design and Energy) indicates that LPAS may specify solar thermal as a minimum requirement for all appropriate development and raises the potential for LPAs to require a design advice report for development over 1000m^2 and to refuse permission if it is considered that insufficient developer consideration has been given to energy issues.

Further, in fulfilment of paragraph 5.2 of TAN8, the Council should give consideration to the formulation of Policies to deal with the promotion of high standards of energy efficiency and energy conservation as well as the above policies on renewables.

Paragraph 5.3 states that local authorities should develop generic development control policies that link renewable energy with other sectors such as housing, employment and rural development.

The TAN is theoretically due for review before 2010. All indications from the Assembly Government are that this review will strengthen the renewable requirement for technologies other than wind, however the design and energy element of carbon reduction / low carbon development policies has been developed through the Planning for Climate Change document rather than through updated TAN 8 or 12.

6.4. TAN 12, Design, 2002

The TAN refers to design as the relationships between all elements of the built and natural environment and specifically refers to the efficient use of energy and natural resources. UDPs should provide policies setting out the planning authority's design expectations which reflect national policies set out in the TAN to secure good quality design in the local context.

Paragraph 3.1 of TAN 12 states that:

> *"At the heart of the design process is the requirement to contribute to the objectives of sustainable development …"* whilst paragraph 3.5 states that *"The planning system has a responsibility to be pro-active in raising the standard of design and in raising awareness of design issues amongst the general public and the private sector…*" And suggests that this is achievable in every area of planning activity; through mechanisms including development plans and supplementary planning guidance (SPG).

A substantial re-definition of 'design' has been introduced into PPW through the amendments within the draft Climate Change MIPPS which is far stronger regarding the energy aspect of design and the pro-active role to be under taken by LPAs through LDP and SPG. This is discussed further in Section 7.

7. Planning for Climate Change Consultation Document

The Planning for Climate Change consultation is a key document which sets out in draft form how the Assembly Government intends to fast track changes to the existing planning system. It is therefore essential that the current guidance in PPW and Technical Advice Notes 8 and 12 (as set out above) should be considered in the light of the changes and amendments proposed within the Planning for Climate Change consultation.

The document is structured in three distinct sections:

Part A: 'Content and Approach' provides policy context and an overview of what the document intends to achieve.

Part B: 'Draft MIPPS on Climate Change' introduces the amendments and updates to specific policies. Unlike other amendments to PPW the draft Climate Change MIPPS cuts across a number of sections within PPW, and makes amendments to previously issued MIPPS on Housing and Renewable Energy.

Part C: 'an approach to a Compendium on Climate Change' outlines a new approach to planning policy development through a 'Compendium on Climate Change, clarifies the formal status of the compendium approach and seeks to provide 'timely guidance' to LPAs regarding the structure and content of LDPs in relation to climate change using the specific Model Policy Topic of 'Energy and CO_2 emission reduction in the built environment as an exemplar.

7.1. Draft Ministerial Interim Planning Policy Statement on Climate Change

The draft MIPPS is directly relevant to the Vale of Glamorgan LDP process. All LPAs are expected **to take immediate account** of the draft MIPPS when developing their new LDP documents.

As detailed in the 'Compendium approach' the WAG considers that a TAN on Climate Change would take too long to develop and would be too inflexible. It is acknowledged that there are a number of emerging issues related to Climate Change which necessitate further advice from WAG.

The draft MIPPS concerns itself with amendments to PPW and proposes changes to the overarching policy in relation to context, principles and key policy objectives. There are significant key amendments and additions relating to design, infrastructure and services, and an important amendment to the previous MIPPS on Planning and Renewable Energy (01/2005) (which is subsequently cross referenced and discussed in detail within the Compendium section).

A summary of key amendments and additions is set out below:

7.1.1. Amendments and Changes to Planning Policy Wales

The draft MIPPS proposes amendments to Section 1.4 of PPP 'The context for Planning in Wales' in order to emphasise the scale of the climate change challenge and the need to reduce emissions.

Planning is identified as a mechanism to help mitigate climate change impacts and deliver the assemblies ambition of low/zero carbon development through:

The location of new developments and land uses: with an emphasis on resource efficient development patterns
The design of buildings in their surroundings: with an emphasis on minimising energy demand and reference to localized energy sources and appropriate orientation.

In amended paragraph 1.1.14 specific reference is made to the requirements to be placed on developers and the relationship with building regulations:

'Building regulations have a role to play in the achievement of sustainable buildings and the planning system should not duplicate but complement their requirements[22]. Where there are grey areas such as construction site practices, it is reasonable for local planning authorities to introduce their consideration where appropriate. The planning system should assist in influencing the way that development responds by moving consideration of climate adaptation and mitigation to an earlier stage in the site selection and building design process. Developers should see this as part of their core responsibilities, which need to be demonstrated as part of the planning process and not as a later "add on".

Within Chapter 2 'Planning and Sustainability', Section 2.1 'A commitment to sustainable development 'is updated to specifically identify the 'need to reduce carbon emissions' as a sustainability principle.

This is further developed in an amendment to section 2.2 'Principles' where the following changes are made:

(i) Adding a bullet point
"Contributing to the reduction of predicted CO_2 emissions towards the long term UK aim of a 60% reduction from the 1990 Kyoto baseline by 2050, which should be facilitated by applying the following staged approach to development allocations and proposals:

- maximising design and location opportunities to reduce energy demand;
- considering the use of energy efficient supply measures to meet the reduced demand; and
- incorporating a proportion of on site renewable energy generation. "

(ii) Amending the last bullet point as shown in bold
"Taking account of the full range of costs and benefits **over the lifetime of the development,** including those that cannot be easily valued in monetary terms when making plans and decisions and taking account of timing, risks and uncertainties."

An amendment to section 2.3 'Key Policy Objectives' includes reference to the draft Climate Change Compendium approach alongside TANs and specifically amends the objectives in paragraph 2.3.2 by:

(i) Replacing the third bullet point
"**Contribute locally to global sustainability and address the causes and potential impacts of climate change by ensuring that development maximises the opportunity to:**
- **reduce energy and water use, and to promote renewable energy and efficient energy and water supplies, and**
- **ensure the causes and impacts of climate change are taken into account in the location of development allocations and design and siting of proposals."** (see Sections 5.6 to 5.8 and 13.2 to 13.4).
(ii) Amending the last sentence of the fourth bullet point
"This includes managing and seeking to mitigate the … **and the natural and built environment by anticipating increased temperatures, water constraints and flood risks."**
(iii) Revising the eighth bullet point as shown in bold

"Minimise use of non-renewable resources, and where it is judged necessary to use them, maximise efficiencies in their use, **by requiring where appropriate, the use of recycled materials, renewable materials, or materials which have the lowest embodied energy.** The use of renewable resources and of sustainably produced materials from local sources should be encouraged **and recycling and reuse levels arising from demolition and construction maximised and waste minimised.**"

Section 2.4 'Rural and Urban priorities' are also amended to make climate mitigation goals explicit within the context of existing sustainable development goals.

In particular in relation to urban priorities (2.4.1) this is stated to include:

'making places resilient to the effects of climate change in ways consistent with social cohesion and inclusion and securing the highest viable standards of resource and energy efficiency and reduction in carbon emissions.'

Amendments are also made to section 2.5 'Sustainable Development Strategy: locating new development'. The most relevant additions are:

new bullet points to paragraph 2.5.2:

- "Foster development that is likely to be well serviced by existing infrastructure.
- Ensure that development encourages opportunities for commercial and residential uses to derive environmental benefit from co-location.

Significant amendments are proposed to section 2.9: 'Promoting sustainability through good design' with the intention to substantially enhance and strengthen the role of design process in relation to climate change

The most relevant amendments and new additions (in bold) are outlined below:

2.9.1 "Design is taken to mean the relationship between all elements of the natural and built environment. To create sustainable development, design must go beyond aesthetics and include the social, environmental and economic aspects of the development, its construction, and its relationship to its surroundings.

2.9.3 The design process should promote the efficient use of resources, including land. It should seek to maximise energy efficiency and the efficient use of other resources, minimise the use of non- renewable resources and minimise the generation of waste and pollution. Ways to achieve this include, for example, site selection and treatment.

2.9.4 The design process should also ensure that development contributes to tackling the causes of climate change by reducing greenhouse gas emissions and to effective adaptation to impacts. An integrated framework for and staged approach to climate responsive development, including location, density, layout, built form and ensuring in-built flexibility for varying uses over the lifetime of the development will be an appropriate way of contributing to the achievement of sustainable development. This will need to be demonstrated in design statements (see new Section 2.2.1).

2.9.12 In preparing design and access statements which should include energy advice reports where relevant (as described in TAN 8: Renewable Energy), applicants should take an integrated and inclusive approach to sustainable design, proportionate to the scale and type of development proposal. They should deal with all relevant aspects of design, clearly

state the comprehensive design principles adopted and include illustrative material in plan elevation and section where relevant.

2.9.13 Development plans should provide clear policies, supported where appropriate by supplementary planning guidance, setting out the design expectations of local planning authorities for various places and development proposals. Local planning authorities should encourage a high quality design of buildings and spaces in their policies and guidance.

2.9.14 Planning and development briefs should be used to outline sustainable design requirements where appropriate. Supplementary planning guidance and briefs can usefully be prepared in partnership with stakeholders and should be subject to appropriate consultation. The preparation of audits and appraisals can also assist local planning authorities in the exercise of their planning and development control functions. Design frameworks can also help to revitalise urban areas, and towns and guide development in villages."

Within Chapter 12 'Infrastructure and Services' the following bullet points added to section 12.1 objectives paragraph 12.1.6:

"- to ensure every opportunity is taken to use energy efficient, low carbon supply measures to meet demand. Major development is expected to incorporate decentralised heating, cooling and power (CHP) networks, preferably powered by renewable energy sources, or to connect to existing CHP (and CCHP) or communal/district heating networks.
- to ensure every opportunity is taken to maximise the provision of renewable energy generation from microgeneration equipment in new and existing development, including allowing for future inclusion as part of the design of buildings where it is not being incorporated.
- to ensure that vulnerability to severe weather events is minimised and infrastructure is adequate to cope with increasing risk of storm surges, drought and flooding.**"**

7.1.2. Amendments to MIPPS 01/2005: Planning and Renewable Energy

Specific important changes are also proposed to the MIPPS accompanying TAN8 (MIPPS 01/2005: Planning and Renewable Energy) as follows:

Section 12.8 Sustainable energy
Update contents of paragraph 12.8.2 and add to the end:
"Local planning authorities should consider the local level of $C0_2$ /greenhouse gas emissions as an environmental issue in undertaking strategic environmental assessment of development plans."

Section 12.9 Development plans and sustainable energy
Add to the end of paragraph 12.9.1:
"Local planning authorities should include within development plans a policy requiring major developments to reduce their predicted CO_2 emissions by a minimum of 10% (from the current baseline required by building regulations) through improvements to the energy performance of buildings, efficient supply of heat, cooling and power and/or on site renewable energy. The scale of development for the application of the policy and the percentage reduction selected will need to be determined locally, based on sound evidence and the need for planning policy to interact effectively with developing building control requirements."

Section 12.10 Development control and sustainable energy
Add to paragraph 12.10.4 by adding as shown in bold at the end:
"…design of new development. **Local planning authorities should, where relevant, consider the likely impact of any proposed development on existing or proposed efficient energy**

supply networks or on-site renewable energy generation and suggest amending proposals that are likely to have a prejudicial impact on efficient energy supplies and renewable energy generation to make them acceptable.

7.2. An approach to a Compendium on Climate Change

According to the document 'Innovative approaches to Climate change adaptation and mitigation through the planning system are emerging almost daily'. In order to provide timely guidance on what will be expected in LDPS the Assembly Government has set out a new flexible and iterative approach to providing assistance on the implementation of the MIPPS.

The document states that LDPS 'will have a key role in contributing to the mitigation of, and adaptation to climate change through the planned location and sustainable design of buildings in their surroundings over the next 10-15 years' (paragraph 5)

The compendium is not merely a good practice guide – LPAs will need to have regard to it in developing their LDPs. It is clearly stated that the…**'document will have the status of national planning policy advice similar to a TAN' (paragraph 6).** This is reflected in amendments to PPW section 2.3 set out in the accompanying MIPPS.

The document outlines an approach to climate change policy development in LDPs, provides the following type of information on individual policy topics and uses Energy and CO_2 emissions as a 'model Policy Topic' to demonstrate:
- identifying relevant national policy in PPW/MIPPS/TAN,
- suggesting policy, wording and options
- providing good practice examples, and
- describing how tools such as Supplementary Planning Guidance (SPG), development control checklists and Design Statements can assist in implementing the policy topic.

The draft compendium document specifically covers the possible LDP approaches to the percentage carbon reduction policy set out in the draft MIPPS and suggests that whilst flexibility and innovation are encouraged, LPAs will be expected to provide LDP policies based on the examples in the compendium.

The iterative approach the Assembly Government intends to develop is set out as follows:

'innovation in this field has been led by LPAs and new LDP policies or processes not covered in this document that address climate change will be encouraged assuming evidence/ justification is provided to support them' (paragraph 8)

The stated intention is that the compendium will be extended to cover other relevant topics – water, construction materials temperatures and land instability.

7.3. Model Policy Topic: Energy and C0$_2$ Emission Reductions in the Built Environment

The model policy topic selected by WAG to illustrate the process of policy development is directly relevant to the scope of this report and is therefore dealt with in some detail. Due to the nature of the compendium document, and the looseness (or flexibility) of the guidance this section is inevitably somewhat discursive. Recommendations linked to the compendium are set out within part 4.

The worked example is based around the following policy set out within the associated [draft] MIPPS on Climate Change (12.9.1):

"Local planning authorities should include within development plans a policy requiring major developments to reduce their predicted CO_2 emissions by a minimum of 10% (from the current baseline required by building regulations) through improvements to the energy performance of buildings, efficient supply of heat, cooling and power and/or on site renewable energy. The scale of development for the application of the policy and the percentage reduction selected will need to be determined locally, based on sound evidence and the need for planning policy to interact effectively with developing building control requirements."

The compendium guidance states that:

16 This requirement incorporates a flexible policy approach, which should enable continued improvement over time. Building regulations will require increasing carbon emission reductions in future, and there are fast moving technological innovations occurring in terms of what is possible to achieve. ***The 10% should be interpreted as a minimum.***

7.3.1. Local targets and applications

The Planning for Climate Change consultation document states that **'**It will be for local planning authorities to set precise targets and the applications to which the policy applies, as part of their overall approach and strategy for their areas, including the definition of significant development.' (Paragraph 17).

However, by way of guidance reference is made to the definitions employed by various LPAs across the UK which have referenced the definition of major development found in the Town and Country Planning (General Development Procedure Order) 1995.

This includes identifying major development as:

(a) the winning and working of minerals or the use of land for mineral working deposits;
(b) waste development;
(c) the provision of dwelling/houses where -
    i. the number of dwelling/houses to be provided is 10 or more; or
    ii. the development is to be carried out on a site having an area of 0.5 hectares or more and
    iii. it is not known whether the development falls within paragraph (c)(i);
(d) the provision of a building or buildings where the floor space to be created by the development is 1,000 square metres or more; or
(e) development carried out on a site having an area of 1 hectare or more. (article 8, para 7)

It is further clarified that as the suggested policy approach in the compendium is concerned with the built environment, sections (c) and (d) and in some cases section (e) of the above definition are most relevant and that when considering the use of (d) or (e) to define the application of policy then whichever is the smallest should be used to determine the application of the policy.

It should be noted that the powers conferred to English LPAs are somewhat different in enabling LPAs to specify a percentage of predicted energy demand to be met from on-site renewable energy. PPS22 states that "local planning authorities may include policies in local development documents that require a percentage of the energy to be used in new residential, commercial or industrial developments to come from on-site renewable energy developments"

We note that when the policy was first introduced the typical interpretation was in line with the TCPA definitions c,d and e above, however as such 'Merton Style' polices are adopted across England clear trends are emerging which indicate that LPAs are specifying i) an increased percentage requirement over time, and ii) a more inclusive scope of application. Several local authorities now specify this requirement for developments of a single dwelling and above.

7.3.2. Examples of 'staged approach' / Energy Hierarchy

The compendium recommends that a staged approach is adopted in LDPs which sets out order of priority and context for supporting policies:

We note that the staged approach outlined within the compendium document differs somewhat in approach and order of priority from that adopted in other UK planning guidance.

The Assembly staged approach is outlined as follows:

Stage 1: Reduce Energy Demand
Stage 2: Efficient Energy Supply (potentially including renewables)
Stage 3: Renewable Energy Generation

In contrast, within the London Energy Strategy, the Mayor has established the following "Energy Hierarchy":

Stage 1: Use less energy (Be lean)
Stage 2: Use renewable energy (Be green)
Stage 3: Supply energy efficiently (Be clean)

Whilst the reduction of energy demand should always take precedence the approach of the planning authority to the interlinked issues of renewable energy provision and more efficient fuel based (district heating/ CHP and CCHP), with reference to the particular carbon saving opportunities within an area may have implications for the relative ordering of stages 2 and 3 in the preferred energy hierarchy.

This is particularly the case toward the end of the plan period when much lower carbon development will be expected. In summary whilst a more efficient fossil supply is obviously to be preferred to inefficient centralised generation the scale of carbon reduction is limited by definition.

The preferred ordering of the hierarchy is therefore linked to the likely timescale and scope of low or zero carbon requirement. In the context of requirement to achieve very low and zero carbon development **towards the beginning of the plan period** there is an argument that the current

London policy hierarchy is to be preferred provided that opportunities to exploit existing sources of currently wasted heat can be accommodated.

7.3.3. Policies on reducing energy demand

There is little new in this section, and it is likely that many of the measures and advice suggested are already included in SPG based on the existing TAN 12 guidance.

The document notes that policies may cover reference to layout and building design and may be implemented through SPG including:

- Compact form to reduce external surface area,
- Plan depth compatible with natural daylighting and ventilation
- Location to maximise protection from prevailing winds
- Optimise orientation for solar access
- Provide solar shading for summer sunpaths
- Fenestration and internal layout to ensure good solar access to main living areas
- Appropriately located thermal mass to act as heat store
- Buffer zones [eg porches, conservatories] around external entrances

It is noted that the reduction of energy demand in new development is principally a function of building regulation, and the document suggests that planning officers should be aware of such requirements and seek to ensure that advice complements such standards.

In practice if planning officers are seeking to achieve additional carbon reduction by specifying that developments go beyond building regulation carbon specification by a set percentage it becomes difficult to clearly separate these functions. It is also becomes more complicated to estimate the likely scale of carbon savings when requirements are linked to a percentage of a decreasing carbon figure (periodically amended by the revision of regulation).

7.3.4. Policies to achieve energy efficient supply

This section covers a suggested policy requirement that development over a certain size (to be defined by LPAs) should demonstrate:

- How heating and cooling infrastructure for large developments (or areas of growth) could use decentralised energy delivery systems (ideally powered by renewable fuels) and for these to be maximised in the future.
- Where an LDP or SPG has identified opportunities for CHP (and CCHP) developers should examine extension of the scheme beyond the site boundary to adjacent areas especially where this would improve the mix of uses and complementarity of demand.

In particular LPAs are expected to prompt developer consideration of the following technologies:

- Communal/District heating, which preferably includes CHP and trigeneration (CCHP)
- Individual building solutions such as underfloor heating and ground source heat pumps and the
- Role of Energy Supply Companies (ESCos).

7.3.5. Policies which encourage on site renewable energy generation

This section includes examination of a number of policy types (predominantly English and based on Merton Style policies).

It is noted that a number of local authorities are choosing to specify incrementally increasing requirement for on-site renewables over a range of time scales (for example a 10% requirement rising to 25% by 2011) It is suggested that such increments could be linked to proposed changes in building regulations.

In addition suggested policies wording is proposed based on the provision within TAN 8 / MIPPS 12.1.4 enabling LPAs to require solar thermal as a basic requirement on all suitable development.

7.4. Design Guidance and Design Statements

The Welsh Assembly position in relation to design statements was set out within the Planning for Climate Change consultation, which states:

> *17. In July 2006, a package of consultation documents based on the development control aspects of the Planning and Compulsory Purchase Act 2004 (PCPA) included consideration of the usefulness of pursuing statutory design statements in Wales. (The principle of access statements has already been agreed and the plenary process on the secondary legislation was completed on12 December 2006.)*
>
> *PPW (see Section 2.9) indicates that LPAs should include design policies in their development plans and augment these with SPG and TAN 12: Design currently identifies design statements as a tool to accompany proposals with design implications. National policy provides a broad definition of design and lists sustainable design principles, which include energy and resource efficiency. TAN 8: Renewable Energy indicates that LPAs require energy statements to accompany certain nonresidential proposals…*
>
> *19. The Assembly Government has now decided to pursue legislation to bring in a statutory requirement for design statements to accompany planning applications and will bring forward secondary legislation in 2007 to do so. Pending their formal introduction, statutory design statements are implied in the draft MIPPs (proposed Section 2.9) as a tool for ensuring that the sustainability implications of new developments are expressly outlined with planning proposals.*

The draft Ministerial Interim Policy Statement on Climate Change proposes to introduce some totally new paragraphs to the Planning Policy Wales that are key to the approach that any Welsh LDP will have in addressing the issue of design.

"Design is taken to mean the relationship between all elements of the natural and built environment. To create sustainable development, design must go beyond aesthetics and include the social, environmental and economic aspects of the development, its construction, and its relationship to its surroundings." (para. 2.9.1)

This represents a huge shift in thinking and takes planning policy and development control into an even more complex and inter-related set of considerations and arguments.

7.5. Changes to the General Permitted Development Order

Changes are expected to Town and Country Planning (General Permitted Development) Order 1995 in order to promote the installation of microgeneration equipment for domestic properties.

In Wales, these changes will emerge from the document entitled 'Welsh Assembly Government Consultation on Lifting the Planning Barriers to Domestic Energy Micro-Generation: Proposed Changes to Permitted Development Rights'

Consultation on this document started in July 2007, and will continue until November 2007. The consultation paper sets out proposals to amend 'permitted development' regulations for domestic properties so that planning permission is not required for micro generation unless the proposals are of a scale or type that would have a proven impact beyond the host property.

Annex 1 of the consultation draft sets out a summary of recommendations, as follows:

Summary of Proposed Permitted Development Rights

Technology	**Normal Buildings** not in Conservation Areas or World Heritage Sites	**Buildings in Conservation Areas and World Heritage Sites**
Solar on building	Permitted for the roof & walls unless it protrudes more than 150 mm above roof/wall plan. Flats -not allowed on walls or above highest part of roof excluding chimney.	Permitted as normal, except on principal elevation facing onto or is visible from a highway.
Solar stand alone	Permitted if less than 4 metres height. At least 5 metres to any boundary. Maximum panel dimensions 3m x 3m.	Permitted as normal except in front of a principal elevation or visible from a highway.
Ground Source Heat Pumps	Permitted.	Permitted.
Air Source Heat Pumps	Permitted if – internal noise <30dB, external noise <40dB, "garden" noise <40dB.	Permitted as normal
Water Source Heat Pumps	Permitted.	Permitted.
Wind Turbines on building	1 permitted if <3m above ridge (including the blade) and diameter of blades <2m. Also internal noise <30dB, external noise <40dB, "garden" noise <40dB. Up to 4 turbines on buildings >15m (as with antennas). Vibration <0.5mm/s.	Not Permitted.
Wind Turbines (Stand Alone)	1 permitted if <11m (including the blade) high and diameter of blades <2m. At least 12m from a boundary. Also internal noise <30dB, external noise <40dB, "garden" noise <40dB. Vibration <0.5mm/s.	Permitted as normal except in front of principal elevation and visible from a highway.
Bio Mass	Permitted – Limit of Flue height 1m above ridge. No special provision for storage/plant buildings	Flues permitted as normal except on principal elevation and visible from a highway.
Combined Heat and Power	Permitted – Limit of Flue height 1m above ridge.	Flues permitted as normal except on principal elevation and visible

	No special provision for buildings to accommodate plant	from a highway.
Hydro	No change.	No change.

Footnotes:
All equipment is to be sited in a way which, so far as is practical, will minimise the effect on the external appearance of the building and the amenity of the area.
Other provisions apply to Listed Buildings, property within an Site of Special Scientific Interest (SSSI) or archaeological area, buildings where there are protected species e.g. bats and works where ground water could be affected.
Additionally the Local Authority may have made local Article 4 Direction or a Local Development Order, which amend national regulations.

7.6. Building regulations

Building regulations are not currently a devolved matter (although the Welsh Assembly Government is current seeking to achieve this), and they are not planning policy. However the compendium document suggests that planning officers will need to 'consider further the interface with building regulations and conditions' and for this reason a summary of the current building regulations in relation to heat, light and power is set out below.

The 1984 Building Act (amended by the Sustainable and Secure Buildings Act, in 2004) empowers the UK government to make regulations about how buildings are built, relating to health, safety, energy efficiency, sustainability and security.

These requirements are set out in very summary form in Schedule 1 of the Act. Guidance on how to satisfy each requirement is given in Approved Documents and the Building Act is supported by a number of secondary legal documents (Statutory Instruments), which set out additional regulations. The "Building and Approved Inspectors (Amendment) Regulations 2006" are the most current set of Regulations.

Part L of the building regulations specify minimal legal requirements for the conservation of heat and power in both residential and non-residential buildings and encompass the thermal performance of construction elements, heating systems efficiency, controls, and lighting.

The 2006 revision introduced a number of new measures and procedures relating to the conservation of heat and power (Part L), some of which were directly linked to the requirements of the Energy Performance of Buildings Directive (EPBD). A summary of these changes is provided as Appendix C. From the perspective of introducing appropriate and complementary LDP polices the most pertinent points (and acronyms) are as follows:

Part L Building Regulations now:

- refer directly to the notional carbon emissions of a given building (Building Emission Rating (BER) or Dwelling Emission Rating (DER))
- require that compliance is demonstrated through an approved CO_2 emission rate calculation process (based on the Standard Assessment Procedure (SAP2005) for dwellings or the Simplified Building Energy Model (SBEM) for other buildings).
- specify an improvement factor over BER/DER required to achieve compliance with a Target Emissions Rating (TER)
- require a 20% improvement for dwellings (subsequent revisions of building Regulations will progressively increase this improvement factor until dwellings are considered zero carbon)

- require at least a 23% improvement for larger buildings. This is comprised of a regulatory improvement factor (varying according to building type) and a minimum 'Low or Zero Carbon' (LZC) benchmark calculated as *equivalent* to a 10% improvement achieved through the use of on-site renewable energy or combined heat and power
- cover the provision or replacement of most thermal elements, controlled fittings and fixed building services within *existing* buildings

On the basis of current UK timescale it can be assumed that by the time the LDP is adopted in 2011 building regulations:

- Will specify an improvement factor of around 20% for dwellings making the incorporation of renewable energy almost a requirement in order to meet the TER
- Are likely to *require* the incorporation of Low or Zero Carbon technologies as part of an increased TER for buildings other than dwellings

The UK government has announced that it expects new housing to be zero carbon by 2016 and has published the 'Code for Sustainable Homes' as a routemap to communicate the future direction and extent of building regulations to stakeholders. A supplementary 'Code for Sustainable Buildings' is under preparation.

The Welsh Assembly Government has stated an intention to achieve zero carbon housing by the earlier date of 2011 and is currently seeking the devolution of Building Regulation powers in order to achieve this goal.

Within the timeframe of the LDP building regulations will:

- require zero carbon buildings

8. Summary of Planning Policy Implications

The wider climate change and energy policy framework outlined within Part One of this report prioritises carbon emissions reduction and the promotion of renewable energy. Extremely challenging targets have been set in both cases and a clear trend towards greater intervention, even greater targets and more robust policy development is evident.

The planning system is considered to be a pivotal mechanism for achieving carbon reduction and low carbon development; however there is also concern that the planning system as currently constituted does not respond to climate change imperatives in a manner and speed which are appropriate to the scale and timing of the requirement.

The planning policy framework is being reviewed at all levels in order to address this issue with major interventions proposed, from the highest level of strategic UK energy infrastructure to building control considerations concerning domestic microgeneration.

In the Welsh context proposed amendments to Planning Policy Wales explicitly set out to facilitate renewable energy, the realisation of carbon reductions and the achievement of low carbon development as key objectives for local planning authorities to address through LDP policy.

Planning Policy Wales requires that local development plan policies should be consistent with national and international carbon reduction targets and obligations, and should have regard to the emerging policy on the levels of renewable energy and carbon reduction measures required.

The planning policy framework in the UK and Wales is currently a 'work in progress', particularly with reference to energy and low carbon development. At the Welsh level the need to look again at the contribution that planning can make to tackling climate change was clearly signalled in the Environment Strategy for Wales 2006.

The latest mechanism for realising these changes is 'Planning for Climate Change Consultation' (which also summarises and references the key climate change issues for LDPs contained within PPW and MIPPS). The cross cutting 'Planning for Climate Change' framework has been proposed in order to fast track changes across the existing range of Welsh Planning Policies and relevant Technical Advice Notes. In the medium term it is noted that the whole of PPW is due for urgent review in the light of climate change requirements.

The framework for major infrastructure planning (including energy infrastructure) is emerging at a UK level. It is currently unclear how powers will be distributed under the Constitutional Settlement.

It is expected that the role of Local Planning Authorities will be further developed in forthcoming UK and Welsh guidance. The likely direction of such guidance is determined by the context of the wider emerging climate change and energy framework discussed in Part 1 of this report.

Planning Policy Wales is due for wholesale revision in the period to 2010. Current policy already contains a requirement to encourage greenhouse gas reductions and renewable energy generation with regard to national and international targets and emerging policies. The amendments to PPW set out within the Climate Change MIPPS update policy by specifically identifying the need to reduce carbon emissions as a key principle:

> "Contributing to the reduction of predicted CO_2 emissions towards the long term UK aim of a 60% reduction from the 1990 Kyoto baseline by 2050, which should be facilitated by applying the following staged approach to development allocations and proposals:

- maximising design and location opportunities to reduce energy demand;
- considering the use of energy efficient supply measures to meet the reduced demand; and
- incorporating a proportion of on site renewable energy generation.“

A Key policy objective is set out as:

> ‘“Contribute locally to global sustainability and address the causes and potential impacts of climate change by ensuring that development maximises the opportunity to:
>
> - reduce energy and water use, and to promote renewable energy and efficient energy and water supplies, and
> - ensure the causes and impacts of climate change are taken into account in the location of development allocations and design and siting of proposals.” (see Sections 5.6 to 5.8 and 13.2 to 13.4)”

TAN 8 and the associated MIPPS requires an energy assessment of LPA areas and the development of positive and supportive policies across the range of renewable energy technologies. The predominant TAN 8 policy relating to large scale onshore wind development is not directly relevant to the Vale of Glamorgan as there are no ‘Strategic Areas of Search’ within the Vale. Nonetheless positive policies are required for smaller wind development up to 5MW, and it will be for the Vale to specify an approach to the definition of ‘community development’ in such cases.

The approach to domestic scale renewables (‘microgeneration’ technologies in the DTI’s phrase) will be simplified by a forthcoming expansion of the General Permitted Development Order, however the approach to design and on-site renewables within new low carbon development will be complicated by the Assembly Government’s re-definition of design and the approach outlined in the Planning for Climate Change consultation.

TAN 8 raised the prospect of Energy Design Reports for larger development alongside powers to make technologies such as solar thermal a requirement for all appropriate applications. The draft MIPPS significantly strengthens the powers available to LPAs and emphasises planning as a key mechanism to mitigate climate change and deliver low/zero carbon development.

The amendments relating to infrastructure and services, the new definition of design and the role of design statements have particular implications for LPAs as below:

> ‘Infrastructure and Services’ (amendments to section 12.1 objectives paragraph 12.1.6):
>
> ‘“to ensure every opportunity is taken to use energy efficient, low carbon supply measures to meet demand. Major development is expected to incorporate decentralised heating, cooling and power (CHP) networks, preferably powered by renewable energy sources, or to connect to existing CHP (and CCHP) or communal/district heating networks.
> - to ensure every opportunity is taken to maximise the provision of renewable energy generation from microgeneration equipment in new and existing development, including allowing for future inclusion as part of the design of buildings where it is not being incorporated.’
>
> ‘Promoting Sustainability through Good Design’ (additions to section):
>
> “2.9.1 Design is taken to mean the relationship between all elements of the natural and built environment. To create sustainable development, design must go beyond aesthetics and

include the social, environmental and economic aspects of the development, its construction, and its relationship to its surroundings.

2.9.4 The design process should also ensure that development contributes to tackling the causes of climate change by reducing greenhouse gas emissions and to effective adaptation to impacts. An integrated framework for and staged approach to climate responsive development, including location, density, layout, built form and ensuring in-built flexibility for varying uses over the lifetime of the development will be an appropriate way of contributing to the achievement of sustainable development. This will need to be demonstrated in design statements (see new Section 2.2.1).

2.9.12 In preparing design and access statements which should include energy advice reports where relevant (as described in TAN 8: Renewable Energy), applicants should take an integrated and inclusive approach to sustainable design, proportionate to the scale and type of development proposal. They should deal with all relevant aspects of design, clearly state the comprehensive design principles adopted and include illustrative material in plan elevation and section where relevant."

This approach provides the context for the amendment to the TAN 8 MIPPS Section 12.9 Development plans and sustainable energy:

"Local planning authorities should include within development plans a policy requiring major developments to reduce their predicted CO_2 emissions by a minimum of 10% (from the current baseline required by building regulations) through improvements to the energy performance of buildings, efficient supply of heat, cooling and power and/or on site renewable energy. The scale of development for the application of the policy and the percentage reduction selected will need to be determined locally, based on sound evidence and the need for planning policy to interact effectively with developing building control requirements."

The compendium approach attempts to provide a kind of tool kit for LDP development. It is something of an interim measure and provides numerous references and examples of possible policy mechanisms and approaches. In particular the following issues are left open to LPA definition and innovation:

- The detail of the 'staged approach'
- The percentage carbon reduction to be required for new development (beyond current building regulation)
- The definition of major development
- The interpretation of, and relationship between, policies to reduce demand, achieve energy efficient supply and promote on-site renewable energy
- The development of policies to take advantage of specific local opportunities

The weaknesses of current policy lie in the fact that policies and information are only partially developed and are, and will be, subject to review before the introduction of the LDP. PPW is to be overhauled, TAN 8 is to be reviewed, and LPAs do not yet have reliable carbon benchmarks at a local level.

Arguably there is a fairly clear requirement for LDP policies relating to larger renewable energy generation, and the retrofit of smaller technologies within the built environment. It is also clear that the Assembly Government sees a much greater role for LPAs in delivering low/zero carbon development. This involves much scope for variation and positive intervention but also introduces the potential for much greater complexity, particularly in establishing how planning is to interface

with building regulations and the proliferation of building and residential environmental performance standards on offer.

It is possible that in relation to new low/zero carbon development the most sensible approach is to ensure that the LDP framework takes account of the new powers and responsibilities (ie provides a sufficiently robust basis on which to address the scale and scope of the likely requirement) and to expect that the detail of requirements for design statements, energy assessments and percentage reductions will be dealt with primarily through more flexible SPG.

Existing Vale of Glamorgan policies have been overtaken by the new policy requirements to the extent that a totally fresh, cross cutting approach is more appropriate than an attempt to update the UDP policies.

9. Current Vale of Glamorgan Planning Policy Guidance

In the case of the Vale of Glamorgan, none of the SSAs is located within or proximate to the administrative area governed by the Council. Consequently, the further guidance in TAN8 on wind energy development outside of the SSAs and other renewable energy technologies has been considered in the evaluation of relevant existing UDP policies, whilst it is considered that guidance in relation to the SSAs is not of relevance to the interests of the Council.

The following is an examination of renewable energy, energy efficiency and energy conservation policies currently set out within the Vale of Glamorgan Unitary Development Plan 1996 – 2011. In view of the substantial additional Climate Change and Energy implications which will inform the development of future LDP it is not considered that the current formulation is amenable to slight updating. Accordingly, the main recommendations for the LDP are addressed in Part 4 of this report: Recommendations for new LDP.

Relevant policies identified within the Vale of Glamorgan Unitary Development Plan 1996 – 20011 are as follows:

9.1. Strategic Policies

POLICY 1

THE VALE OF GLAMORGAN'S DISTINCTIVE RURAL, URBAN AND COASTAL CHARACTER WILL BE PROTECTED AND ENHANCED. PARTICULAR EMPHASIS WILL BE GIVEN TO CONSERVING AREAS OF IMPORTANCE FOR LANDSCAPE, ECOLOGY AND WILDLIFE, THE BEST AND MOST VERSATILE AGRICULTURAL LAND AND IMPORTANT FEATURES OF THE BUILT HERITAGE. PROPOSALS WHICH ENHANCE THESE AREAS WILL BE FAVOURED.

This Policy is relevant in that renewable energy developments, including microgeneration technologies, have the potential to affect the character of rural, urban and coastal resources in the Council area. Consequently, this policy is such that it could be applied as a material policy in the rejection of proposals for renewable energy developments. Therefore it may be advisable to have supporting notes (or SPG) explaining that conflicts between this Policy and Policies on renewables are likely to arise and that these are best resolved through thorough consultation and the strong consideration of design aspects to attempt to achieve conformity with all relevant Policies.

POLICY 2

PROPOSALS WHICH ENCOURAGE SUSTAINABLE PRACTICES WILL BE FAVOURED INCLUDING:

i. PROPOSALS WHICH CONTRIBUTE TO ENERGY CONSERVATION OR EFFICIENCY, WASTE REDUCTION OR RECYCLING; POLLUTION CONTROL; BIODIVERSITY AND THE CONSERVATION OF NATURAL RESOURCES;

ii. PROPOSALS WHICH ARE LOCATED TO MINIMISE THE NEED TO TRAVEL, ESPECIALLY BY CAR AND HELP TO REDUCE VEHICLE MOVEMENTS OR WHICH ENCOURAGE CYCLING, WALKING AND THE USE OF PUBLIC TRANSPORT;

iii. THE RECLAMATION OF DERELICT OR DEGRADED LAND FOR APPROPRIATE BENEFICIAL USE; AND

iv. PROPOSALS WHICH IMPROVE THE QUALITY OF THE ENVIRONMENT THROUGH THE UTILISATION OF HIGH STANDARDS OF DESIGN.

This Policy does not refer to renewable energy at all – surely one of the most prominent and immediately deliverable technologies in sustainable practices. Given that paragraph 5.2 of TAN8 requires that "*Local Development Plans should promote high standards of energy efficiency, energy conservation and the use of renewable energy of part of the national and international response to climate change and this should be reflected in the strategy of development plans*" there is a need for the emerging LDP to reflect this. Perhaps a strategic policy such as this should also reflect further guidance on the formulation of LDPs within paragraphs 5.2 – 5.5 of TAN8.

9.2. Specific Policies

POLICY ENV 1 - DEVELOPMENT IN THE COUNTRYSIDE

WITHIN THE DELINEATED COUNTRYSIDE PERMISSION WILL ONLY BE GRANTED FOR:

1. DEVELOPMENT WHICH IS ESSENTIAL FOR AGRICULTURE, HORTICULTURE, FORESTRY OR OTHER DEVELOPMENT INCLUDING MINERAL EXTRACTION, WASTE MANAGEMENT, UTILITIES OR INFRASTRUCTURE FOR WHICH A RURAL LOCATION IS ESSENTIAL;
2. APPROPRIATE RECREATIONAL USE;
3. THE RE-USE OR ADAPTATION OF EXISTING BUILDINGS PARTICULARLY TO ASSIST THE DIVERSIFICATION OF THE RURAL ECONOMY; OR
4. DEVELOPMENT WHICH IS APPROVED UNDER OTHER POLICIES OF THE PLAN.

Such a Policy could be applied once again sweepingly to the rejection of proposals for renewable energy projects. Perhaps the development of such a Policy through the LDP process could look at caveats whereby some developments, for example for microgeneration, hydro, biomass and small wind, would be considered appropriate in the countryside where they can demonstrate limited, acceptable effects and conformity with other Policies.

POLICY ENV 4 - SPECIAL LANDSCAPE AREAS

NEW DEVELOPMENT WITHIN OR CLOSELY RELATED TO THE FOLLOWING SPECIAL LANDSCAPE AREAS WILL BE PERMITTED WHERE IT CAN BE DEMONSTRATED THAT IT WOULD NOT ADVERSELY EFFECT THE LANDSCAPE CHARACTER, LANDSCAPE FEATURES OR VISUAL AMENITIES OF THE SPECIAL LANDSCAPE AREA:

1. ELY VALLEY AND RIDGE SLOPES
2. LOWER THAW VALLEY
3. UPPER THAW VALLEY
4. NANT LLANCARFAN
5. CWRT YR ALA BASIN
6. DUFFRYN BASIN AND RIDGE SLOPES
7. CASTLE UPON ALUN

Consideration may be given towards adapting this Policy so that developments linked to climate change, such a renewable energy developments of suitable scale and microgeneration technologies, would be permitted where, again, they can demonstrate limited, acceptable effects and conformity with other Policies.

POLICY ENV 5 - THE GLAMORGAN HERITAGE COAST

THE SPECIAL ENVIRONMENTAL QUALITIES OF THE GLAMORGAN HERITAGE COAST WILL BE CONSERVED AND ENHANCED. WITH THE EXCEPTION OF LIMITED INFORMAL RECREATION FACILITIES AT CWM COLHUW, OGMORE-BY-SEA AND DUNRAVEN, THE

REMAINDER OF THE AREA WILL BE TREATED AS A REMOTE ZONE WITH PRIORITY BEING GIVEN TO AGRICULTURE, LANDSCAPE AND NATURE CONSERVATION.

Consideration should be given as to whether this Policy, and any subsequent LDP Policy based on protection of the Heritage Coast, would be in conformity with the provisions of paragraph 3.1 of TAN8, particularly with respect to onshore installations supporting offshore wind farms or other technologies e.g. tidal barrage. Under the TAN8 obligation, local planning authorities should "*plan positively for such installations and minimise their environmental impacts*".

This same advice applies in respect of Policy ENV6.

POLICIES ENV 13, ENV 14, ENV 15 AND ENV 16 ARE ALL RELEVANT POLICIES BUT SHOULD REMAIN UNAFFECTED BY THE EMERGING PLANNING POLICY FRAMEWORK FOR WALES

POLICY ENV 17 - PROTECTION OF BUILT AND HISTORIC ENVIRONMENT

THE ENVIRONMENTAL QUALITIES OF THE BUILT AND HISTORIC ENVIRONMENT WILL BE PROTECTED. DEVELOPMENT WHICH HAS A DETRIMENTAL EFFECT ON THE SPECIAL CHARACTER APPEARANCE OR SETTING OF:

1. A BUILDING OR GROUP OF BUILDINGS, STRUCTURE OR SITE OF ARCHITECTURAL OR HISTORIC INTEREST, INCLUDING LISTED BUILDINGS AND CONSERVATION AREAS;
2. SCHEDULED ANCIENT MONUMENTS AND SITES OF ARCHAEOLOGICAL AND / OR HISTORIC INTEREST;
3. DESIGNED LANDSCAPES, PARKS OR GARDENS OF HISTORIC, CULTURAL OR AESTHETIC IMPORTANCE

WILL NOT BE PERMITTED.

This Policy would need to be re-evaluated on the basis of potential legislation in Wales for microgeneration and technologies approved through a revised GPDO. This advice is relevant to Policy ENV 20 also.

POLICY ENV 27 - DESIGN OF NEW DEVELOPMENTS

PROPOSALS FOR NEW DEVELOPMENT MUST HAVE FULL REGARD TO THE CONTEXT OF THE LOCAL NATURAL AND BUILT ENVIRONMENT AND ITS SPECIAL FEATURES. NEW DEVELOPMENT WILL BE PERMITTED WHERE IT:

1. COMPLEMENTS OR ENHANCES THE LOCAL CHARACTER OF BUILDINGS AND OPEN SPACES;
2. MEETS THE COUNCIL'S APPROVED STANDARDS OF AMENITY AND OPEN SPACE, ACCESS, CAR PARKING AND SERVICING;
3. ENSURES ADEQUACY OR AVAILABILITY OF UTILITY SERVICES AND ADEQUATE PROVISION FOR WASTE MANAGEMENT;
4. MINIMISES ANY DETRIMENTAL IMPACT ON ADJACENT AREAS;
5. ENSURES EXISTING SOFT AND HARD LANDSCAPING FEATURES ARE PROTECTED AND COMPLEMENTED BY NEW PLANTING, SURFACE OR BOUNDARY FEATURES;
6. ENSURES CLEAR DISTINCTION BETWEEN PUBLIC AND PRIVATE SPACES;
7. PROVIDES A HIGH LEVEL OF ACCESSIBILITY, PARTICULARLY FOR PUBLIC TRANSPORT, CYCLISTS, PEDESTRIANS AND PEOPLE WITH IMPAIRED MOBILITY;

8. HAS REGARD TO ENERGY EFFICIENCY IN DESIGN, LAYOUT, MATERIALS AND TECHNOLOGY; AND
9. HAS REGARD TO MEASURES TO REDUCE THE RISK AND FEAR OF CRIME.

This policy would need to be re-evaluated in the light of TAN 8 and the requirements to reduce carbon emissions and promote renewable energy and low carbon development within PPW – no mention is made of on-site renewables. Similar consideration should be given to Housing policies.

Introduction to the Housing policies (Chapter 4) refers only to the ensuring the availability of a range and choice of housing throughout the Vale. No mention in the opening paragraphs how housing provision, design and delivery can be tailored to include climate change goals.

The analysis of National Planning Guidance and the setting out of Objectives again fail to identify the contribution that new building design and housing settlements could play in combating climate change.

With regard to relevant policies:

Policies HOUS 1 and HOUS 2 relate to the allocation of land for housing development. There is no evidence that the policies have considered access and public transport arrangements to minimise private car use and hence greenhouse gas emissions.

Policy HOUS 3 – Dwellings in the Countryside and Policy HOUS 4 – New Settlements relate to restricting new development in the countryside and preventing the development of new settlements. No comment on revising these policies is offered on the basis that no targeted advice on energy conservation or renewable energy would be relevant to such policies.

Policies HOUS 5, HOUS 7, HOUS 8, HOUS 9 and HOUS 10 relate to criteria relevant to housing developments or conversions. None of the criteria relate to:

- the principles of suitable building design in order to minimise electricity and heat use i.e. energy reduction
- the use of multiple housing CHP or biomass schemes to provide heat and electricity loads to properties
- the use of microrenewables on properties for heat and electricity generation

Policy HOUS 6 relates to changes to conditions placed on agricultural occupancy buildings and no relevant advice on energy conservation or renewable energy is merited for this policy.

Policy HOUS 11 to Policy HOUS 14 relates to housing matters for which advice on energy conservation and renewable energy is not though to be relevant.

POLICY COMM 7 - WIND GENERATORS AND FARMS

PROPOSALS FOR INDIVIDUAL WIND GENERATORS AND WIND FARMS WILL BE PERMITTED IF:

1. THE PROPOSAL HAS NO UNACCEPTABLE EFFECT UPON THE LANDSCAPE, PARTICULARLY WHEN VIEWED FROM PUBLIC ROADS, PUBLIC RIGHTS OF WAY AND OTHER LAND USED BY THE GENERAL PUBLIC. PROPOSALS WHICH FALL WITHIN THE GLAMORGAN HERITAGE COAST AND AREAS OF HIGH LANDSCAPE IMPORTANCE, OR LIE OUTSIDE SUCH AREAS BUT HAVE AN UNACCEPTABLE ADVERSE VISUAL EFFECT UPON THEM WILL NOT BE PERMITTED;

2. THE PROPOSAL HAS NO UNACCEPTABLE EFFECT UPON SITES OF CONSERVATION, ARCHAEOLOGICAL, HISTORICAL, ECOLOGICAL AND WILDLIFE IMPORTANCE;

3. ALL POSSIBLE STEPS ARE TAKEN BY THE DEVELOPERS TO MINIMISE NOISE DISTURBANCE AND SHADOW FLICKER FROM THE TURBINES FOR LOCAL RESIDENTS. DEVELOPERS WILL BE REQUIRED TO AMELIORATE PROBLEMS BY THE USE OF APPROPRIATE LEGAL AGREEMENTS AND / OR CONDITIONS ATTACHED TO THE GRANTING OF PLANNING CONSENT;

4. ALL POWER LINES CONNECTING THE TURBINES TO THE NATIONAL GRID SHOULD RESULT IN NO UNACCEPTABLE VISUAL EFFECT UPON THE LANDSCAPE OF THE VALE OF GLAMORGAN;

5. THE NUMBERS OF ANCILLARY BUILDINGS ARE LIMITED AND ARE DESIGNED AND SITED TO MINIMISE THEIR IMPACT ON THE LANDSCAPE;

6. THE CUMULATIVE EFFECTS OF DEVELOPMENT DO NOT HAVE AN UNACCEPTABLE IMPACT UPON THE LANDSCAPE;

7. ACCESS FOR CONSTRUCTION TRAFFIC CAN BE PROVIDED WITHOUT DANGER TO HIGHWAY SAFETY AND SHOULD BE CONSTRUCTED IN LOCALLY SYMPATHETIC MATERIALS (I.E. ROAD BASED MATERIALS TOP DRESSED WITH LOCAL SOIL TO REGENERATION OF VEGETATION);

8. THE PROPOSAL DOES NOT CREATE SIGNIFICANT OR IRREMEDIABLE RADIO INTERFERENCE;

9. THE PROPOSAL DOES NOT UNACCEPTABLY EFFECT OPERATIONS UNDER THE CONTROL OF THE CIVIL AVIATION AUTHORITY OR THE MINISTRY OF DEFENCE; AND

10. WITHIN 24 MONTHS OF PART OR THE WHOLE OF THE SITE BECOMING PERMANENTLY INOPERATIVE THE STRUCTURES SHALL BE REMOVED, AND THE SITE RESTORED TO ITS FORMER USE.

PERMANENTLY INOPERATIVE IS CONSIDERED TO BE WHEN A TURBINE HAS NOT BEEN IN OPERATION FOR THE PURPOSE OF ELECTRICITY PRODUCTION FOR A PERIOD EXCEEDING 6 MONTHS).

Clearly this Policy needs considerable updating to reflect the provisions of TAN8. The principle parameters and criteria that should be considered in the preparation of a Policy or Policies on wind energy are:

- The development of wind power should be encouraged for schemes up to 25MW within urban/industrial brownfield sites, where such developments do not conflict with statutory provisions and other Policies within an emerging LDP (para 2.11 of TAN8).
- The Council should encourage smaller community based wind farm schemes, to be generally less than 5MW. Local criteria against which proposals can be evaluated should be prepared, along with more definition on what is meant by ‘smaller’ and community based’ (para 2.12, TAN8). In addition, criteria should be established for ascertaining cumulative impacts between schemes (para 2.13) and that a policy or policies should be developed to restrict wind energy developments outside of urban/brownfield sites to less than 5MW (para 2.13).
- The Council should make clear in their LDP the scope of possible ‘planning contributions’ that would be construed as community benefits. Such contributions should be pro rata with the scale of development. It should be clearly set out that the provision of such contributions by a developer/applicant should not in themselves lead to the approval of a development proposal.
- Specification of the standard criteria (contained in COMM 7) and in Annex C, 2 of TAN8 for development control purposes against which application should be evaluated. This should include guidance on appropriate conditions for the decommissioning of wind farms or

individual turbines and their restoration, as well as stating that financial bonds will be required through Section 106 agreement for the costs of decommissioning.

An additional element of this Policy or Policies should be the establishment of criteria that would engender the positive planning of onshore installations linked to offshore wind farms, if they arise (para 3.1 of TAN8).

Further drafting of appropriate technical, environmental and planning guidance in the form of specific criteria can be provided by Dulas if requested by the local authority.

POLICY COMM 8 - OTHER RENEWABLE ENERGY SCHEMES

PROPOSALS FOR OTHER RENEWABLE ENERGY SCHEMES WILL BE PERMITTED IF ALL OF THE FOLLOWING CRITERIA ARE MET:

1. THE PROPOSAL HAS NO UNACCEPTABLE EFFECT ON THE IMMEDIATE AND SURROUNDING COUNTRYSIDE;
2. THE PROPOSAL HAS NO UNACCEPTABLE EFFECT UPON THE SITES OF CONSERVATION, ARCHAEOLOGICAL, HISTORICAL, ECOLOGICAL AND WILDLIFE IMPORTANCE;
3. ADEQUATE MEASURES ARE TAKEN, BOTH DURING AND AFTER CONSTRUCTION, TO MINIMISE THE IMPACT OF THE DEVELOPMENT ON LOCAL LAND USE AND RESIDENTIAL AMENITY.

The effectiveness of other onshore renewable energy technologies and the cost effectiveness of installing and operating them have improved considerably over the last decade, albeit that they are not generally keeping apace with onshore wind energy and their potential contribution to the 2010 target will be limited. However, in the more medium to long term timeframe (i.e. the LDP timeframe) it is expected that they will make a greater contribution to generation targets and therefore local authorities are encouraged to adopt policies for their promotion. Several technologies are identified and explained in TAN8, including anaerobic digestion, biofuels, CHP, district heating, energy from waste, biomass, hydro power, methane and solar technology.

In addition to the above, the Council should consider the preparation of appropriate Policies (perhaps incorporated into a Policy for supporting onshore installations for offshore developments) to support onshore installations linked to wave and tidal generation technologies. Such technologies will have a considerable contribution to make to clean energy generation and they are nearing a market ready stage whereby the considerable deployment of such technologies is expected in the next 10 to 15 years.

Part 3: Vale of Glamorgan Energy Assessment

10. Introduction

The current, and proposed, requirements of planning policy with regard to LDP development are examined within Part 2 of this report. As the core of the requirement, the Welsh Assembly Government requires that LPAs seek to minimise carbon emissions through LDP policies and that policy development should have reference to the specific opportunities and potential within LPA areas.

The Renewable Energy Ministerial Interim Planning Policy Statement associated with TAN8 (MIPPS 01/2005) specifically requires local planning authorities to undertake an assessment of all potential renewable energy resources, renewable energy technologies, energy efficiency and energy conservation measures.

A sustainable energy assessment must have reference to the physical aspects of an area in order to judge resource potential, and reference to current and expected energy usage (and carbon emissions) in order to assess energy demand and the potential for energy and carbon reduction.

10.1. Methodology of Energy Assessment

Salient facts relating to the Vale of Glamorgan have been extracted from the SA scoping report and other sources. Vale of Glamorgan Energy and Carbon emissions have been sourced, to the extent that they are available, from government statistical agencies.

Existing renewable energy, microgeneration and energy conservation measures have been assessed with reference to a variety of data sources

Renewable energy resource potential for larger technologies has been based on GIS overview, assessment for smaller technologies linked to available building and housing statistics.

Further information on methodology and approach is provided under the relevant section headings below.

10.2. The Vale of Glamorgan

The Vale of Glamorgan is a largely lowland landscape formed on a gently rolling limestone plateau dissected by shallow valleys and extending from the outskirts of Cardiff to the east, practically to Bridgend in the west. Rhondda Cynon Taf borders the Vale to the north.

The Vale is a mix of undulating farm land, valley basins, woodland and coastline (partly designated as the Glamorgan Heritage Coast). To the West of the Vale there are some areas of undulating lowland hill terrain and active lowland river flood plain systems. The intertidal coast line of the Vale is mainly rock cliff and shore, with small areas of sand dunes and wild coast land.

The East of the Vale is a more varied physical environment, comprised mainly of lowland escarpment, lowland plateau and lowland till plain/field. This is interspersed with small areas of

wooded lowland valleys and wooded rolling lowland along with some areas of engineered features and reclaimed/infilled land.

The Vale has a population in the region of 119,292 and approximately 48,753 dwellings (based on 2001 census data and now considered underestimates). Barry is the administrative centre of the Vale however there is easy access to the major centres of Cardiff and Bridgend (both of which lie outside the Vale boundaries). Within the Vale the larger urban areas, Llantwit Major, Barry and Penarth are located to the south and east. The town of Cowbridge is located in the centre of the Vale.

Whilst around 85% of land area within the Vale is classified as Agricultural (digest of Welsh Local Statistics 2004) past trends indicate that the majority of development to date has been on brownfield land (SA scoping report based on JHLA Studies 2001-2005)

Employment statistics within the Vale give an indication of the nature and type of commercial energy use. The largest employment sectors are Health and Social work, Manufacturing, Wholesale and retail trade, and Public Administration and Defence. Manufacturing employment has declined significantly over the last decade.

Manufacturing is concentrated in Llandow, Cowbridge, Llantwit Major and parts of the East Vale. From the perspective of energy assessment particularly notable industries include Power Generation at Aberthaw (Coal fired), the Chemical industry sector, the port of Barry, and hotel provision linked to Cardiff Airport.

The major military base of RAF ST Athan is also located within the Vale and a major development and expansion of the site (DTA St Athan) is currently under active consideration.

10.3. National Energy and Carbon emissions

At a Wales level the Assembly has set a specific target of 20% cut in Greenhouse gases by 2020 on a 2000 baseline of 46.114 mega-tonnes of carbon dioxide (equivalent to 9.22 mega-tonnes carbon dioxide). Within this framework and timescale the Assembly Government has also committed to set out 'ambitious' more detailed and time limited reduction targets.

Greenhouse gas emissions are identified as a key SA indicator within the SA draft scoping report and reference is made to the headline data based on Key Environmental Statistics for Wales.

The graph below illustrates greenhouse gas trends from 1990 in a similar format.

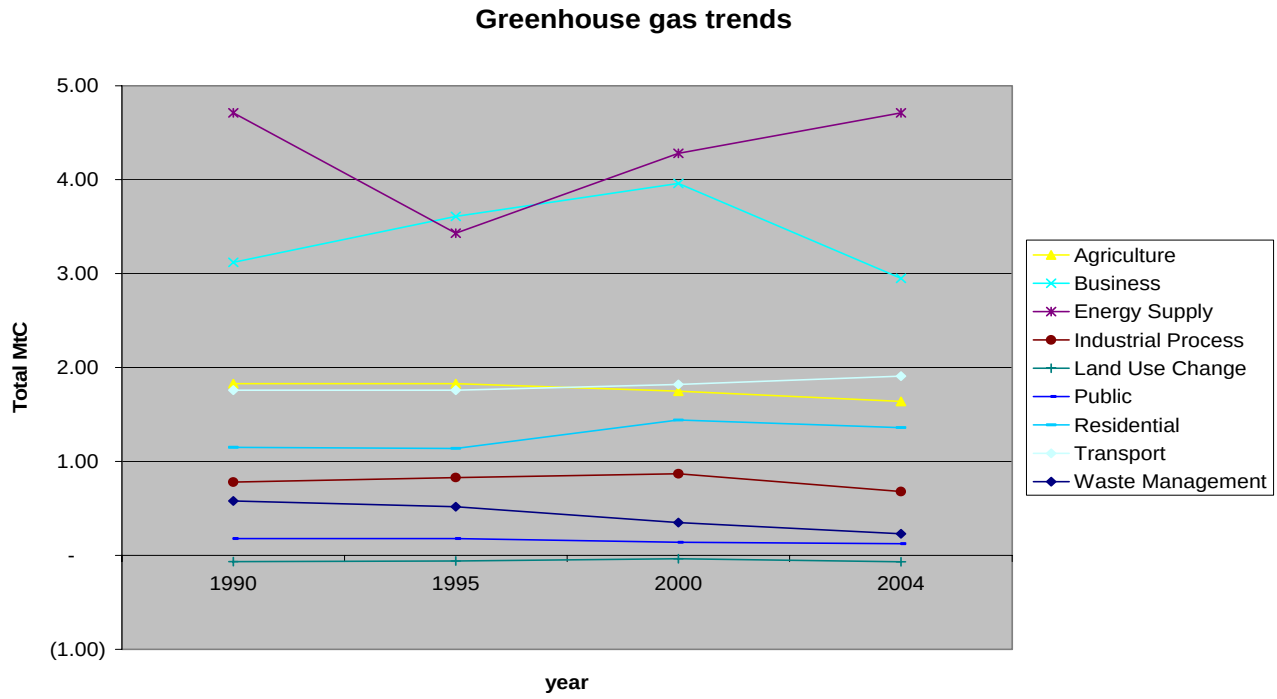


Figure 1 Wales Greenhouse Gas Emissions 1990 to 2004

Unfortunately, the current national headline data sets are not particularly useful for LPAs in determining the scale and scope of carbon reductions which could reasonably be expected within a specific local authority region.

It should be noted that a large proportion of emissions within Wales result from activities such as major power generation over which LPAs, and indeed the Welsh Assembly Government, have limited control.

The 2006 Environment Strategy also provides a breakdown of emissions by sector.

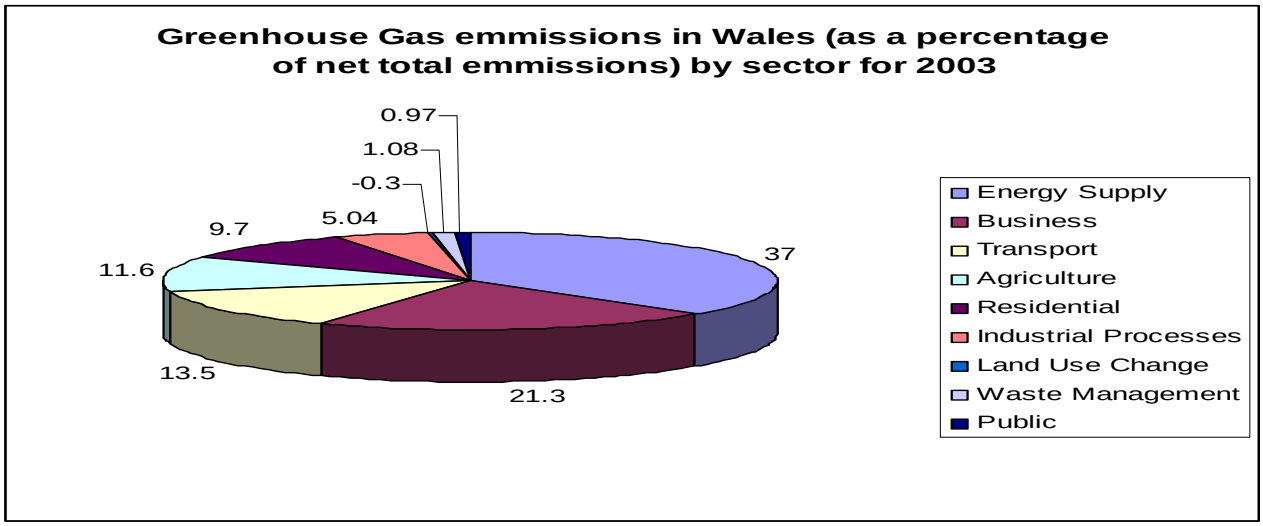


Figure 2 Welsh Greenhouse gas emissions 2003

10.4. Vale of Glamorgan Energy and Carbon emissions

It is recognised that current statistical data does not support local authorities in establishing and monitoring realistic carbon reduction targets at a local level.

The Department for the Environment, Food and Rural Affairs (DEFRA) and the (former) Department of Trade and Industry have been working to produce estimated carbon dioxide emission statistics at a local authority level, however the methodology of data collection and aggregation is not yet established and accordingly the government is keen to stress that these statistics are to be regarded as 'experimental' and therefore to be used with caution.

We have used the 2003 figures for illustration. [Note that these figures are not comparable with updated estimates produced for 2004 due to changes in methodology]. Data should be used with reference to the report 'Local and Regional CO_2 Emissions Estimates for 2004', produced by AEA Energy & Environment for Defra http://www.defra.gov.uk/environment/statistics/.htm. The implication for LPA development is that as currently formulated these statistics should be used to establish the context for policies rather than used as a performance benchmark/ sustainability indicator.

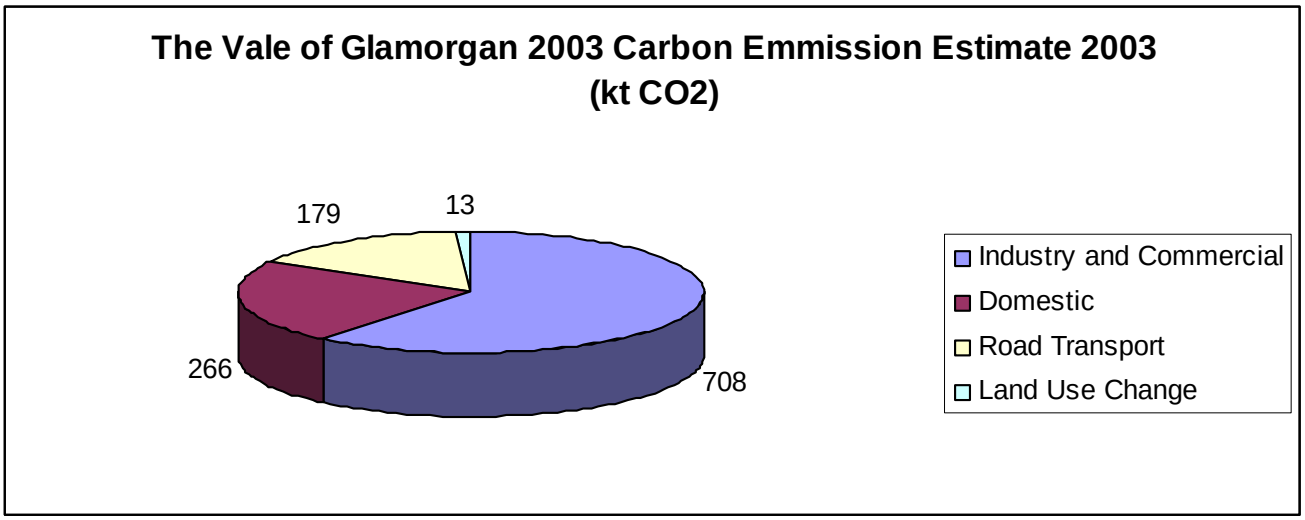


Figure 3 Illustration of 2003 Vale of Glamorgan Carbon Emissions (DEFRA Experimental data)

The experimental data indicates that in 2003 the Vale of Glamorgan was responsible for somewhere in the region of 1.16 M tonnes of $C0_2$.

Based on an assumed population of 121,000 the data also indicates a per capita CO_2 figure of 9.6 tonnes and a domestic per capita figure of 2.2 tonnes. A report based on this 2003 data arrived at an estimate of 4622kg CO_2 per dwelling within the Vale of Glamorgan.

The Carbon Trust have indicated a willingness to assist LPAs in establishing robust baselines for carbon emissions in each local authority area and should be contacted if the Council wishes to establish a performance benchmark.

11. Renewable Energy

11.1. Introduction

A full description of the following renewable energy technologies is included as Appendix A of this report. This includes baseline information on the physical requirements for each technology, including climatic, topographic, aspect/orientation, geological and structural requirements:

A number of approaches were employed in order to estimate levels of renewable energy installed within the Vale, to assess the scale of the potential for renewable energy technologies, and to identify broadly appropriate locations for relevant technologies.

11.2. Methodology

Existing Capacity

There is no single source of reliable data on installed renewable energy capacity at a regional and local level. Larger installations are obviously easier to identify by reference to official sources such as the listing of generators eligible for Renewable Energy Certificates (ROCs) maintained by OFGEM.

In the case of domestic scale 'micro-generation' installations no centralised data exists, planning permission is not always required, and assessment is reduced to estimation linked to national figures (which are themselves estimates) and the partial data available from bodies with a degree of professional involvement (trade associations, energy agencies and government bodies). Up to the present time small installations (particularly solar) have been very responsive to grant schemes and incentives, with this in mind it is also sometimes worthwhile examining grant allocations by region as an indication of likely levels of installation activity.

In order to arrive at an assessment of installed levels of renewable energy the following steps have been taken:

i. A search of the OFGEM database of accredited electricity generators within the Vale of Glamorgan.

ii. Planning applications for renewable energy installations have been researched for the period 1997 – 2007 (the dates for which searchable computerised records are available).

iii. Data from relevant grant schemes (SWISH, Clear Skies, LCBP) has been identified

iv. Relevant organisations and bodies have been contacted (EST, Energy agencies, trade associations)

v. Existing estimates have been examined and collated (Microgeneration Strategy / Action Plan, listings maintained by Energy Wales)

Potential Capacity

Geographical Information System (GIS) mapping has been utilised to identify suitable broad locations for commercial scale small wind clusters (below 5MW), biomass and hydro.

Data is collected from a variety of sources covering international, national and local areas of environmental importance. In addition data concerning major archaeological sites and technological constraints is also identified. This information is subsequently 'layered' on top of a 1:50,000 OS base 'electronic map' using ArcView 8.3 GIS (Geographical Information System)

software. The multiple layers of information provide a composite view of planning and technical constraints in the site selection of potential wind farm sites. Those areas largely free of such planning and technical constraints show an absence of hatching / colouring, and these areas are deemed to have the greater potential for site location.

Environmental and technical constraints from national datasets were mapped alongside local information from the UDP proposals map. The criteria used to define suitable locations for wind, biomass and hydro are detailed in the relevant technology section below.

For 'micro-generation' technologies (below 50 kW electrical/ 45kW thermal) which tend to be associated with the built environment reference has been made to known statistics, and the number of dwellings in particular.

11.3. Onshore Wind (Commercial Scale)

There are currently no operational or planned wind farms within the Vale boundary. One application for four large scale turbines was received in 1994, but this was refused by the council due to potential affects on the radar at RAF St Athan and Cardiff Airport, predicted noise emission and the affects on Landscape and Visual Amenity. The council has been consulted on wind farm developments in neighbouring local authority areas.

There is considered to be little potential for larger scale wind development within the Vale, as the scattered nature of settlements would make meeting the noise criteria of ETSU R97 very difficult. The windspeed generally across the Vale indicated by the NOABL database is reasonable, but not exceptional, for the deployment of wind turbines, and in some of the higher areas, for instance around Colwinston, a wind speed of 6.8 m/s at 45 metres is indicated. This is generally sufficient for economic generation.

TAN 8 refers to "smaller, community owned" turbines, and leaves local authorities to define what this means. For the purpose of this study, the definition of size is taken to be the definition used to determine whether a project falls within the EIA regulations, that is 3 turbines or 5 MW, whichever is the greatest. The definition of "community" is taken to be a project where a significant proportion of the ownership in the project lies with:

- A local landowner, or
- A local business, or
- A business located in the local authority area, where the majority of the energy generated will be used by the business in that location, or
- A local community group or a number of local residents

.

Onshore Wind Turbine

Medium to large scale horizontal axis wind turbines are commonly used for the generation of electricity onshore. The generated electricity is delivered to the grid or to a local site via electric cabling. Onshore wind turbines are usually installed at high elevations or open areas to maximise wind speed, decrease wind turbulence, and increase the electricity generated.

The main barrier to wind turbines in the Vale is potential interference with the radar at Cardiff Airport and operations at RAF St Athan. There are indications that the technology may be available in the near future to alleviate this problem, but it is arguable whether the cost could be justified for small projects. A Zone of Theoretical Visibility has calculated the areas within the Vale which are currently not within line of sight of the Cardiff Airport Radar. However, when these areas are mapped, they almost entirely coincide with the Special Landscape Areas, and areas where the windspeed is very low in commercial terms – generally around 5.6 m/s. Therefore, while areas within the flight path of the airport have been avoided, those within site of the radar have been included based on the potential for future mitigation measures.

Connection to the grid is often a constraint for wind development. But this tends to be less of a problem for smaller developments, although a small project may struggle to bear the cost of a long transmission line. For the purposes of this assessment, an economically viable distance of within 5 km of a 33 Kv line has been assumed.

With the forgoing provisos, particularly that regarding air traffic safeguarding, 4 areas have been identified where the indicated windspeeds are in excess of 6.5 m/s, and the distribution of dwellings indicated on the map would accommodate up to 3 turbines. The criteria used to identify the areas were:

- Windspeed in excess of 6.5 m/s
- No international or national planning designations
- Within 5 km of 33 kV grid

The four areas with the indicated windspeeds are

	Location	**Windspeed at 45 m**	**Comments**
W1	South of St Donats	7.5	2-3 turbines, good access
W2	Colwinston	6.8	2-3 turbines, good access
W3	South of Corntown	6.6	3 turbines
W4	East of Wick	7.4	3-4 turbines, good access, less constrained by property. Could be constrained by RAF St Athan

: These are shown on Map 1: Renewable Energy Potential, overleaf.

As part of the current LDP process, land at the Port of Barry (Barry Waterfront) has been submitted as a candidate site, with a proposal that the land is allocated as a brownfield site suitable for wind energy within the LDP. The indicated windspeed at that location is 6.4 m/s, and the area may be constrained due to the proximity to Cardiff Airport.

For the purpose of this study it is assumed that if radar interference solutions were in place at Cardiff airport and RAF St Athan and all five of the sites identified above were submitted to the planning authority, only two of these sites would get permission. This would equate to 10MW of wind energy, based on an indicative maximum size of 5MW per site in line with TAN8 policy.

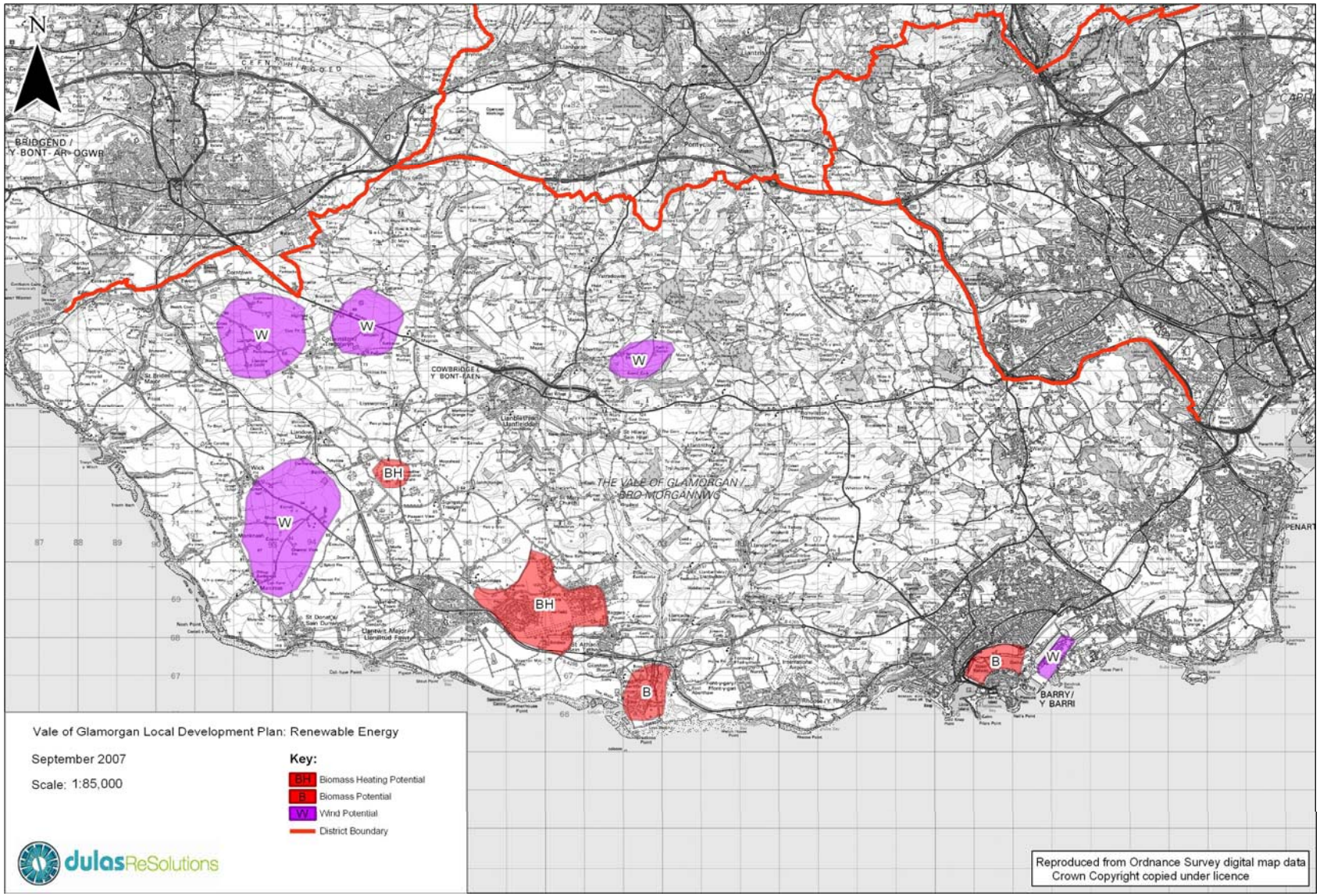


Figure 4 Areas of Renewable Energy Potential (Wind and Biomass)

11.4. Biomass Combustion

Since 2002, Aberthaw coal power station has been co-firing a range of biomass materials to replace some of the coal burned. The total capacity of the power station is 1,552,500 kW. An environment agency source reports that Aberthaw are currently using biomass for about 2% of thermal input. Based on a plant efficiency of 36% and a capacity factor of 60% Energy Wales calculate that this accounts for 0.16TWh electrical per annum (equivalent to 3.94% of the 4TWh 2010 target).

A number of biomass fuel types have been used to present. The vast majority are thought to have been imported.

In the near future the Environment Agency are expecting to issue a Pollution Prevention and Control permit to Aberthaw which may require investigation of an increase in biomass intake. Whilst it may be possible for Aberthaw to increase biomass intake it is currently only economic to do so if Renewable Obligation Certificates can be obtained.

The 2007 Energy White Paper clearly states the government intention to phase out ROCs for co-firing. This reflects an opinion that whilst co-firing may be an effective way to stimulate biomass fuel markets, the use of proportionally small quantities of biomass in older carbon intensive coal fired station is not an effective long term method of reducing carbon emissions.

The Aberthaw co-firing case was the only planning application for biomass during the UDP period.

There is very little indigenous biomass resource within the Vale of Glamorgan itself, in terms of commercial forestry. However, its close proximity to the Morgannwg Forest does present an opportunity for the use of the technology.

For clarity, biomass can be broken down into 3 separate categories –

1. Small/medium scale heat production in the range 10kW to 150 kW for individual dwellings, hotels, schools etc. For economic and environmental viability, the fuel supply should ideally be within 40 Km, and is log, woodchip or wood pellet. There is potential for the uptake of this scale of technology anywhere in the Vale. In the north east of the Vale the conditions exist for on site fuel supply, where a landowner uses arisings from woodland on a farm or estate to provide the fuel for a biomass heating plant. There is an example of one such scheme just outside the Vale at Merthyr Mawr. The implications for the planning system of this scale of technology are not major, and policy should facilitate the uptake, particularly on new developments. The potential for biomass in existing housing stock is given in Section 12.

2. Large scale heating plant in the range 150kW to 2MW, including district heating schemes. As above, there needs to be a fuel supply within 40km for this to be viable. Amongst potential end users are leisure centres, low grade heat intensive processes such as dairy processing, and potentially new high density housing through district heating schemes. Two areas have been identified where opportunities may exist – the redevelopment area of Barry Waterfront, which has a leisure centre in close proximity, and Llandow Industrial Estate. These are shown on Map 1: Renewable Energy Potential. In order to take advantage of these opportunities, planning policies should be encouraging towards such developments in the area. A more generic opportunity is for biomass fuelled district heating schemes for new housing developments. Planning policy in England, and the Building

Regulations are both providing an incentive to developers to incorporate biomass in a development, in order to meet carbon reduction targets.

3. Large scale electricity generation or combined heat and power. Unlike the other two categories, it is likely that the fuel for a development of this size would come from a wide area, and may even be imported. In order that the environmental impact of the latter is minimised fuel would need to be delivered either by ship or by rail, and considerable existing infrastructure would be required. Such infrastructure (a working rail link) exists at Aberthaw, and it is understood that the plant is currently co-firing biomass with coal. Such co-firing currently attracts Renewable Energy Certificates, but there is a reducing mechanism that effectively means that this will not be the case beyond 2010. Aberthaw would certainly present the opportunity for large scale electricity generation from biomass in the future, and it would be prudent to formulate policy that takes account of this.

11.5. Community Heating

No community/district heating schemes have been identified within the Vale of Glamorgan. The sites which have the most potential for a community heating network are the proposed Defence Training Academy (DTA) expansion at RAF St Athan and the Llandow Industrial Estate, shown on Map 1: Renewable Energy Potential. Both of these will be new-build, making it easier and cheaper to integrate the heat pipes. It is envisaged that these would be biomass installations, so are covered in the biomass section above. There is considered to be scope for RAF St Athan to utilise waste heat from Aberthaw.

District heating/cooling (DH/C)

District heating/cooling uses site-centralised heat/cold generation and a network of optimally sized pipes to distribute this heat/cold to the end users. The technology has become widespread in Europe over recent years due to its energy-efficient nature and the ability to upgrade the heat generation plant with little impact. With modern pre-insulated pipe work end consumers can be remote from the generation site.

11.6. Small Hydro

OFGEM list one operational hydro scheme within the Vale of Glamorgan, unfortunately Aberdulais Falls, a 200kw scheme, actually falls within the boundary of Neath Port Talbot.

There is little or no potential for commercial scale small hydro in the Vale. The hydrology in the area is typified by lowland, slow moving watercourses with relatively small catchments, and this is not the hydrology that is required for small hydro schemes.

An extensive inventory of hydro potential in the range 25kW to 5MW complied by Salford University in 1989[2] indicates that there are no commercially viable sites in the area. There may well be some potential for very small domestic schemes (below 5 kW) and the planning system should encourage the development of these, provided environmental criteria can be met.

It is thought that no hydro schemes within the Vale have received funding under recent grant schemes.

11.7. Energy from Waste and Geothermal

The OFGEM listing details a number of sewage and landfill gas energy installations in Mid and West Glamorgan (including a landfill gas site in Bridgend), but does not appear to show existing energy from waste facilities within the Vale of Glamorgan.

As part of the Regional Waste Plan areas of search for waste facilities have been defined, but details of these are not yet available. Within the current UDP, sites B2 and B8 allocated for employment allocation have been included as sites which may be suitable for waste management facilities including handling, treatment and transfer of waste. These sites could be used for small energy from waste units, and as many of these sites are in or close to existing employment, heat from these installations could be utilised in a district heating network.

In the past, Aberthaw has been approached regarding incineration of waste at the power station. No firm decision has been made on this to date.

Energy from Waste Boiler
An incinerator can be used to generate heat (and electricity) from burning refuse. This technology can be applied as central plant for a district heating network. There are issues surrounding this technology in respect of the 'hazardous' classification of its fuel, and public perception of the process.

Bio-digestion
Digestion of organic wastes via bacterial process, producing biogas (methane) and organic fertilizer.
Gas may be used for CHP engines and turbines or used in municipal gas networks.

[2] Small Scale Hydroelectric Generation Potential in the UK, ETSU-SSH-4063-P2,1989

11.8. Biofuels

Aberthaw Power station is reported to have used Palm oil as a starter fuel at some stage (following previous use of tallow), but it is not known whether this is still the case. There is some use of biodiesel within the Vale of Glamorgan (ie council fleet), but there are no known production facilities within the Vale.

11.9. Photovoltaics

Two planning applications for solar PV installations were received and approved during the UDP period. There are no records of larger installations.

Estimates of the scale of PV installed within the Vale are provided under the heading 'microgeneration'. The potential for PV as a retro-fit on existing housing stock is given in Section 12.

Roof Mounted PV Cells

Solar photovoltaic technology uses the properties of appropriately treated silicon wafers to produce electricity when exposed to sunlight. Arrays of these 'silicon cells' mounted on the roof or facades of buildings can be used to generate enough power to offset, or even meet, the electricity demands of a building. On a smaller scale they can be used to generate small amounts of power for localised plant. In addition to power generation they can provide an attractive and interesting 'high tech' finish to a building.

11.10. Solar Thermal

Nineteen planning applications were received for solar thermal – it should be noted that two of these were for multiple dwellings, one for three dwellings and one for thirty-seven dwellings. Newydd Housing Association has installed Solar Water Heating systems at Clos Llawhaden. These provide hot water and/or heat for thirty-six houses and one bungalow.

There were no awards relating to properties within the Vale of Glamorgan under the Solar Water Heating in Social Housing (SWISH) programme.

Photo: Clos Llawhaden Solar Thermal

Solar Thermal

Solar thermal technology uses sunlight falling on flat plate collectors or evacuated tubes to generate heat that can be used to produce domestic hot water, space heating and even cooling. Although often considered inferior to solar PV, it actually produces energy for a greater proportion of the year, and is substantially more efficient. Solar thermal collector arrays can be mounted to the roofs of buildings or as freestanding ground mounted arrays.

Estimates of the scale of solar thermal installed within the Vale are provided under the heading 'microgeneration' The potential for solar thermal as a retro-fit on existing housing stock is given in Section 12.

11.11. Heat Pumps and Geothermal

No large heat pump installations have been identified within the Vale and no records of planning applications relating to heat pumps are known.

Heat pumps are ideally suited to well insulated building types, and ideally require fairly continuous low level heat demand. Site conditions usually dictate the type of collector, e.g., straight pipes, slinky, narrow deep trenches, wide trenches or boreholes. Porous ground conditions which enable reasonable transfer of heat are most suitable for ground source heat pumps and the vast majority of ground conditions within the Vale are likely to be suitable.

Estimates of the scale of heat pumps installed within the Vale are provided under the heading 'microgeneration'. The potential for heat pumps to be incorporated into existing housing stock is given in Section 12.

Heat Pumps

Heat pumps upgrade low-grade heat to higher and more usable temperatures for space and water heating. Low grade heat may be extracted from the ground by circulating cooled water in horizontal ground loops or vertical boreholes (ground-source). The heat pump unit uses an electrically powered refrigeration cycle to extract the low temperature heat to higher temperature heat for use in the building heating systems.

This technology can also be used to extract heat from the atmosphere (air-source). In this scenario the buried ground loop is replaced with an external evaporator unit. These systems are able to operate at low temperatures, enabling heat to be extracted even on cold winter days.

A further heat extraction medium for heat pumps is from bodies of water such as ponds, lakes etc. Here circulation loops are laid in the water.

All heat pumps have the potential to be reversed and used as building cooling systems allowing the extraction medium to be used as a heat store rather than extract alone. Utilising systems like this will depend on the equipment selected and the heating/cooling services installed in the building.

11.12. Microgeneration

Prior to 2004 the Energy Saving Trust reported a government estimate of 80,900 UK 'microgeneration' installations. This is the figure cited in the UK Microgeneration Strategy.

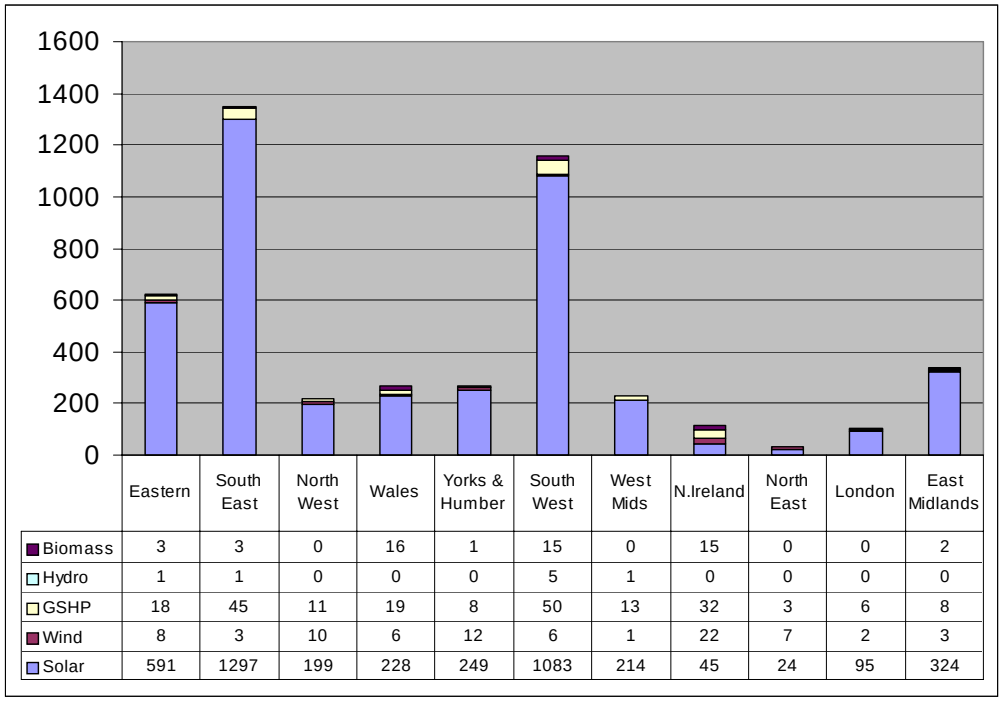
Evidence from current UK-wide grant schemes indicates that Welsh take up of grants is roughly proportional to population. On this basis we could arrive at a simplistic estimate in the region of 5000 Welsh microgeneration installations prior to 2004, however, due to the concentration of non-grant subsidised solar water heating systems in the South of England a figure in the region of 3500 -4000 installations is considered more realistic.

Given that the Vale of Glamorgan has roughly 3% of dwellings within Wales the Energy Saving Trust figure can be used to estimate that prior to 2004 around 120 microgeneration installations could be expected within the Vale (the vast majority being solar water heating)

Installation rates have increased rapidly since 2004, particularly for solar technologies, largely due to grant availability, however total numbers are still extremely modest. Partial Wales data from the Clear Skies (now closed) and Low Carbon Building Programme phase 1 are presented below.

Technology	Total Committed £	Total Committed	Total Paid £	Total Paid	Total Apps	Paper Apps	Online Apps
Total for all technologies	**504,204.23**	**404**	**307,685.17**	**248**	**540**	**224**	**316**
Biomass Room Heater/Stove (Automated Wood Pellet Feed)	989.00	2	600.00	1	2	0	2
Ground Source Heat Pump	41,200.00	35	18,400.00	16	45	15	30
Small Scale Hydro	9,300.00	4	0.00	0	4	2	2
Solar Photovoltaic	210,206.10	30	167,368.01	22	42	16	26
Solar Thermal Hot Water	86,034.00	216	63,634.38	160	267	126	141
Wind Turbine	117,655.83	90	36,540.36	34	144	52	92
Wood Fuelled Boiler System	38,819.30	27	21,142.42	15	36	13	23

Figure 5 Wales Low Carbon Buildings Program (LCBP) Phase 1 statistics.
NB. Grants were launched on the 1st April 2006, and the scheme is still ongoing.



	Eastern	South East	North West	Wales	Yorks & Humber	South West	West Mids	N.Ireland	North East	London	East Midlands
Biomass	3	3	0	16	1	15	0	15	0	0	2
Hydro	1	1	0	0	0	5	1	0	0	0	0
GSHP	18	45	11	19	8	50	13	32	3	6	8
Wind	8	3	10	6	12	6	1	22	7	2	3
Solar	591	1297	199	228	249	1083	214	45	24	95	324

Figure 6 Clear Skies grant statistics – 2004/5

Solar thermal installations are now generally considered permitted development, and are often installed without grant funding so it is difficult to estimate the number of these installed. It is estimated that around seventy-five additional solar thermal installations may have been installed within the Vale of Glamorgan since 2004.

It is estimated that up to half a dozen or more PV systems may have been installed in the Vale of Glamorgan as permitted development.

There are likely to be less than half a dozen existing Ground Source Heat Pump within the Vale of Glamorgan (more likely in rural off gas areas).

Six planning applications for small wind turbines were received and approved by the Council to date (June 2007), including those for a 6kW and 2.5kW machine. The other four machines are described building mounted so it can be assumed that these were either 1kW or 1.5kW turbines.

In summary, there are high margins of error on such estimates, however the scale of microgeneration is certainly extremely modest and the total number of installations is likely to be in the low hundreds. The combined electrical capacity of domestic scale installations is likely to be around 100kW and the thermal capacity perhaps 200kW.

11.13. Building Integrated Renewables

The following table shows the potential for carbon reduction through the installation of small scale renewables in existing housing stock. This is based on the 2003 level of 50,100 households within the Vale of Glamorgan and a fuel mix of 86% gas, 4% solid fuel, 5% oil and 5% electric (based on HECA report).

System Type	*System Size*	*Energy Saving (kWh)*	*kg CO_2 Saving (gas)*	*kg CO_2 Saving Electricity*	*kg CO_2 Saving Oil*	*kg CO_2 Saving Solid Fuel*	*Vale of Glamorgan Suitability Factor*	*Vale of Glamorgan Total CO_2 Saving (kg)*	*% saving against current emissions*
Solar Thermal	3m2	1,227	264	697	341	920	50%	7,909,287	3.4%
Solar PV	1kWp	935		531			50%	13,301,550	5.7%
Biomass	10kW	8,000	1,283	4102	1781	5558	60%	48,692,691	21.0%
Heat Pumps	10kW	8,000	880	3700	1378	5156	35%	21,339,043	9.2%

Table 2 Key figures for retrofit microgeneration

If all of the above renewables were installed, the total CO_2 saving would be 91,242,571kg. The current CO_2 emission of 173,698,939.6kg could therefore be reduced to 82,456,369kg - a reduction of 52.5%.

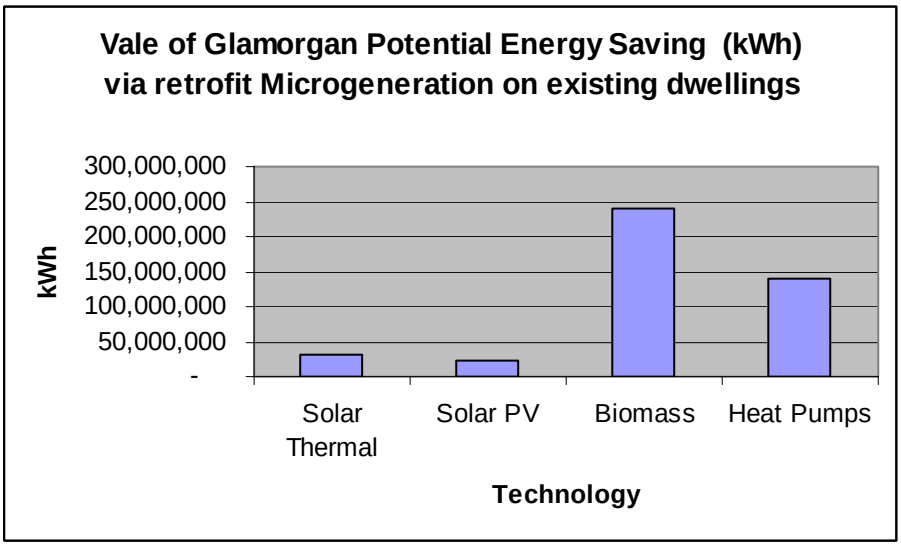


Figure 7 Potential energy saving via retrofit domestic renewables

11.14. New Development

The table below shows a selection of scenarios for low carbon dwellings. This is based on the current fuel mix, and 460 new homes per year (an average of the new build from 1996-2006 within Vale of Glamorgan). It is assumed that these are 2 bed houses of 90m^2 built to 2006 regulations and including appliance consumption.

Regulation Type	*2007*		*2010*		*2014*		*Zero DER*	
	Annual CO_2 Saving per dwelling (kg)	*Total annual Vale of Glamorgan Saving (kg)*	*CO_2 Saving per dwelling (kg)*	*Total annual Vale of Glamorgan Saving (kg)*	*CO_2 Saving per dwelling (kg)*	*Total annual Vale of Glamorgan Saving (kg)*	*CO_2 Saving per dwelling (kg)*	*Total annual Vale of Glamorgan Saving (kg)*
'Merton Rule' @ 10%	302	138,757	255	117,508	209	96,261	71	32,535
10% over Building Regs	231	106,232	185	84,986	139	63,739	0	-
Eco-Homes 'Very Good'	346	159,349	277	127,479	208	95,609	0	-
CSH Level 3	577	265,581	462	212,465	346	159,349	0	-

Table 3 Key carbon saving figures per regulation type; new build domestic

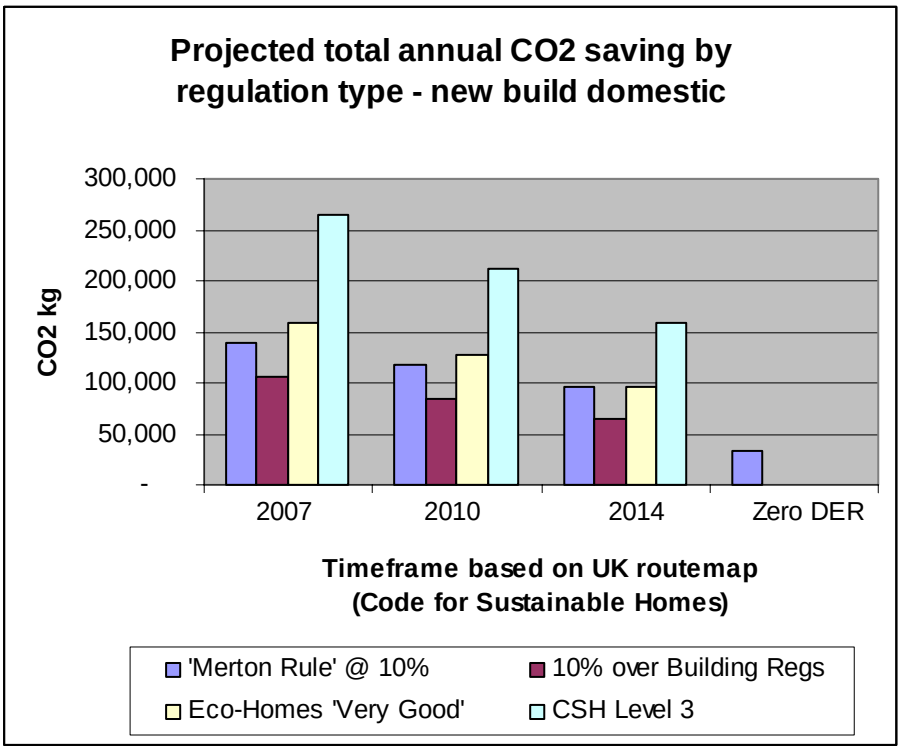


Figure 8 Graphical representation key carbon saving figures per regulation type new build domestic

Note that additional new development is unlikely to reduce CO_2 emissions unless it replaces more inefficient development of the same type. These scenarios demonstrate how the increase in CO_2 emissions can be kept to a minimum level.

12. Energy Efficiency and Energy Conservation

12.1. Energy Efficiency

Fuel Poverty in Wales (2005) estimates that 25% of full income households in the Vale of Glamorgan suffer from fuel poverty, 3.8% of whom are in severe fuel poverty: the average figure for Wales is 31%, with 6.2% of these in severe fuel poverty. With regard to basic income households, 28% of those within the Vale of Glamorgan suffer from fuel poverty, with 8.9% of these being severe fuel poverty. By comparison, the average for basic income households in Wales, 34% are in fuel poverty, with 10.2% of these being in severe fuel poverty. The report states that The Vale of Glamorgan has the lowest level of fuel poverty in Wales.

The Home Energy Efficiency Scheme Wales annual report 2005/06 provides the following information on households which have received energy efficiency installations during 2005/06:

The Vale of Glamorgan Properties 352

	Number of properties	Total measure cost
Cavity Wall	92	£32,110
CFLs	246	£2,345
Draughtproofing	39	£3,935
Hot Water Tank Jacket	45	£569
Heating	392	£103,319
Loft Insulation	127	£30,866
Security Measures	67	£6,318
Smoke Alarm	147	£6,203
		£185,665

The Standard Assessment Procedure (SAP) is the Government's recommended system for energy rating of dwellings. The Standard Assessment Procedure is used for:

- calculating the SAP rating, on a scale from 1 to 100[3], based on the annual energy costs for space and water heating.
- calculating the Carbon Index, on a scale of 0.0 to 10.0, based on the annual CO_2 emissions associated with space and water heating.

The SAP rating for the Vale of Glamorgan domestic properties is 54 using SAP 2005. Data from the Vale of Glamorgan has yet to be received for 2006/07.

Across Wales the average improvement under the UK Home Energy Conservation Act (HECA) was 8.6% (up to 31st March 2006). Within the Vale of Glamorgan this figure is 11.7%. Figures up to 31st March are not yet available.

[3] 2001 SAP ratings were graded on a scale 1 to 120. The revised SAP (2005) uses a scale from 1 to 100.

13. Summary of Energy Assessment

Within the Vale all other individual and collective sources of carbon emissions are dwarfed by Aberthaw power station's output of 5.1 M tones of CO_2. Aberthaw power station also accounts for the largest proportion of renewable energy generation (0.16TWh$_e$ although unfortunately biomass co-firing with coal is not an effective long term method of reducing carbon emissions), and by far the largest surplus heat source.

Biomass does present opportunities at all scales.

- Small scale installations are appropriate for individual homes and buildings (particularly for off-gas areas).
- Two areas, Barry Waterfront and Llandow Industrial Estate, have been identified as suitable for medium scale district heating
- One development, DTA St Athan, has been identified as suitable for the utilization of heat from generation at Aberthaw power station.

Additionally biomass networks should be a consideration for residential and mixed development at any scale over 25 units or so and would be particularly appropriate for high density brownfield sites.

The Vale has limited capacity for the development of other large renewable technologies. There is potential for four or five small wind clusters (below 5MW) with an expectation that perhaps 10MW of capacity would be realistically consented. Even this would require a potentially expensive technical solution to radar interference issues.

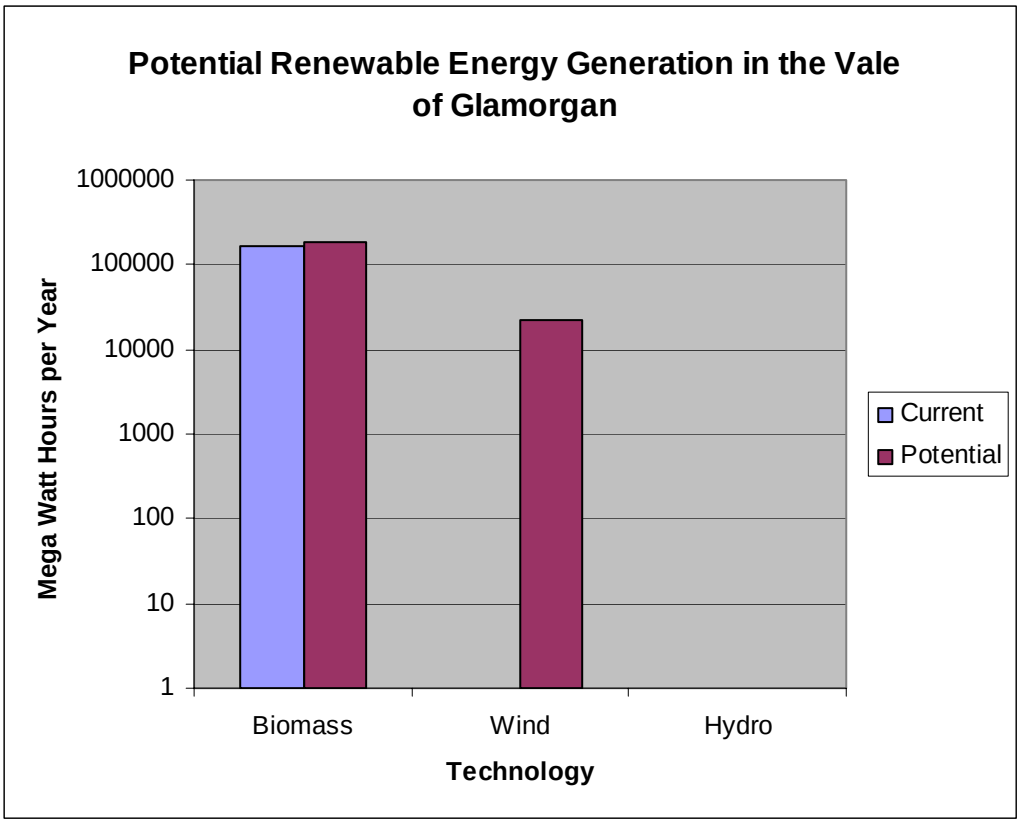


Figure 9 Key figures for major renewable energy technologies

In terms of building linked renewable energy there is considerable scope for contribution from retro-fit microgeneration, however in this case the LDP role is largely limited to removing barriers in line with the aims of the proposed GPDO. There is more scope for practical intervention in relation to new low and zero carbon development using the new powers available. Particular attention should be paid to developments of a scale to justify infrastructure investment, and care should be taken to balance the carbon savings available from fossil fuel based solutions against the alternative of renewable (biomass) provision.

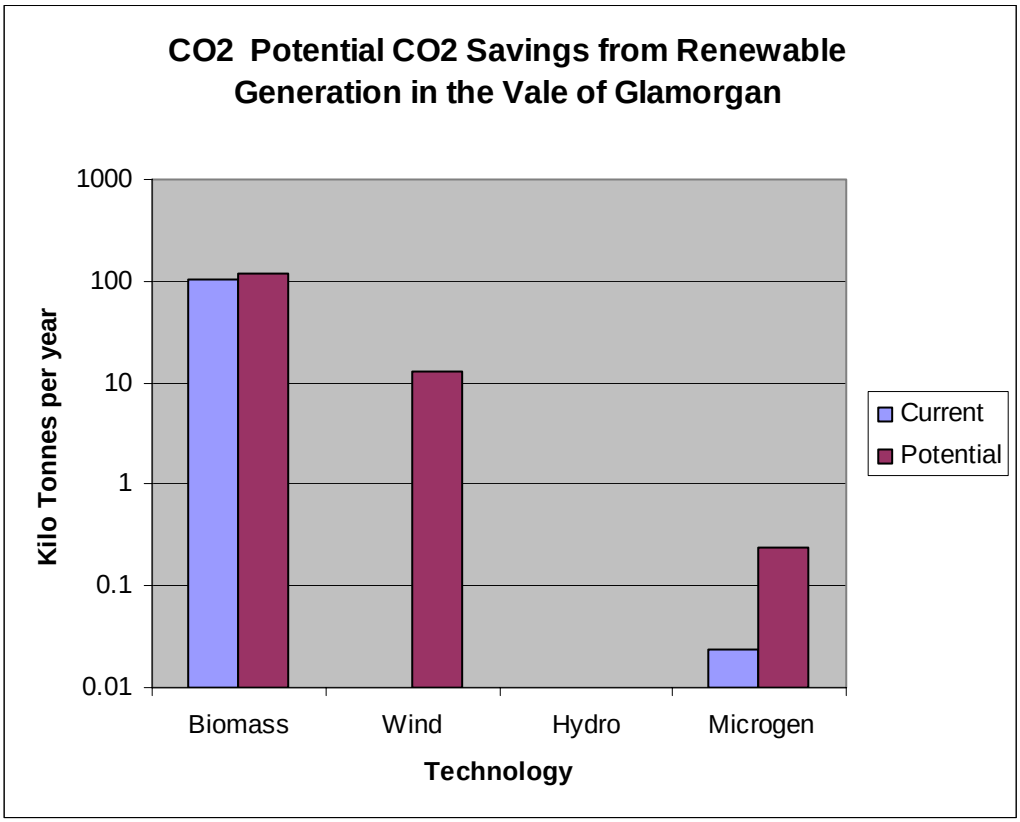


Figure 10 Key figures for carbon saving per renewable technology (Note logarithmic scale)

Part 4: Conclusions and Recommendations for emerging LDP

14. Introduction

Policy Aims and Carbon Targets

The wider climate change and energy policy framework outlined within Part One prioritises carbon emission reduction and the promotion of renewable energy. Extremely challenging targets have been set in both cases and a clear trend towards greater intervention, even greater targets and more robust policy development is evident.

The planning system is considered to be a mechanism for achieving carbon reduction and low carbon development, however there is also concern that the planning system as currently constituted does not respond to climate change imperatives in a manner and speed which are appropriate to the scale of the requirement.

The planning policy framework is being reviewed at all levels in order to address this issue with major interventions proposed from the highest level of strategic UK energy infrastructure to building control considerations concerning domestic microgeneration.

The energy and climate change policy framework is still in a process of rapid development, and the Council will need to be guided by the direction of the evolving framework development as much as by the detail of current policy (much of which is likely to be replaced by the plan period) – the importance of Part One of this report is in providing context and in introducing the likely mechanisms for controlling and reducing carbon emissions. The 2007 Energy Review and the proposed Climate Change Bill are of particular relevance.

Unsurprisingly, since it relates directly to wider energy and climate change policy, planning policy in relation to energy is in an even earlier stage of development, resulting in considerable uncertainty for LPAs in developing appropriate LDP policies and frameworks.

It is worth summarising the current position at 3 distinct levels:

1) Major infrastructure and generation above 50MW capacity – decided at UK level. A more centralised fast track process is under development (draft Planning White Paper 2007)
2) Distributed generation and commercial scale renewables - Welsh planning powers. Policy set out in TAN 8 with particular emphasis on SSAs and wind - due for review before 2010
3) Microgeneration, on- site generation design and energy efficiency – Welsh planning powers and refinement to the general permitted development order is proposed

In the Welsh context proposed amendments to Planning Policy Wales explicitly set the facilitation of renewable energy, the realisation of carbon reductions and the achievement of low carbon development as key objectives for local planning authorities to address through LDP policy.

Headline carbon targets have been set for Wales, however the numbers are much less certain at the local regional level and at present local planning authorities seeking to quantify a nominal carbon reduction target will find that only ‘experimental’ statistics are officially available. The data providers are anxious to point out that the carbon consumption statistics should be viewed as providing LDP policy context rather than used to set a performance benchmark.

With these caveats stated it is noted that the 'experimental' data indicates a Vale of Glamorgan carbon emission figure of 1.16 million tonnes of CO_2 – and therefore indicates a requirement to displace in the region of 0.7 million tonnes of CO_2 in order to meet a 60% reduction target.

- **The emerging policy framework makes it very clear that in relation to energy the key objective of LDP should be to contribute to carbon reduction.**

- **It is understood that the Council have been working with the Carbon Trust to develop a wider 'Vale of Glamorgan Carbon Management Strategic Implementation Plan' which is scheduled for adoption in April 2008.**

- **The Carbon Trust have been working to establish robust carbon emission baselines for Wales and it is recommended that the Council should continue to work with the Carbon Trust to establish robust carbon emission figures at Vale of Glamorgan level.**

Scope of LDP opportunity

In reality the implementation of the majority of carbon reduction measures fall outside the powers available to local planning authorities. In particular, under the Electricity Act 1989 the decision concerning any replacement for the current coal fired generating plant at Aberthaw (one of Wales' largest sources of CO_2) will be made outside Wales.

Development applications to the Vale are likely to concern either proposals for new energy generation (commercial below 50MW electrical or serving existing development) or proposals for developments requiring energy services.

The Vale of Glamorgan LDP can facilitate and encourage appropriate renewable energy generation in line with the requirements of TAN8, however the energy assessment (Part 3) indicates that below 50MW capacity there is relatively little opportunity for commercial scale generation. Despite this limited capacity the action to be taken by the Vale is relatively clear and firm conclusions and recommendations are provided

The LDP can minimise planning barriers to the installation of small scale renewable energy in line with TAN 8 and the proposed amendments to permitted development rights. In itself this positive step will have little direct impact on levels of uptake, however the action to be taken by the Council is relatively clear and firm conclusions and recommendations are provided.

Finally, the LDP may set out the Vale of Glamorgan's requirements for low carbon development of all types. These will achieve carbon reductions to the extent that they replace more carbon intensive existing development and infrastructure (additional development means additional carbon). This pro-active approach to carbon reduction is relatively new and emerging 'fast track' planning policy ventures into uncharted territory and suggests that the route to achieving low and zero carbon development should be defined through an iterative process of policy development between LPAs and the Welsh Assembly Government

It is considered that in this area the Vale of Glamorgan can have the largest positive impact on carbon emissions. Unfortunately, at this stage in the development of national policy concerning low carbon development it is not possible to provide detailed guidance and recommendations simply because the information available at this early stage simply does not allow us to separate the potential impact of enhanced local planning role from the impact of an enhanced building regulatory function.

Context of Recommendations

We have provided recommendations to support the LDP which are intended to enable the Council to clearly set out the context in which low carbon development is required and make it clear what will be expected of developers with reference to a clear energy hierarchy and the requirement for an energy design statement.

At this stage what cannot be included is a recommendation as to the specific quantified requirement couched in terms of % beyond building regulations or % renewable contribution.

It is recommended that policy development proceeds with the expectation of introducing a specific requirement via SPG once the parameters of the building regulation framework are known. The trend of policy development indicates that the ability to be flexible and to review and potentially strengthen requirements within a relatively short timeframe will be a positive advantage.

As detailed within Part 2 it is considered that existing Vale of Glamorgan policies have been overtaken by the new policy requirements to the extent that a totally fresh, cross cutting approach is more appropriate than an attempt to update the UDP policies.

Policies in support of renewable energy generation (with reference to TAN 8) can be largely addressed within a specific Energy chapter of the emerging Vale of Glamorgan LDP. As previously noted, the policy guidance in relation to remote and retrofit renewable generation is relatively clear, whilst that relating to low carbon development remains open for debate and consultation.

However, to address the need to minimise carbon emission to the full extent possible (with reference to the current proposed amendments to PPW) it is considered that the Vale of Glamorgan will need to adopt a cross cutting approach to carbon reduction in new development which runs through every policy and strand of the LDP.

14 Structure and Approach

The importance attached to promoting energy conservation and renewable energy generation could be reflected in appropriately formulated strategic aims within the LDP designed to clearly convey

i) The intention to encourage appropriate renewable energy generation (including heat)
ii) The intention to promote energy efficiency, energy conservation and renewable energy in relation to all developments

On the basis of these stated aims the Vale of Glamorgan LDP could incorporate a clear and concise strategic policy statement on energy conservation and generation. The example policy provided below is modelled on the Powys County Council Policy UDP- SP12.

EXAMPLE POLICY - ENERGY CONSERVATION & GENERATION

A. ALL DEVELOPMENTS SHOULD DEMONSTRATE THAT ENERGY CONSERVATION, EFFICIENCY, AND RENEWABLE ENERGY MEASURES HAVE BEEN CONSIDERED AND, WHERE PRACTICABLE, INCORPORATED.

B. APPROPRIATE PROPOSALS FOR ENERGY GENERATION FROM RENEWABLE SOURCES WILL BE APPROVED PROVIDING THAT THEY MEET THE LANDSCAPE, ENVIRONMENTAL, AMENITY AND OTHER REQUIREMENTS SET OUT IN THE OTHER POLICIES OF THIS PLAN.

Figure 11 Example policy based upon Powys County Council UDP 2001-2016 Deposit Draft, October 2004

This suggested structure has two distinct parts:

Part A serves as the basis for detailed policy within a specific energy chapter contained within part development plan. Within a development plan such a section would typically outlines the legislative and environmental background before moving on to policies largely related to specific technology and types of renewable energy generation.

Part B serves to outline energy conservation and efficiency as a cross cutting policy theme to be incorporated across the development plan. Accordingly, energy issues are a component part of generic policies, environment policies, housing, economy, retail and commerce, transport and tourism, recreation and leisure, community services, minerals and waste and general development policies.

14 Structure Recommendations – Energy and CO_2 reductions in new development

In order to make clear the scope and scale of the Vale of Glamorgan's requirement for carbon reduction in new development, it is recommended that the Vale of Glamorgan adopts headline policies which set out:

1. **The basic logic of the Vale of Glamorgan's Approach to carbon reduction expressed as an 'Energy Hierarchy'**
2. **The requirement for developers to provide a design statement and energy assessment of proposed developments which demonstrates the steps taken to apply the principles of the Energy Hierarchy**
3. **The Vale of Glamorgan's requirement for major development to achieve CO_2 reductions beyond those required by building regulations and/or a proportion of energy needs via on site renewables.**
4. **Clarification of the robust approach to energy assessments (specific and quantified) which developers must adopt within design statements**

On the basis of current information we do not consider that it is possible to specify a 'percentage beyond benchmark' carbon reduction/ renewables requirement for major development during the period 2011-2026. This is because the scope and scale of the (non planning) regulatory requirement is currently unknown.

The Vale of Glamorgan LDP is expected to make specific energy requirements proportionate to the scale and type of development. We suggest that on the basis of current guidance:

5. **A criteria based (minimum standards) approach is most appropriate to minor development**
6. **A 'percentage beyond benchmark' carbon reduction/ renewables requirement is most appropriate for major development**
7. **A site specific 'minimum feasible carbon' approach is appropriate for very large development**

Headline polices should provide a robust framework for these requirements, however it is recommended that the specific requirements are detailed within SPG.

15.1. Strategic / Headline Policies

15.1.1. Energy Hierarchies and the staged approach

The Climate Change compendium recommends that a staged approach is adopted which sets out an order of priority and context for supporting policies designed to achieve maximum levels of carbon reduction.

As outlined in the compendium document the draft MIPPS gives significant flexibility to LPAs in setting policies to reduce demand, achieve efficient supply and encourage on-site generation. The Climate Change compendium suggests the following energy hierarchy formulation:

Stage 1: Reduce Energy Demand
Stage 2: Efficient Energy Supply (including renewables)
Stage 3: Renewable Energy Generation

However it is noted that elsewhere a formulation prioritising renewables (largely zero carbon) over energy efficient supply (largely low carbon) has been adopted. This is the case within the current London Plan which is set out as follows

Stage 1: Use Less Energy (Be lean)
Stage 2: Use renewable energy (Be Green)
Stage 3: Supply Energy Efficiently (Be Clean)

It is considered that whilst the WAG formulation may be preferred for current policies the London plan policy which more specifically prioritises zero carbon renewables (over the energy efficient supply of fossil fuel based energy) is more appropriate to the timescale 2011-2026.

In the context of Welsh Assembly aspiration to achieve zero carbon development towards the beginning of the plan period it is recommended that the Vale of Glamorgan adopt the following order of priority:

Stage 1: Use Less Energy
Stage 2: Use available Heat
Stage 3: Use renewable energy
Stage 4: Supply Energy Efficiently

This formulation specifically prioritises zero carbon renewables over the energy efficient supply of fossil fuel based energy (via CHP and district heating for example). This is considered more appropriate to ‘step-change’ in approach to carbon reduction required within the timescale 2011-2026.

In specific and exceptional circumstances it may be preferable for a development to take advantage of an existing fossil fuel based heat resource (which may otherwise be wasted) than to consume a resource such as biomass. The Vale of Glamorgan will need to ensure that underlying policies relating to specific requirements for development are flexible enough to take account of co-location with existing fossil fuel generation.

The logic behind this recommendation is that whilst more efficient fossil fuel based (district heating/ CHP and CCHP) supply is obviously to be preferred to inefficient centralised generation – the scale of carbon reduction is limited by definition for the lifetime of the infrastructure (perhaps 20 years).

15.1.2. Design Statements

Emerging guidance and legislation require that the LDP adopt a much more robust approach to promoting low carbon development through design requirements. Design statements should now be central to Vale of Glamorgan consideration of energy and carbon reduction policy for new development.

Previous guidance relating to design and energy was set out within TAN 12 and TAN 8. (TAN 12 paragraph 4.2 specifies that development plans should provide policies setting out the planning authority's design expectations. TAN 8 suggests that major developments should provide energy advice reports). These policies have been strengthened through amendments and integrated into the new approach set out within the Planning for Climate Change consultation document and associated MIPPS.

Design statements are set to become a statutory part of planning submission and are strongly supported as a key delivery mechanism. Amendments to Planning Policy Wales section 2.9 (particularly 2.9.1, 2.9.4, 12.9.12 and 12.9.13) place design at the centre of guidance relating to the achievement of low carbon development through LDP policies. The definition of 'design' is explicitly stated to encompass environmental performance and CO_2 reduction.

The design process should also ensure that development contributes to tackling the causes of climate change by reducing greenhouse gas emissions and to effective adaptation to impacts. An integrated framework for and staged approach to climate responsive development, including location, density, layout, built form and ensuring in-built flexibility for varying uses over the lifetime of the development will be an appropriate way of contributing to the achievement of sustainable development. This will need to be demonstrated in design statements.

In terms of structure the Council may wish to prepare an overall design statement which states the authority's vision, design process, design quality expectation, alternatively types of SPG relating to design issues can be addressed individually.

We have had reference to the London Plan Policy 4A.8 and the Powys policy 'Designing Energy Efficient developments' (IDCG) and would recommend that the Vale of Glamorgan consider a set of headline policies similar to the examples below:

All developments will be required to provide an assessment of the energy demand of the proposed development, which should also demonstrate the steps taken to apply the Vale of Glamorgan's energy hierarchy

Minor development will be required to address minimum standards criteria set out within (refer to SPG). Major developments will be required to show that development would: a) Reduce CO_2 emissions below the current baseline required by building regulations b) Generate a proportion of the site's electricity or heat needs from renewables, wherever feasible. .to the extent required within (refer to SPG)

Development proposals which do not demonstrate, through the design statement, how appropriate energy conservation, energy efficiency, and renewable energy measures have been considered and incorporated into the design, will be refused by the Local Planning Authority.

Design statements should include an assessment of the energy demand and carbon dioxide emissions from proposed major developments, which should demonstrate the expected energy and carbon dioxide emission savings from the energy efficiency and renewable energy measures incorporated in the development, including the feasibility of renewable energy CHP/CCHP and community heating systems.

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The assessment should include:

- Calculation of the baseline energy demand and carbon dioxide emissions;
- Proposals for the reduction of energy demand and carbon dioxide emissions from heating cooling and electrical power
- Proposals for meeting the residual energy demands through sustainable energy measures (including the use of surplus heat wherever practicable)
- Calculation of the remaining energy demand and carbon dioxide emissions.

15.2. Specific Energy Requirements - Energy and CO_2 in new development

Planning policy guidance supports local planning authorities in seeking to achieve carbon reduction via specific energy requirements.

TAN 8 supports LPAs in setting out minimum standards such as the requirement for particular renewable technologies for particular development types. Amendments to PPW suggest that requirements should be proportionate to the scale and type of development.

The [draft] MIPPS on Climate Change (12.9.1) provides a tool for setting specific carbon reduction requirements for major development:-

"Local planning authorities should include within development plans a policy requiring major developments to reduce their predicted CO2 emissions by a minimum of 10% (from the current baseline required by building regulations) through improvements to the energy performance of buildings, efficient supply of heat, cooling and power and/or on site renewable energy. The scale of development for the application of the policy and the percentage reduction selected will need to be determined locally, based on sound evidence and the need for planning policy to interact effectively with developing building control requirements."

Amendments to Chapter 12 of PPW 'Infrastructure and Services' are set out within paragraph 12.1.6 of the draft MIPPS. LPAs are instructed as follows:

"to ensure every opportunity is taken to use energy efficient, low carbon supply measures to meet demand. Major development is expected to incorporate decentralised heating, cooling and power (CHP) networks, preferably powered by renewable energy sources, or to connect to existing CHP (and CCHP) or communal/district heating networks

"to ensure every opportunity is taken to maximise the provision of renewable energy generation from microgeneration equipment in new and existing development, including allowing for future inclusion as part of the design of buildings where it is not being incorporated …"

(Draft Climate Change MIPPS amendments to section 12.1 objectives paragraph 12.1.6)

It is suggested that with currently available information the Vale of Glamorgan can best accommodate specific energy requirements through an approach which sets out:

- **A criteria based (minimum standards) approach for minor development**
- **A 'percentage beyond benchmark' carbon reduction/ renewables requirement for major development**
- **A site specific 'minimum feasible carbon' approach very large development**

Planning policy guidance enables LPAs to define what constitutes 'major development' – our recommendations assume that the Vale of Glamorgan will adopt a conventional definition close to that of the TCPI (10 houses or 1000m^2).

It is recommended that within SPG Vale of Glamorgan develop a stack of policies with a sliding scale of requirement - minimum standards for all development, a higher blanket requirement for major development, and zero carbon infrastructure requirements for very large development.

In terms of cost effective carbon saving potential the largest developments should be targeted – the objective should be to achieve the infrastructure required for a zero carbon development.

It is recommended that the Vale of Glamorgan seeks to address the major carbon saving opportunities of very large developments with long term planning requirements at the earliest possible date. The process to be adopted is almost identical to that recommended for general major development, however the emphasis should be on the justified expectation that low carbon infrastructure should be proportional to the scale of development.

It is considered that the responsibilities of the Welsh Assembly Government in this regard are roughly parallel to the responsibilities for regional development agencies as set out within the 2007 Energy White Paper.

- *ensure all regeneration projects (from December 2007) and other developments for which RDAs provide funding or land meet carbon emissions standards significantly in advance of those required by Building Regulations (e.g. at least 10 BRE Environmental Assessment Method (BREEAM) carbon credits). This includes commercial developments not covered by the Code for Sustainable Homes*
- *play a key role in advocacy for the development of critical energy infrastructure*
- *provide support through monitoring and advice on strategic proposals.*

In view of the Assembly Governments 2011 zero carbon building aspiration the Vale of Glamorgan should be confident that it is entirely reasonable to expect that such development should achieve zero carbon status or as near as is practicable. In the case of DTA St Athan or other developments with significant public sector leverage the council, acting in partnership with the Assembly Government, should seek to make this requirement very clear from the earliest possible opportunity.

14.2.1 Minor Development (minimum standard recommendation)

The experience of English local planning authorities who have successfully introduced Merton style policies for **all** development indicates that there is no practical reason why a percentage renewable energy policy should not apply to minor development of a single dwelling and above. Equally there is no particular reason why *at the present time* a % beyond building regulations policy could not be applied).

In practice the MIPPS policy relating to this requirement specifies its application to 'major development'. Additionally, for minor development it is noted that there is likely to be a tension between the guidance that specific requirements should be proportional to the scale and type of development and the additional practical and economic difficulty small developers would face meeting additional percentages beyond building regulations requirements when building regulations are themselves requiring very low or zero Dwelling Emission Ratings (DERs).

To avoid complexity it is recommended that a minimum criteria approach is adopted for minor development. This should include a requirement, justified against TAN 8, that solar

thermal should be installed as part of all developments at all scales wherever it is practicable. An example of such a policy is provided below:

> The incorporation of solar water heating schemes in proposals is required where it is practicable to do so. Any scheme not incorporating solar hot water must provide justification for no doing so in the design statement accompanying that planning application, such a justification may for instance include reasoning that the technology is not required since the buildings hot water is generated from another, more suitable renewable technology.
>
> 'Designing Energy Efficient Development' Powys County Council IDCG

The provision within TAN 8 is reinforced within the Climate Change Compendium worked example, which also suggests that LPAs should adopt policies requiring that development proposals should demonstrate that PV has been installed where appropriate and that all developments should identify how design is adaptable to the future integration of micro generation.

It is recommended that the Vale of Glamorgan adopts policies similar to the examples provided within the compendium document. The examples reproduced below could be incorporated in policies outlining the requirement for energy assessment and design statements.

> *All development proposals to demonstrate how the provision of appropriate microgeneration equipment has been installed, in particular solar water heating and where appropriate solar PV.*

> *All developments to identify how building design is adaptable to future installation of micro generation equipment*

In general it is not proportionate to require that minor development should address infrastructure which tends to be more appropriate to large scale development (biomass district CHP for instance), however the matrix adopted should be flexible enough to accommodate a future requirement for connection to an existing heat network, or provision to connect to a proposed network in appropriate areas (typically urban).

The reasonable expectation of the Vale of Glamorgan in relation to minor development could be usefully presented in a matrix which sets a checklist of appropriate technologies against development type.

This approach has been selected by Powys County Council and set out within Interim Development Control Guidance (IDCG). The Powys IDCG has been out to consultation and is now nearing adoption. The only substantive objection to the document came from the Home Builders Federation. Unfortunately no formally adopted policies of this type have been identified elsewhere in Wales.

The Powys IDCG reiterates the need for Design Statements and gives firm guidance as to the renewable energy technologies that should be investigated in each of 6 categories of development types. In the case of solar water heating (solar thermal) and passive solar design there is a

requirement for its incorporation in all developments, unless there are very sound reasons to the contrary.

It is recommended that the Vale of Glamorgan adopt an approach similar to that of Powys. The summary matrix from the draft ICDG is reproduced below:-

7 Matrix of appropriate energy efficient measures against development types

The matrix below must be used by those preparing planning applications; it will be used as a checklist by planning officers in scrutinising development proposals and design statements.

R Required, compulsory where practicable – Planning applications not incorporating these technologies will be refused unless the non-incorporation is fully justified in the design statement.

I Investigate, these measures should be included where investigations show that such measures are practicable, fit with the site context and are appropriate to the integrated design solution.

N Not considered necessary for an application to investigate or include this measure.

Development type

A Essential Rural Workers dwellings in the open countryside, rural building conversions outside development limits, isolated building redevelopment, affordable housing for local needs in rural settlements

B Small sites / redevelopments of <5 inside development limits and rural exception schemes of <5

C Allocated / windfall / redevelopment and exceptions sites of 5 or more dwellings

D Householder applications

E Non residential buildings development / redevelopment <1000sqm

F Buildings >1000sqm

Measure	**Development Type**					
	A	**B**	**C**	**D**	**E**	**F**
Site layout and orientation, passive solar design & water management. (Water management considered in separate IDCG)	**R**	**R**	**R**	**R**	**R**	**R**
Solar thermal systems (Solar Hot Water)	**R**	**R**	**R**	**R**	**R**	**R**
Green roofs	**I**	**I**	**I**	**I**	**I**	**I**
Community heating / heat and power	**N**	**N**	**I**	**N**	**I**	**I**
Biomass fuel	**I**	**I**	**I**	**I**	**I**	**I**
Solar electric (Electricity)	**I**	**I**	**I**	**I**	**I**	**I**
Micro hydro power	**I**	**I**	**I**	**I**	**I**	**I**
Heat pump technology	**I**	**I**	**I**	**I**	**I**	**I**
Micro Combined heat and power	**I**	**I**	**I**	**N**	**I**	**I**
Small scale wind energy	**I**	**I**	**I**	**I**	**I**	**I**

14.2.2 Major Development (percentage beyond benchmark conclusions)

The area where policies set out within the Vale of Glamorgan could have the greatest direct impact on predicted carbon emissions is also the area with the newest and least established guidance as to how carbon savings are to be achieved.

The draft Climate Change MIPPS policy on percentage energy requirement is applicable to all major development, both residential and non-residential. The MIPPS states that the definition of major development is to be as specified by the Vale of Glamorgan. We have assumed that the Vale will adopt a definition based on the conventional TCPI guideline of ten or more dwelling units / 1000m^2 or above. We assume that any major variation from this standard would need to be robustly justified – perhaps by reference to historical development trends which demonstrate that a lower threshold would be appropriate in individual cases. As detailed in the previous chapter it is currently quite feasible to apply a percentage beyond building regulations or percentage renewable energy requirement down to the level of individual residential development.

The MIPPS amendments to PPW Ch12 (Infrastructure and Services) make it clear that in the case of major development it is reasonable for a Local Planning Authority to require that issues of low carbon infrastructure, co-location and connection to heat and power networks to be addressed within design statements and adopted where practicable.

Drawing on the analogy of Carbon emission figures at local authority level the policy direction set out within Planning for Climate Change could be characterised as 'experimental'. In both cases the urgent imperative and timescale imposed by climate change mitigation have necessitated an approach which pushes those involved into constructing a framework before all the component building blocks are in place.

The Planning for Climate Change document includes a clear recognition of the scope and scale of the climate change obligations through amendments across all sections of PPW, radically re-defining and expanding the definition of 'design' and providing LPAs with additional power to specify energy standards in new build development,

The experimental policy structure includes the new mechanism of Climate Change compendium – equivalent to a TAN but different. The compendium is not guidance in the traditional sense. Rather it provides a multiplicity of options and exemplars (including English policies) and invites LPAs to engage in an iterative process of interpretation and policy development.

In arriving at policy recommendations for this area it is particularly important to have reference to the emerging national policy and regulation framework, and to the criteria of environmental build standards such as the and the (as yet unpublished) Code for Sustainable Buildings.

The status of the Code for Sustainable Homes provides an example of the current complexity of the situation. In terms of energy the Code is directly linked to building regulation standards and calculation methodologies. It is intended to serve as a 'route-map' setting out the requirements of a progressive tightening of building regulations relating to heat and power cumulating in a requirement for 'zero carbon' homes in 2016.

The Welsh Assembly has set itself an extremely challenging target of achieving 'zero carbon' homes by 2011 and has announced that it is seeking the devolution of building regulations effective from 2008. The Assembly Government has not confirmed that it will be adopting the Code as a standard in Wales and is currently instructing housing associations to work against the older 'Eco-homes' standard.

If the Assembly Government meets its 2011 target through devolved building regulations it would be become meaningless to specify an energy requirement couched in terms of a percentage beyond the carbon emissions specified by building regulations.

No determination of the appropriate specific carbon reduction requirement can be gauged until the Assembly Government clarifies its position in this regard. Informal discussion with WAG indicates that the anomalies between the zero carbon buildings aspiration and the percentage requirement policy within the draft MIPPS are recognised and will be addressed in a final Planning for Climate Change document. It seems likely that this will only be released when a decision regarding building regulation powers has been confirmed and a zero carbon routemap adopted (*presumably to be based upon the UK Code for Sustainable Homes (CSH) and the yet unpublished code for sustainable buildings).

It is recommended that the Council reconsider the specific requirement for major development when this information becomes available.

At this stage planned LDP policies in relation to energy in new build development should be structured so as to provide a robust basis for whatever specific requirement, or combination of requirements, may be considered most appropriate.

Section 14 'Structure and Approach' provides an example how headline LDP policies alongside a clearly stated energy hierarchy/ staged approach could provide a clear structure, order of priority and context for energy in new development.

It is recommended that the headline LDP policy clearly sets out the requirement for and expectations of a development design statement, however to provide flexibility it is recommended that the specific detail of requirement(s) for development(s) is set out with supplementary planning guidance.

Unfortunately, with the information currently available it is not possible to provide recommendations on the percentage targets which may be appropriate and feasible within the plan period. It is recommended that this is addressed through SPG as and when the framework and timescale for regulation towards zero carbon development become known.

Informal discussion with Welsh Assembly Government representatives suggests that changes to the final Planning for Climate Change document are likely to clarify this position. The implication is that this document will only be released following the decision regarding devolution of building regulation powers and the announcement of a routemap and timescale for the achievement of low carbon buildings. At this point it will be possible for the Vale of Glamorgan to consider specific carbon requirements on the basis of a more certain benchmark.

After due consideration of design statements and energy assessments, and in the light of the specific targets adopted by the Vale of Glamorgan, it will be for the Council to adopt a position regarding what is considered practicable in relation to energy and carbon emissions for major development proposals.

Developers are likely to argue that initial capital cost renders infrastructure investment economically impractical, however the Vale should have reference to the experience of the London Plan in defining (and defending) a position on what is deemed practicable.

Further, it is almost inevitable that within the timescale of the Vale LDP (2011-2026) that the regulation towards zero carbon development will have prompted major expansion of combined utility infrastructure and service companies (typically referred to as Energy Service Companies or ESCo).

For the domestic sector initial studies such as the cost review of the Code for Sustainable Homes estimate that beyond a 44% reduction below 2006 building regulations carbon emissions district heating is the sensible economic choice, and an ESCo arrangement the most efficient means of financing such infrastructure.

It is recommended that within design statements major developments are required to demonstrate that the most carbon efficient energy efficient supply has been adopted wherever feasible.

In the case of known sites for very large proposed development this requirement could form part of SPG or master planning. As general policy for areas not currently identified the Vale of Glamorgan may want to consider inserting additional design and energy requirements for developments which are:

a) **within urban areas of high density**
b) **of a sufficient scale to merit consideration of specific energy infrastructure**
c) **located close to a source of surplus heat or additional capacity**
d) **In an area served by an existing or proposed heat and/or power network**

In both cases, given the likely timescale for LDP implementation it should be clearly communicated to developers that the Vale of Glamorgan's expectation is that such developments should achieve at least carbon neutral status, and should at least investigate the potential for the complementary supply of zero carbon infrastructure to adjacent areas and applications.

Except where 'waste' heat can be utilised it is generally preferable, in carbon terms, to promote renewable heat and electricity generation over fossil fuelled CHP or district heating. This consideration should inform the adoption and ordering of a policy outlining a 'staged approach' or energy hierarchy.

It may be that under policies adopted by the council the installation of fossil fuel heat and/or power networks represents the largest currently achievable carbon saving. In this case, wherever possible it is recommended that the council should require that provision is made for the future incorporation of renewable technology. In the case of Biomass heat and/or power this requirement would be for the provision of suitable space and access for boiler plant, fuel deliveries and storage.

14.3 Prescriptive Requirements to reduce energy demand/ carbon emissions

There are numerous ways in which policies to encourage on-site renewables can complement or be combined with policies on reducing energy demand.

In developing major development policies based upon the 'minimum of 10%' policy within the draft MIPPS a whole range of options are open to the LPA. For example it would be possible to:

- specify a higher percentage beyond building regulations carbon reduction (as illustrated by the CSH level 3 scenario equivalent to over 20% beyond current 2006 building regs),
- specify a percentage beyond building regulations **and** an on-site renewable energy requirement
- provide a weighted option requiring **either** a (higher) percentage beyond building regulations to be achieved through energy efficiency **or** a (lesser) percentage from on-site renewable energy
- Provide a weighted option requiring either a (higher) percentage beyond building regulations or a (lesser) percentage subject to installing specific measures (such as provision for future connection to a planned district heat main)

The 2011 baseline regulatory carbon requirement for residential and non-residential development in Wales is currently undefined, and this makes it impossible to recommend an appropriate formulation and percentage requirement. Rather we have recommended that the Vale adopts headline policies within the LDP which are capable of accommodating a variety of specific targets (likely to vary over time) within SPG, and that these targets are developed when the regulatory requirement for the beginning of the plan period is known.

If the Council wishes to examine the current economics of promoting particular combinations of renewables versus other measures we would recommend reference to the London renewable tool kit (all development) and the cost review of the code for sustainable homes report.

It is recommended that due to the potential complexity of the formulation, and the variability of outcome in carbon terms, the Vale of Glamorgan should seek to work closely with development control in the development of policy and should seek to model the carbon impact of proposed formulations.

We note that on-site renewables become much more commercially attractive as the carbon requirements of building regulations / Code for Sustainable Homes get tighter, and we would also refer to the Government's stated intention to put an increasingly higher cost on carbon over the period of the plan.

14.3.1 Cardiff Rule versus Merton Rule

Within the compendium document a number of English policies are referenced which require that a minimum of 10% of the predicted CO_2 requirement of development should be delivered through on-site renewables (the policy originated with the London Borough of Merton, hence the descriptor 'Merton Rule').

The Cardiff Rule policy set out in the draft MIPPS uses building regulation carbon requirements as a benchmark and empowers LPAs to require that developments reduce their predicted CO_2 emissions by a minimum of 10% beyond current building regulations.

This apparently minor difference creates a host of issues and we consider that the use of the building regulations as a carbon target is inherently problematic for the development of future LDP policies.

Merton Rule policies are based on the total predicted CO_2 requirement of development. This includes a benchmark allowance for energy use within building which is not captured by building regulations which, by definition, focus on the energy performance of buildings themselves. For residential development the use of various electrical appliances would account for this additional energy. In non-residential development it could be anything from computer usage to industrial process heating or machinery (in practice predicted requirements are based on established development type benchmarks) and in many cases constitutes a very significant proportion of total predicted CO_2.

It is this energy use not accounted for by building regulations which makes the minimum CO_2 savings which result from a Merton rule 10% renewable policy greater than the Cardiff rule 10% beyond building regulations policy.

At present, due to the additional cost of renewables Merton style policies currently have the advantage of providing an inbuilt economic incentive to improve energy efficiency beyond building regulations in order to reduce the proportion of total energy attributable carbon to be offset through on-site renewables. A Cardiff rule policy would not have this effect since building regulations are themselves the benchmark.

This problem intensifies as the carbon requirements of building regulations are tightened with subsequent revisions. At the point at which building regulations specify a 100% improvement over building regulations for homes (ie a zero Dwelling Energy Requirement) the Cardiff rule becomes obsolete simply because any percentage beyond zero remains zero.

Under the current distribution of powers building regulations set by Whitehall seem likely to require a zero DER at some point between 2014 and 2016 (which the government has announced as the target date for the achievement of completely zero carbon homes).

The Welsh Assembly Government is seeking building regulation powers and has announced an aspiration to achieve zero carbon buildings (as yet undefined) by 2011, presumably through building regulations. In theory this means at the point at which the Vale of Glamorgan LDP is scheduled to come into full force the Cardiff Rule policy could cease to have any practical effect.

For this reason we consider that it would be more appropriate for the Vale of Glamorgan to adopt policies and carbon benchmarks based on predicted total building carbon emissions. We recognise that this formulation differs from that set out within the draft MIPPS.

Within the Planning for Climate Change consultation document the Assembly Government pledges to remain open to innovative evidence based policy. Paragraph 8 of the introduction to the draft Climate Change Compendium states that:

'The Assembly Government will expect LPAs to provide climate change policies in their LDPs using the examples outlined in this document. Innovation in this field has been led by LPAs and new LDP policies or processes not covered in this document that address climate change will be encouraged assuming evidence/justification is provided to support them.

Accordingly we have developed appropriate policy wording for major residential and non residential development. We would recommend that the formulation of policy wording is discussed with the Planning Division and Sustainable Buildings Project Manager of the Welsh Assembly Government.

All new residential developments of over 20 dwellings shall incorporate on-site renewable energy installation/s or additional energy efficiency measures. Such installations and/or measures should be sufficient to reduce emissions of carbon dioxide associated with the heating, lighting and use of the building (ie including cooking and appliances) by a minimum figure that shall be determined by the Council and incorporated into Supplementary Planning Guidance. Such installations and/or measures shall always be in addition to any that are installed in order to comply with the Building Regulations in force at the time.

All new non-residential buildings of over 1,000 sq m total floor area should incorporate on-site renewable energy installation/s (or where appropriate high quality gas fired combined heat and power). Such installations should be sufficient to reduce emissions of carbon dioxide associated with all activities to be undertaken within the building (including heating and lighting) by a minimum figure that shall be determined by the Council and incorporated into Supplementary Planning Guidance. In exceptional circumstances where the development is to be used for purposes that require particularly high quantities of electrical energy and on-site generation is not practical, this may be sourced from off-site renewable energy installations. This policy shall also apply to any building where a change of use entails an increase in anticipated emissions of carbon dioxide by 10% or more over the previous use.

14.3.2 Thresholds and Minimum Requirements

In the absence of clear information regarding the scope of the baseline building regulation requirement for even the start of the plan period (2011) we are unable to provide recommendations as to what would be an appropriate additional planning requirement. However, from our current position we are able to provide comment on the practicalities of compliance for dwellings as subsequent building regulation revisions require additional carbon reductions (from a 2006 baseline).

By the time the Vale of Glamorgan LDP is introduced developers and consultants will have become very familiar with the requirements of English Merton rule policies, and processes for the calculation of requirement and the design of compliant development will have become standard practice.

We would suggest that whilst it is feasible to require the incorporation of renewable energy for single residential developments, as illustrated by that example of Guildford and Waverley. The current Powys IDCG model provides a simple and effective way to convey expectations to developers at all scales (and could easily be adapted to incorporate a percentage requirement at a later date).

In practical and financial terms we note that a 10% over (2006) building regulations requirement for a single dwelling can generally be met solely through the installation of a reasonably sized solar water heating system. Our experience indicates that, despite a slightly higher requirement, it is also generally possible to meet a Merton Style '10% of CO_2' requirement through solar water heating alone. A typical solar thermal system with a collector area of around $4m^2$ is likely to cost in the region of £3000.

It is recommended that in examining the financial implications of particular requirements the Vale of Glamorgan have reference to the document 'A cost review of the Code for Sustainable Homes' (2007). This report for English Partnerships and the Housing Corporation provides detailed estimated costs per dwelling type for measures (including on-site renewables) required to meet the percentage over building regulation benchmarks of the code for sustainable homes.

Interestingly that data provided by the report indicates that at Code level 3 (25% beyond 2006 building regulations requirements) the inclusion of renewable energy becomes economically attractive for standard house types, indicating that at this level a requirement to incorporate solar thermal will generally cease to be an addition financial outlay.

14.4 Very large development

Opportunities to develop renewable supply infrastructure have been identified in relation to a number of sites where district heating/ cooling /CHP may be particularly appropriate. The most notable being Barry Waterfront, Llandow Industrial Estate and DTA St Athan.

In each case a detailed assessment will be required to establish the feasibility of such infrastructure. It is recommended that the Vale of Glamorgan adopt policies that require such an assessment as a component part of the design statement.

In terms of the costs of carbon reduction there is a tipping point after which a major developer may as well be required in to achieve very low or zero carbon development (in the case of housing anything above code level 4 essentially requires biomass heating). A combination of building regulation and commercial motives (linked to an increased cost of carbon) will increasingly encourage very low and zero carbon infrastructure. This process will be well underway (complete if the WAG aspiration is met) at the onset of the plan period in 2011.

In view of the potential for the cost effective achievement of major carbon reduction we would strongly suggest that in such cases the Vale of Glamorgan should be expecting the achievement of zero carbon (or even carbon negative) development, achieved through major investment in infrastructure.

This expectation should be communicated to developers at the earliest possible stage in the process.

In the case of the St Athans Defence Training Academy development it is recommended that the Vale of Glamorgan co-ordinate an approach to development with the Welsh Assembly Government Department for Economy and Transport who are understood to be handling the site disposal process with input from Energy Wales and the Assembly Low

Carbon Buildings team. Informal discussion with the Assembly indicates that there is a willingness to push for the lowest possible carbon impact in this case.

15.3. Heat and Major Generation

Aberthaw is one of Wales largest sources of carbon emissions and coal fired electricity generation at Aberthaw produces over four times the estimated total emissions for which the Vale of Glamorgan is otherwise responsible (calculated by end user).

Major generation is outside the current scope of LPA and WAG powers but a decision regarding replacement of Aberthaw is likely to be taken within the plan period. It is therefore recommended that Vale of Glamorgan adopts a clear position in its role as statutory consultee,

The Council has little direct control over major centralised energy generation within the Vale of Glamorgan, but the Council may wish to adopt a policy expressing support for renewable thermal power stations (ie Biomass) with a view to establishing a clear position as a statutory consultee prior to the replacement of the current coal fired plant.

In addition it is expected that the cost of carbon and carbon cap and trade policies adopted by UK government will increasingly encourage co-location and the use of heat distribution networks. The Vale of Glamorgan could facilitate such processes by seeking to identify areas surrounding the current Aberthaw site as allocated for industries with high heat requirement (such as food processing).

It is also recommended that the Council adopt a related policy concerning heat. Heat produced as a by-product of major generation is commonly used for low grade industrial applications and to feed district heat networks. With reference to the co-location remit set out within amended PPW the Council may wish to develop a land use policy allocating areas around the power station for developments with high heat requirements (such as food processing or commercial laundries).

The role of the Assembly government is not entirely clear at present however the guidance set out for English regional development agencies within the 2007 Energy White Paper may be of some relevance

> *9.8 With their detailed knowledge of existing and likely locations for new development in the regions, RDAs are ideally placed to identify opportunities to exploit the sustainable use of heat. They are key consultees in the revised guidance on CHP for developers considering proposals for new large-scale power stations under section 36 of the Electricity Act. New power station developers will be signposted to seek advice from RDAs on potential customers for heat when considering the viability of heat recovery in new power plants.*

15 Renewable Energy Policy Recommendations

The Assembly Government has set clear targets for the generation of renewable electricity for 2010 and 2020. TAN 8, Planning Policy for renewable energy is clear that the majority of the 2010 target is to be met through large scale wind and in designating specific areas suitable for large scale development (strategic search areas) is fairly prescriptive regarding how this is to be achieved.

In practical terms the Vale of Glamorgan has very little capacity to reduce carbon emissions through the facilitation of commercial scale renewable energy (with the potential exception of biomass using imported fuel). Wind energy capacities, very small scale hydro power and energy from waste are options but are largely limited.

Nevertheless, despite limited potential it is clear that Vale of Glamorgan has an obligation to develop a suite of positive planning policies to encourage renewable energy technologies and it is worth bearing in mind that wider energy and climate change policies intending to raise the cost of carbon (so heat as well as electricity) are likely to transform the economics of renewable energy projects within the lifetime of the plan.

In line with the requirements of TAN 8 (and presumably its scheduled update before 2010) it is expected that The Vale of Glamorgan will look to develop a set of positive criteria based policies for the range of renewable technologies.

Detailed technical guidance relating to technologies is not considered appropriate to LDP level policies, but may be usefully addressed through SPG or Development Control guidance notes. The information contained within Annexe A 'Technology Overview' may be useful in this respect. In relation to domestic scale renewables it is relevant to note that the WAG plan to extend the provisions of the GPDO to cover micro-generation technologies and specify the exceptional circumstances under which planning permission may be considered necessary.

A number of general recommendations are discussed below together with possible criteria for each of the major technologies and a number of suggestions for a more robust approach in certain key sectors.

15.4. Retro- fit Microgeneration

The retro-fit installation of small scale renewables on all appropriate dwellings within the Vale could make a significant carbon reduction[4]. Whilst local authorities can have a measurable impact on microgeneration levels the large scale uptake of such installation will be largely dependent on UK (and potentially Welsh Assembly) government measures and economic incentives.

UK and Welsh microgeneration policy is to kick start a mass market by making small scale renewable energy a sensible economic choice for consumers. The implication is that within the LDP timeframe local planning policy will need to account for retro-fit microgeneration installations on a massive scale.

In accordance with the WAG policy direction set out in TAN8 and the draft document 'Lifting the Planning Barriers to Domestic Energy Micro-generation - Proposed Changes to Permitted Development Rights' (July 2007) the vast majority of microgeneration installations are expected to

[4] Whilst it is possible to estimate renewable capacity for housing stock on the basis of 'typical dwelling' assumptions linked to census data this is not possible for existing commercial and business premises.

be deemed permitted development. Local planning policy will need to be sufficiently positive in relation to each technology (see guidance within section 4 and detail in appendix A) with a focus on removing unnecessary barriers to installation and clearly presenting the criteria for exceptional cases where planning permission will be required.

15.2 Biomass Combustion

In addition to environmental benefits linked to carbon neutrality, biomass installations can have a positive impact on the local economy and the supply of biomass fuel can secure a long term income for farmers, forestry owners, contractors and transport workers. The planning implications for large scale Biomass and biomass combined heat and power plants will differ from the limited implications of small scale (below 5MW) biomass schemes.

15.5. Small Scale Biomass

Within the LDP the council may wish to express strong support for small biomass heating schemes throughout the County Borough and indicate that such schemes will be supported and approved provided that the following criteria can be met:

iv. Visual intrusion is reasonable, and does not have a critically damaging impact upon the environment
v. The development does not have a critically damaging impact upon important archaeological, historic, ecological or conservation sites.
vi. Access to the site is reasonable in terms of the frequency and method of fuel delivery, and does not prejudice highway safety
vii. Development does not significantly impact on the amenity of residents in terms of noise, dust, smell or fumes
viii. Emissions to the air, ground or water are acceptable

With reference to criteria set out in the proposed permitted development rights for Wales, small scale biomass would be classed as permitted development in normal buildings as long as the flue height is no more than 1m above the ridge. No special provision would be given for storage/plant buildings.

15.6. Large Scale Biomass

Within the LDP the council may wish to express support for larger (in excess of 1MW) biomass schemes, provided that:

i. Visual intrusion is reasonable, and does not have a critically damaging impact upon the environment.
ii. The development does not have a critically damaging impact upon important archaeological, historic, ecological or conservation sites.
iii. Noise from traffic and plant operations accords complies with relevant standards (BS 4142 – industrial development may be appropriate).
iv. Traffic to and from the site is acceptable and appropriate to the area and does not prejudice highway safety. Development does not significantly impact on the amenity of residents in terms of noise, dust, smell or fumes.
v. Emissions to the air, ground or water are acceptable.
vi. Additional weight should be given to developments that are able to demonstrate that heat energy is utilised in addition to the generation of electricity.

15.7. Very Large Scale Biomass

The Energy Assessment noted the significant potential for very large scale biomass at a site on or close to the existing Aberthaw coal fired power station.

The power station at Aberthaw will reach the end of its effective life during the plan period. Decisions concerning very large scale biomass (above 50 MW electrical) fall outside of the powers of local planning authorities and the Welsh Assembly Government under the current Electricity Act. The Vale of Glamorgan may only be a statutory consultee in the decision making process concerning the replacement of Aberthaw however, in this capacity it is recommended that a general policy is adopted expressing support for a new renewable (biomass) thermal power station.

Very large thermal generation also provides opportunities for the Vale of Glamorgan to strongly encourage co-location of development with high heat loads and complementary infrastructure requirements. This issue is dealt with in more detail in section 14.2.2.

15.8. Anaerobic Digestion

Anaerobic Digestion can provide a convenient method of waste treatment for some materials. Animal waste, sewage sludge and agricultural, household and industrial residues can all be used as feedstock.

Within the LDP the council may wish to indicate that AD facilities will be supported and approved provided that:

i. That the installation is visually acceptable and appropriate to its setting.
ii. That there is a road network of a standard appropriate to the anticipated nature and scale of traffic
iii. That there is a suitable means of vehicular access to the site.
iv. That noise from on-site operations would not exceed prescribed limits (BS4142 may provide appropriate standards)
v. That measures are in place to ensure that there is no significantly adverse impact by reason of dust, odour or fumes at any nearby sensitive properties (such as schools, residential or hotel properties)
vi. That any dumping of heat into the environment is fully justified and that it can be demonstrated that there is no practical alternative.

15.9. Solar Photovoltaics (PV)

TAN 8 indicates that local planning authorities will need to 'very clearly justify any refusal of planning permission for PV installations'. In general terms PV installations should be supported other than in circumstances where visual impact is considered critically damaging. In most cases PV installations should be considered to fall within the category of permitted development. Criteria within the consultation document on permitted development state that Solar on the roof and walls of buildings should be classed as permitted development if it protrudes less than 150mm from the roof/wall plan. However, on flats it would not be permitted development on walls or above the highest part of the roof excluding the chimney. Under the same guidance a standalone Solar system would be classed as permitted development providing that it was less than 4 metres in height, at least 5 metres to any boundary and a maximum panel dimension of 3m x 3m.

There is scope for Vale of Glamorgan to clarify criteria for possible refusal by specifying reasons with reference to listed buildings, ancient monuments or conservation area vistas.

15.10. Solar Thermal

TAN8 is strongly supportive of solar water heating, stating that 'Other than in circumstances where visual impact is critically damaging to a listed building, ancient monument or a conservation area vista, proposals for appropriately designed solar water heating should be supported'. In most cases SWH installations may be considered to fall within the category of permitted development. Criteria for solar thermal within the consultation document on permitted development in Wales are the same as that stated above for Solar Photovoltaics.

i. There is scope for Vale of Glamorgan to clarify criteria for possible refusal by specifying reasons with reference to listed buildings, ancient monuments or conservation area vistas.
ii. There is scope for Vale of Glamorgan to require solar thermal in all appropriate development

15.11. Small Hydro

Small Hydro power is the most site specific of the small renewable energy technologies. Planning officers are likely to operate in close co-operation with the Environment Agency and conservation bodies. There will be a considerable amount of shared interest and responsibility and therefore a highly co-operative approach from an early stage is likely to be beneficial to all parties.

Within the LDP the council may wish to express strong support for small hydro development provided that Environment Agency requirements are met. In practice the Environment agency is likely to take a lead on the identification and assessment of technical and environmental criteria, although planning officers may lead in regard to issues including:

i) Noise
ii) Recreation and public access
iii) Disruption due to construction and operational procedures
iv) Visual impact in terms of siting and landscape considerations

Criteria set out within the proposed changes to Permitted Development states that there would be no change to hydro – that it will require planning permission.

15.12. Heat Pumps and Geothermal

Heat pumps have limited planning implications, and with the partial exception of external air source heat pumps, very little noise or visual impact. In most cases heat pump installations may be considered to fall within the category of permitted development.

i. There is scope for Vale of Glamorgan to clarify criteria for possible refusal by specifying reasons with reference to listed buildings, ancient monuments

Criteria within the proposed changes permitted development rights states that ground source heat pumps would be classed as permitted development. Air source heat pumps would be classed as permitted development, but depending on noise emissions, both internally and externally.

Appendices to

Vale of Glamorgan Local Development Plan

Renewable Energy

Appendices to Vale of Glamorgan Local Development Plan

Renewable Energy

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Appendices to Vale of Glamorgan Local Development Plan
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1 Technology Overview

1.1 Solar Photovoltaic (PV)

Photovoltaic (PV) systems exploit the direct conversion of daylight into electricity in a semiconductor device.

The most common form of device comprises a number of semi conductor cells which are interconnected and encapsulated to form a solar panel or module. There is considerable variation in appearance, but many solar panels are available that are dark in colour, and have low reflective properties. Solar panels are typically 0.5 to 1m^2 having a peak output of 70 to 160 watts. A number of modules are usually connected together in an array to produce the required output, the area of which can vary from a few square metres to several hundred square metres. A typical array on a domestic dwelling would have an area of 9 to 18m^2, and would produce 1 to 2 kW peak output.

Other forms of solar modules are becoming more common, such as solar tiles, which are modules that are of the size and appearance of roofing tiles or slates, which can take the place of conventional roofing materials. They have the advantage of giving a roof a homogeneous appearance, virtually indistinguishable from conventional roofing materials.

Modules can be fitted on top of an existing roof using a low support structure. In this case, the panels will rarely project more than 120 mm above the existing roofline. Alternatively, and particularly in new buildings, they may form all or part of the weatherproofing element of the roof, replacing conventional slates or tiles. Where the modules form only part of the area of the roof, they can be integrated in a similar way to proprietary roof lights.

Connections between individual panels are made either in the support structure, or inside the roof void, and are rarely visible from the exterior of the building.

1.1.1 Siting Issues

For best performance, PV modules need to be inclined at an angle of 30 – 40 degrees, depending on the latitude, and orientated facing due south. In practical terms, this is not always possible on existing buildings, and some degree of flexibility in inclination and orientation at the expense of best performance is acceptable. However to function satisfactorily, collectors need to be inclined at between 10 and 60 degrees, and orientated facing from east to west.

Although roof mounted PV is the most common installation, modules can also be mounted on the sides of buildings, or on free standing support structures on the ground. In some cases, particularly on institutional or commercial buildings, PV cladding on the side of the building may be regarded as an architectural feature. Other examples of the mounting of PV panels in buildings are their use as external sun shading of office windows (*bris – solaires)* and forming the roof of an atrium.

Shadows from buildings, trees or other structures can significantly reduce performance of the PV system and planners and designers should take reasonable steps to minimise overshading of the PV.

There are two ways in which PV is most commonly deployed**:**

Stand-alone systems: PV is widely used to provide power for communications, domestic dwellings and monitoring systems in remote areas. The use of PV to provide energy for lighting of telephone

kiosks in rural areas, bus shelter lighting, remote traffic monitoring, and railway trackside signalling is increasing as it can compete in remoter areas with the costs of mains connections and cabling.

Grid connected Schemes: These use PV technologies that are connected to the local electricity grid via power conditioning equipment known as an inverter. Any surplus electricity not being consumed within the building can be exported to the local distribution network with the agreement of the network operator and an electricity supplier. The connection is usually made within the owner's premises, and due to the relatively low capacity of individual systems additional overhead cables are very rarely required.

Although the majority of grid connected schemes will be roof mounted, other applications may occur, such as modules used as sound barriers alongside motorways.

PV technology is expected to decrease in cost over the next decade and PV systems could provide a useful contribution to renewable energy generation.

1.1.2 Planning Issues

There are clearly implications for listed buildings and the sensitive 'front elevations' of some conservation areas but as a generality "solar panels" should be something to be encouraged. In some cases, provided the installation is not of an unusual design, or involves a listed building, and is not in a designated area, PV is regarded as "permitted development" and is thus deemed not to require a planning application. Unless the panels are of an unusual design, they should be treated as being within the plane of the existing roof slope for the purposes of Part 1, Class B1(b) of the Town and Country Planning (General Permitted Development) Order 1995.

1.2 Solar Water Heating

Solar water heating systems can be used to heat water for a variety of purposes. Amongst the most common are: domestic use, light industrial and agricultural use and to heat swimming pools. At present, the widest utilisation is in the residential domestic hot water sector. Such systems are rarely used to provide space heating, but occasionally may occur.

There is a common misconception that solar water heating is ineffective in Wales for climatic reasons. Whilst it is clearly not as effective in Wales as it is in Spain for instance, a good modern system will make a significant contribution to water heating requirements. The domestic sector is an obvious priority - a well designed system should provide 50-60% of annual domestic hot water requirements, most of this energy capture being between May and September.

The key component in a solar water heating system is the collector. Two main types are common in the UK: flat plate collectors and evacuated tube collectors, although other designs are occasionally employed. In both types, radiation from the sun is collected by an absorber, and is transferred as heat to a fluid, which may be either water, or a special fluid employed to convey the energy to the domestic system using a heat exchanger.

Flat plat collectors comprise a water filled metal “envelope” with a special black coating which improves absorbtion of solar energy and heat transfer. This is housed in a glazed, insulated box. The collector is connected to the hot water system of the building in a similar way to a conventional boiler, usually using an indirect coil in the hot water cylinder. Water is circulated either by thermo-syphon or, more commonly using a circulating pump. The pump is controlled in such a way that when the temperature of the collector is lower than the temperature in the hot water system, the pump is switched off. Flat plate collectors need to be protected against frost, and this is effected either by the addition of antifreeze to the heating circuit, or by arranging the system such that the collector “drains down” when the pump is switched off.

Evacuated tube collectors comprise a number of vacuum tubes, typically around 100 mm in diameter, and 2 metres in length containing a finned metal collector tube. Each tube is filled with a heat transfer fluid, and the upper ends of individual tubes are connected to a manifold heat exchanger, which is connected to the hot water system of the building as in the case of flat plate collectors. Evacuated tube collectors do not require protection against frost.

Although both types of collector will collect more energy during summer months, a significant amount of energy will be collected on cold winter days, and evacuated tube collectors are more effective in achieving both.

A type of flat plate collector has the storage cylinder as an integral part of the collector, mounted on the roof. Although common in warmer climates these are rare in the UK, and normally the only part of the installation that is visible is the collector.

The collector, together with the glazing and insulation, are generally mounted in a box which is usually coloured grey or black, typically of 1 - 2 m^2 in area. For an average residential domestic installation, some 4 or 5m^2 of flat plate collector, or some 3m^2 of evacuated tube, is required. Typically, this would be mounted on a southerly facing roof pitch, or more rarely on a free-standing tilted frame on the ground, or a flat roof. Increasingly, collectors are becoming available that can be incorporated into a new or existing roof in much the same way as proprietary roof windows. Some systems use photovoltaics (PV) to provide power for the system pump. In this case, a separate PV module, typically 20cm by 40 cm, will be mounted adjacent to the solar hot water collector.

Collectors rarely project more than 120 mm above the existing roofline. Connecting pipework is normally run from the back of the collector directly through to the roof void, as it is not normally visible from the exterior of the building.

Solar water heating collectors for swimming pools generally comprise mat of neoprene, or other black rubberised material that is mounted near to the swimming pool. Typically this will have an area of about half that of the surface area of the pool. The collector may be mounted on the roof of an adjacent low building (such as a garage, or more commonly on a low ground mounted frame. The collector is often mounted flat, or only slightly inclined with the outlet higher than the inlet.

1.2.1 Planning Issues

Planning issues are similar to those for Solar PV

1.3 Small Hydro

The technology for harnessing waterpower is well established. Water flowing from a higher to a lower level is used to drive a turbine, which produces mechanical energy. This mechanical energy is then turned into electrical energy by a generator, or more rarely to drive a useful mechanical device.

The energy produced is directly proportional to the volume of water and the vertical distance it falls. Thus, a similar amount of energy could be produced from a small volume of water falling over a long vertical distance (high head), as from a larger amount of water falling a much shorter vertical distance (low head).

The great majority of schemes will be “run of river”, where water is taken from a river from behind a low weir, with no facility for water storage, and returned to the same watercourse after passing through the turbine. In addition, there is a small potential for small hydro installed on existing reservoirs, but these may also be treated as “run of river”, as they do not involve the construction of a new impounding structure.

The essential elements of a hydro scheme are as follows:

- A source of water that will provide a reasonably constant supply. Sufficient depth of water is required at the point at which water is taken from the watercourse, and this is achieved by building a low weir (typically around 2 metres high) across the watercourse. This is called the ‘intake’.
- A pipeline to connect the Intake to the turbine. A short open ‘headrace’ channel may be required between the intake and the pipeline, but long headrace channels are rare due to environmental and economic constraints.
- A building housing the turbine, generator and ancillary equipment - the ‘turbine house’.
- A ‘tailrace’ returning the water to the watercourse.
- A link to the electricity network, or the user’s premises.

The Intake
The scale and nature of these elements depend on site conditions, and whether the scheme is low head or high head.

The intake typically comprises a concrete or rubble masonry weir, up to 2 metres high, across the watercourse. A spillway ensures that the downstream watercourse is never totally deprived of flow, and a screen or trashrack prevents floating debris or fish from entering the pipeline. A valve or sluicegate is often incorporated, and where the watercourse has a high silt load, a settling tank may be required. The Environment Agency should be consulted regarding disposal of debris from the trashrack. Current regulations may require that debris is disposed of off site, but an exemption may be granted by the EA under some circumstances.

The Pipeline
The pipeline (sometimes called the penstock) connects the intake with the turbine. This is typically a pipe of steel, plastic or composite material, the diameter of which could be between 10cm and 100cm, depending on the characteristics of the site, and the capacity of the scheme. High head schemes typically have smaller diameter pipes of longer length (sometimes over a kilometre), whereas low head schemes are typified by short, larger diameter pipes. Pipes are often buried for environmental or technical reasons. Anchor blocks to restrain the pipe are required at vertical and horizontal changes of direction, but these are usually buried if the pipe is buried.

Open headrace channels are now rare on new schemes, but may occur if the project involves the rehabilitation of an existing scheme, particularly on old watermill sites.

The Turbine House
The turbine house accommodates the turbine, generator and ancillary equipment, and is typically a single storey building of between 3 metres by 4 metres for a small domestic scheme, to 10 metres by 10 metres for a large grid connected scheme. Occasionally, particularly on old watermill sites, the machinery may be located in an existing building. Vehicular access to the turbine house is required for construction and maintenance purposes.

To minimise the length of the tailrace, and to maximise the available head, the turbine house is usually located close to the watercourse.

Such turbine houses should typically be constructed in association with the local vernacular materials used in the area.

The Tailrace
After use, the water is returned to the natural water course via concrete or masonry channel which connects the turbine house to the watercourse. To avoid flooding of the turbine, this channel should have a gradient sufficient to allow free discharge of water. A screen to prevent the ingress of fish is often incorporated, and occasionally the tailrace is an underground structure.

Electricity Connection.
The connection between the turbine house and the local electricity network is typically 3 wires, supported on single wooden poles.

1.3.1 Planning Issues

Planning applications for hydro schemes in excess of 1 MW capacity are considered by the Secretary of State for Energy, under Section 36 of the Electricity Act 1989. In this case, the local planning authority is a statutory consultee. For schemes below 1 MW the local planning authority is the decision making body and they will often be construed as EIA developments under Statutory Instrument No. 293 1999, particularly where greater than 0.5 MW.

The development of hydro – electric power generation schemes should be achieved in a manner which is compatible with the many other uses to which a river is put. Early liaison between the developer, planning authorities, the Environment Agency and statutory consultees such as the Countryside Council for Wales is essential to ensure that all statutory remits are met, and that proposals do not detract from the existing value and interest of the watercourse and its surroundings. There is some potential for environmental improvements through technical and environmental enhancement measures.

In addition to planning permission, any small hydro scheme will require an Abstraction Licence from the Environment Agency. This generally will require an environmental impact assessment, usually covering issues that will be of concern to a planning officer, including:

Siting and landscape considerations
Design considerations
Hydrological issues
Ecological considerations
Fisheries considerations
Noise
Recreation and public access considerations

Because of this shared interest, it is beneficial for all concerned that there is a high degree of co-operation between planning officials, EA officials and the applicant during the application process.

1.4 Biomass

Energy generation based on biomass is technologically well advanced and widely utilised in many parts of the world. For example, in the forested areas of Scandinavia and North America, the use of wood for heat and electricity generation on a commercial scale is well established. In the UK, a 36 MW straw-fired power station was officially opened in January 2002 near Ely in Cambridgeshire. The scheme uses new techniques to burn surplus straw to generate over 270 GWh of electricity a year, enough power to heat and light 80,000 homes. In many rural areas, particularly those with an established forestry industry, woody biomass are used to provide heating for schools and other public buildings.

There are three methods for converting dry biomass fuels into energy:

- **direct combustion** is used for heating water or to raise steam to drive a steam engine or turbine to generate electricity (steam cycle). Equipment ranges from very small wood stoves used for domestic heating to multi megawatt plants for electricity production. The upper limit is restricted by local energy demand and availability of biomass rather than by combustion technology. Equipment design depends on the moisture content and particle size of the fuel;
- **gasification** is a technique in which the solid fuel undergoes incomplete combustion in a limited air supply to produce a combustible gas that can be burned in a boiler or used as fuel for an engine or gas turbine. This technology is more applicable to multi megawatt plants, but smaller plant of under 5 MW are becoming more common;
- **pyrolysis** involves heating in the absence of oxygen (rather like traditional charcoal production) to produce a combustible gas, which is used in a similar way to gas produced from gasification.

Direct combustion is the most commonly used technology for heat only plant, whilst both direct combustion and gasification are used for Combined Heat and Power (CHP) and electricity only plant. Pyrolysis is more commonly associated with the production of transport fuel, such as bio diesel. Combustion technology and generation of electricity using the steam cycle is an advanced, mature technology. Whilst becoming much more common, gasification and pyrolysis are much less mature technologies than direct combustion.

The three technologies appear externally to be very similar, and share much in common from a planning perspective. For a given capacity of plant, the size, extent and appearance of the development will be similar, similar amounts of fuel feedstock will be required, and emissions and other waste products will be similar.

Fuel Sources

Although this report deals with the planning implications of the energy conversion plant itself, and not of the fuel supply, some reference to the different sources is important. There are five main sources of biomass fuel:

- Material from forestry harvesting
- Material from timber processing
- Agricultural residues
- Energy crops
- Waste Streams

A large biomass scheme may use fuel from one or more sources, in order to ensure security of supply.

All 'dry' biomass fuels have a similar gross energy content – 4 to 4.5 MWh per dry tonne. How much of this energy content can be exploited depends on the process, the technology employed, and the moisture content. Some direct combustion technologies can use fuel with a high moisture content (up to 50%), but gasification and pyrolysis generally require fuel to have a moisture content of less than 30%, and fuel may have to be dried as part of the process.

Biomass material from forestry harvesting, agricultural residues and energy crops may have a similar supply strategy. Most biomass plants require fuel to be in a chipped form, and chipping often occurs close to where the crop is grown. Once chipped, fuel tends to deteriorate fairly quickly, hence fuel in long term storage (e.g inter-seasonal) is usually left in the "as harvested" state, either in situ, or in converted agricultural buildings. Chipped fuel is often loaded directly onto lorries for delivery to the energy plant. Generally, only short term storage facilities are provided at the energy plant, and regular fuel deliveries are needed. A useful rule of thumb for fuel deliveries is two 38 tonne lorry deliveries per day, per MW continuous heat input. Thus, a 250kW boiler operating for half of the time (a duty cycle of 50%), supplying heat to a leisure would require 1 or 2 deliveries a week, and a 10 MW plant producing electricity continuously would require around 20 deliveries a day.

Existing large coal fired power stations can use biomass to augment the traditional fuel. This is known as 'co-firing'. Although this may not have implications for the planning system, it is an important way of increasing the critical mass of producers in the fuel supply chain

1.4.1 Planning Issues

The remit of consideration for planners is around the power plant and associated impacts and not the production of the fuel source. However, the impacts of growing and collecting the fuel are key to ensuring the successful development of a facility. Many of the environmental issues associated with the fuel supply (e.g. impact on landscape, ecology, archaeology, land use etc) may be covered by an Environmental Impact Assessment (EIA) undertaken by other bodies in connection with the scheme – for instance the Forestry Commission (FC) for all applications submitted to the Energy Crops Scheme.

New electricity generation plant whose capacity equals or exceeds 50MW needs the Consent of the Secretary of Sate for Energy, under Section 36 of the Electricity Act 1989. This includes deemed planning consent, and for which the Local Planning Authority is a Statutory Consultee. Heat only plant, and electricity plant or CHP, with an electrical output of less than 50MW will require planning permission from the local planning authority under the Town and Country Planning Act 1990 (Section 57).

Local planning authorities may wish to consider the following issues when determining an application:

- Visual intrusion - the plant is an industrial feature with a chimney and may not always be regarded as appropriate to the landscape. In certain weather conditions a plume may be evident from the chimney and/or drying equipment depending upon the design of the equipment.
- Noise from traffic and plant operations. As an industrial development, BS 4142 may be the applicable standard
- Effects on health, local ecology and conservation from airborne and water borne emissions.
- Traffic to and from the site in order to transport biomass fuel and subsequent by-products. Transportation of the fuel is one of the greatest causes of contention for local communities.

Traffic volumes and the associated noise will increase with the introduction of a large biomass power facility, as the scheme may require a continuous fuel supply.

- The sustainability of the fuel supply i.e. could there be an intention to change the operating feedstock over time.
- The positive benefit of the plant to the local economy. The supply of biomass fuel can secure a long term income for farmers, forestry owners and contractors, and transport operators in rural areas.
- Carbon mitigation

1.5 Anaerobic Digestion

Anaerobic digestion (AD) is a method of waste treatment that produces a gas with high methane content from organic materials such as agricultural, household and industrial residues and sewage sludge (feedstocks). The methane can be used to produce heat, electricity, or a combination of the two. The process has the benefit of using waste substances that are otherwise difficult to dispose of in an environmentally acceptable manner.

AD is the bacterial fermentation of organic waste in warm, oxygen-free conditions. The process, which is sometimes known as bio-stabilisation, converts complex organic molecules into an inflammable gas comprising methane and carbon dioxide, leaving liquid and solid residues. The gas is usually referred to as *biogas*. During this process, up to 60% of the digestible solids are converted into biogas. This gas can be used to drive a generator, to supply heating systems, or to serve a range of industrial applications.

The digestion process takes place in a sealed airless container (the digester) and needs to be warmed and mixed thoroughly to create the ideal conditions for the bacteria to convert the organic matter into biogas. There are two types of AD process:

Mesophilic digestion. The digester is heated to 30-35°C and the feedstock remains in the digester typically for 15-30 days. Mesophilic digestion tends to be more robust and tolerant than the thermophilic process (see below), but gas production is less, larger digestion tanks are required and sanitisation, if required, is a separate process stage.

Thermophilic digestion. The digester is heated to 55°C and the residence time is typically for 12-14 days. Thermophilic digestion systems offer higher methane production, faster throughput, better pathogen and virus 'kill', but require more expensive technology, greater energy input and a higher degree of operating and monitoring.

A typical AD plant will comprise waste pre-treatment equipment, a digester tank, buildings to house ancillary equipment such as a generator, a biogas storage tank, a flare stack and associated pipework. If municipal solid waste (MSW) is digested, pre-treatment facilities will be required to separate organic from inorganic waste. Plants that use sewage sludge or farm slurry will require post-digestion equipment to treat the resulting liquors.

Fuel Sources
The main types of feedstock employed in AD are:

Sewage sludge. This is the sediment that is removed from foul sewage during the course of treatment by a process of settlement. AD of sewage sludge currently takes place at many sewage treatment works and some schemes include energy recovery. The raising of sewage treatment standards – together with tighter controls on the disposal of sludge – has lead to greatly increased arisings, particularly in coastal areas where sludge dumping at sea ceased to be an option since 1998. Water companies are placing a priority on finding alternative methods of safe disposal. Energy recovery will potentially become more economically attractive where AD is the chosen waste treatment measure.

Farm slurry. The intensive rearing of livestock, particularly cattle and pigs, produces large quantities of slurry - manure in liquid form - which is not only odorous but can also present pollution problems if it is not carefully disposed of. Silage effluent can cause similar problems. Farmers can face stiff penalties for causing these substances to pollute water courses.

Municipal solid waste (MSW). Municipal refuse contains large quantities of food, garden waste, paper and packaging with a high organic content, and is therefore suitable for AD. With the introduction of the RO, the market for CAD plant, utilising 100% food processing waste for example, is large and is likely to grow still further.

Digestion does not only reduce the volume of the wastes treated, but it does make them less odorous and can remove harmful pathogens - a particular benefit in the case of farm slurry and sewage sludge. The options for after use or disposal of the residual waste are thus widened substantially.

Feedstocks for AD inevitably contain plant or animal pathogens (such as *Salmonella*) and parasites (such as *Cryptosporidium*) to different degrees in different materials. Precautions are therefore needed in AD projects, especially CAD projects which involve transporting residues from various sources to a central point, which could lead to cross-contamination unless appropriate preventative measures are taken. Mesophilic AD will reduce pathogens and bacteria, but will not eliminate them from waste. Thermophilic digestion will further reduce the levels, but again cannot guarantee total removal. Pasteurisation (holding the waste at 70°C for 30 minutes or at 55°C for four hours) is the only method that will ensure the complete elimination of pathogens.

1.5.1 Planning Issues

Site selection, Transport and Traffic
A plant will be located close to the waste source. Small digesters on farms can sometimes be accommodated quite satisfactorily within the existing complex of farm buildings. Similarly, sewage sludge digesters will be built at existing waste water treatment works, and will often be unnoticeable amongst the existing array of tanks and ponds

Centralised digestion facilities handling large quantities of agricultural wastes, sewage sludge or MSW may be more economically viable for farmers, but have the potential to raise more complex siting issues. The most acceptable sites are likely to be beside existing industrial or waste water treatment works or, in the case of digestion schemes using MSW, in close proximity to a landfill site or waste transfer station.

Transport movements at on-farm digesters are not likely to have greater impact than normal farm activities. However, CAD plants will draw traffic to their central location as feedstock is delivered and products are distributed. The impact of these transport movements can be minimised by carefully considering fuel supply logisitics, thereby optimising the distances travelled between the feedstocks, storage tanks, digester and local markets.

Feedstocks and Product Storage
Planning permission may be given to a scheme specifying a certain feedstock and in these circumstances the feedstock will not be able to be changed without the further prior approval of the planning authority. The local authority and/or Environment Agency should be consulted early in the process when considering waste handling issues and classifications.

Odour
The AD of organic materials is, by its very nature, an odorous process. Local authorities should examine predicted odour effects and proposed mitigating measures such as odour control systems. If a location is considered to be sensitive to odour nuisance, the local authority should ensure that all possible sources of odour are accounted for in the proposals for odour control. Odour may arise from:

- waste input storage bays: especially during the summer when the breakdown of organic material can begin before it is even collected for disposal;
- sorting and mixing plant: in which the waste is treated or sorted or mixed with digestate prior to digestion;
- the digester: which, though sealed during use, will release odours when opened to allow cleaning;
- digestate draw-off and de-watering plant digested material is significantly less odorous than raw organic material, but can still give off unpleasant smells.

At the same time, AD can bring benefits in terms of odour reduction. The digestion of slurry, for example, is significantly less odorous than the common practice of storing slurry in pits.

Emissions to Ground and Water Courses

Serious farm pollution incidents can occur through the leakage or run-off of raw agricultural wastes, particularly farm slurry, dirty water and silage effluent. By following the DEFRA Codes of Good Agricultural Practice for the Protection of Land and Water, emissions to ground and water courses should be minimised. The AD of farm waste should reduce the likelihood and capacity of the material to pollute controlled waters.

Emissions to Air

The production and use of biogas through AD results in a number of emissions to air, including those from gas vents, engine exhausts and flare stacks. These emissions are generally minor and are unlikely to present any significant environmental problem, provided the equipment meets relevant design specifications and is properly serviced. The Environment Agency will apply Integrated Pollution Control regulations to larger plant which will control emissions to all media; this will apply to larger on-farm schemes as well as CAD plants.

1.6 Energy from Waste

Conventional incineration and the advanced technologies defined in the Renewables Obligation above are the two technology routes most likely to be used to recover energy from solid waste in the short to medium term. The provisions of the Renewables Obligation may increase substantially the numbers of Energy from Waste installations using advanced processes in the future.

Direct combustion
The majority of MSW incinerators burn the waste stream essentially in the form it is collected. This process is called direct combustion. The combustion gases are cleaned in a sequence of processes which remove particulates, acid gases and trace organic compounds. The ash exits the process as two distinct streams – bottom ash that falls from the combustion grate, and fly ash that is separated from the flue gases. Bottom ash is considered to be inert and, after the separation of metals, is either taken to general landfill or used as aggregate. Fly ash can contain heavy metal contamination and so should be disposed of in a controlled landfill.

Pyrolysis
In recent years the concepts of waste pyrolysis and gasification have received considerable attention and a number of companies are offering systems for commercial installation. Pyrolysis is the process of heating fuel in the absence of air to produce charcoal and a gaseous fuel ('syngas'). These can then be burned in boilers, engines or turbines to generate heat and power. Plants with pyrolysis only are less common than those where pyrolysis is combined with gasification.

Gasification
Gasification is a process of partial combustion, which enables operators to effectively control the temperature of the process, with consequent mitigation of pollutants. A gas is formed when the fuel reacts with sufficient oxygen to maintain a high reaction temperature but with insufficient oxygen to complete combustion. This gas can then be used in engines, boilers or turbines to generate power.

For all these processes the useful energy in the waste is generally released by combustion, although increasingly syngas from pyrolysis and gasification is being used as a source of hydrogen for fuel cells. In the context of fuel cells, pyrolysis and gasification as processes have the advantage of producing a homogeneous gas from which hydrogen can be extracted.

Pyrolysis and gasification are still developing but experience thus far has demonstrated that the superior control of the combustion offered by these processes can create much lower levels of contaminants in the exhaust gas when compared with typical grate combustion. Pyrolysis and gasification systems can generally be implemented at smaller scales than conventional incineration, making them more flexible in meeting the needs of smaller communities, and reducing local air quality impacts through minimisation of waste transportation. The ash resulting from pyrolysis and gasification followed by combustion has also been found to be more stable and less polluting than that from conventional incineration.

Waste can be pre-treated in a variety of ways to improve its combustion efficiency and extract recyclable materials such as metal and glass. Treatments include shredding, sorting and separation, and drying. The equipment used for sorting waste will typically include rotating and vibrating screens, magnetic separators, air separators and manual picking belts. Some more innovative systems use high temperature washing. The pressure from recycling targets will mean that all MSW plant will have extensive materials recovery facilities.

Combined Heat and Power
The most efficient Energy from Waste schemes generate both electricity and heat, through combined Heat and Power (CHP) plants. This method is particularly beneficial as most of the

energy in the waste can be put to good use and the improvement in energy efficiency leads to a corresponding reduction in emissions. It is desirable for CHP and Community Heating Schemes to be situated close to local energy users in order to minimise the costs of the heat distribution system.

A typical waste-fuelled combined heat and power process will involve some or all of the following:

- waste reception and storage;
- waste processing, material sorting and recovery;
- feeding waste into the combustion, pyrolysis or gasification chamber;
- the combustion, pyrolysis or gasification reactor itself;
- generation of heat and power using steam turbines, gas engines or gas turbines;
- treating the waste gases to reduce emissions;
- handling, storage and disposal of ash; and,
- handling, storage and disposal of liquid effluents such as boiler water and surface water.

Scale of development
Energy from Waste plants vary in size from small installations (serving factories for example) to large-scale MSW plants (see table 1). New projects therefore might either be accommodated within existing or converted buildings, or may require large new sites.

The costs of meeting stringent licensing standards mean that MSW plants using incineration need to achieve economies of scale to be viable. Incinerators in the UK have a waste throughput of in the region of 100,000 to 600,000 tonnes per year. A MSW plant consuming 400,000 tonnes of waste per year will produce approximately 34MW of electricity, enough to supply about 46,000 homes.

Disposal of ash and gas cleaning residues
There are two types of ash from conventional incinerators. The ash that falls from the combustion grate (bottom ash) is inert and can be sent to normal landfill. The ash from the flue gas cleaning installation contains heavy metals and traces of other contaminants and should be sent to controlled landfill. The ash from gasification and pyrolysis plants may contain a higher carbon content but this is not thought to be harmful as the carbon is in its elemental form and inert. Heavy metals will still be found in the finer ash and may need disposal in controlled landfill. This will depend upon the process and appropriate treatment of this ash will be a condition of the licence to operate.

1.6.1 Planning Issues

Siting issues
Planning authorities should consider proposals for energy from waste developments in the same way in which they would handle any other industrial scheme. The relevant planning considerations are largely the same. However the siting of an Energy from Waste plant is likely to be influenced by the following factors:

- the source of the waste;
- the economic implications of transporting the waste;
- site access; and,
- proposed energy use, the availability of local heat markets and ease of connection to the

electricity distribution network.

In general, waste treatment and disposal operations are characterised to a large extent by the high volume of materials entering and exiting the site. In order to minimise the adverse environmental effects of transporting waste, they should, wherever possible, be located close to the waste source. The optimum locations for most MSW and business waste plants are therefore likely to be in or very close to urban areas.

Local planning authorities should have regard to the waste management plans drawn up for their area. They should identify the spare capacity at existing plants, sites for new waste management plants, or areas of search for new sites. They should also set out the land-use criteria against which planning applications for new waste management development will be assessed. Further guidance is given in PPS23 Planning and Pollution Control (2004).

Visual Effects
In many cases, Energy from Waste developments are likely to be proposed in industrial areas, where they will be broadly in keeping with the existing buildings. Even so, the developments can be prominent features, and therefore local authorities will wish to encourage a high standard of design and landscaping in order to minimise their visual impact.

Chimney height will vary with the scale of plant and the technology used. Pyrolysis and gasification plant generally need significantly lower stack height than incineration. Chimney height will be determined by pollution control procedures under the Pollution Prevention and Control Act 1999, or the Clean Air Act 1993, to ensure adequate dispersal of emissions in the exhaust gas.

Ambient air quality and odour
A plant that complies with licence requirements for air pollution might still give rise to odours. For large projects such as MSW incinerators odour is covered under the IPPC authorisation, and for smaller projects it is covered under the local authority authorisation.

The sources of odour nuisance may not always be emissions through chimneys and vents from the works, but could arise from open-air storage, handling or transport of waste materials or their products. In identifying sites for Energy from Waste plants in local plans and in considering planning applications for them, planning authorities will wish to bear in mind that some problems may be created by odour, particularly where a site is close to housing or other odour-sensitive land uses.

Dust
Excluding particulates from stacks, most dust is created during waste processing and ash handling operations. Practical measures for dust control include minimising, or eliminating, open-air storage, water sprinkling and transportation within covered skips or lorries. Emission levels are regulated through the Environment Agency or the terms of a site's Waste Management Licence.

Emissions to water
Water may be affected by certain liquid effluents created by particular processes. The main sources of liquid effluent will be from gas cleaning systems, cooling water and surface run off. The Environment Agency has responsibility for the control of water quality. Consultations should take place between the developer, the planning authorities and the Agency if it is proposed that river water is used for cooling.

1.7 Wind Clusters

There are essentially two types of wind turbine, and they look very different—vertical axis machines with rotors that rotate about a vertical axis, and horizontal axis machines whose rotating shafts are aligned horizontally. Most wind turbines installed today are of the horizontal axis type. This is likely to remain the case for the foreseeable future in relation to large, grid connected wind turbines. One area in which vertical axis machines may become prevalent is the application of small wind turbines in the built environment. Unless otherwise stated this report is describing horizontal axis machines.

Wind turbines use the wind to generate mechanical power for water pumping or for electricity generation. This report deals only with the electricity-producing variety. It is also limited to consideration of land-based machines (although there is little essential difference with machines that are installed in off-shore locations). Such wind turbines convert the kinetic energy of the wind that passes through the swept area of the rotor into electrical energy by means of a rotor (generally comprising 3 blades), a mechanical drive train (usually including a gearbox) and an electrical generator. These are all mounted on a tower that is at least high enough for the blades to clear the ground by a sensible margin and preferably high enough to maximise the energy capture of the wind turbine.

Wind turbines are defined by the size (diameter) of the rotor and rated power or capacity in kilowatts (kW) or megawatts (MW). The rated capacity of a wind turbine is a measure of the maximum output of the electricity generator which will be achieved in wind speeds greater than 12-15m/s at the hub height of the rotor. There are two things worth noting: An increase in the rotor diameter of a wind turbine does not result in a proportional change in rated power. For instance, doubling a 30 meter rotor diameter to 60 metres will result in a roughly four-fold increase in rated capacity, as the capacity is proportional to the square of the rotor diameter. Secondly, an increase in windspeed does not result in a proportional change in rated power. Rated power is proportional to the *cube* of the windspeed, and hence a doubling of windspeed will result in a roughly eight-fold increase in power output.

Wind turbines are available in a wide range of sizes, from small battery charging units with rotor diameters of less than a metre and a tower height of 15 metres to very large wind turbines with rotor diameters greater than 100 metres rated at several megawatts mounted on towers of 60 metres in height. Wind turbines have increased in size and capacity over time and will continue to do so in the foreseeable future. The choice of turbine size depends on the site chosen and the scale of development required. Commercial wind clusters that supply electricity to the electricity grid tend to use few larger machines. However, farms and businesses using wind power might size their turbines according to the size of their own electricity demand.

The *blades* are usually of a glass-fibre reinforced plastic construction. Other materials used include wood-epoxy laminates and carbon fibres. These may both become more prevalent with future up scaling of current wind turbine designs. They are generally the largest single item that is transported to a wind farm during construction. Smaller turbines (less than 50kW) may use blades made of a variety of other materials such as plastics, metal or wood.

The *blades* are attached to the *hub*, which is in turn attached to the main shaft that drives the generator, usually, but not always, via a gearbox. Any grid connected wind turbine must produce its power output at 50Hz alternating current (AC), in common with the electricity transmission and distribution networks.

The generator, gearbox and yaw drive that turns the rotor to face the wind are the main components housed within the *nacelle*. For large, grid-connected turbines the rotor alignment with the on-coming wind is always controlled actively via the yaw drive and they are designed so that

the blades see the wind before the tower does. Such a design is known as an upwind rotor with active yaw control. Smaller turbine designs may use upwind or downwind rotors and may use active or passive yaw control. Vertical axis machines require no yaw control by virtue of their design.

The *nacelle* is mounted on the *tower*, which for large grid-connected turbines is always of a tubular steel construction. Smaller turbines (less than 50kW) may be mounted on similarly designed towers, but may equally use lattice or guyed towers. Turbines designed specifically for the built environment may be mounted directly on to existing structures, such as roofs.

There are a number of technical differences amongst the wind turbines that are currently available. The most obvious difference is in the number of blades. Most machines now have three blades, but there are some two-bladed machines in operation. Other than this the two most important differences are the way in which a turbine regulates its power capture above rated wind speed (pitch or stall regulation) and whether the machine operates at a fixed or variable rotor speed.

Planning Issues

Wind clusters of 1 or 2 turbines may not need a statutory Environmental Impact Assessment, but planners may wish to consider all or some of the issues generally covered in an EIA for a larger project, including:

- Noise effect
- Landscape and visual effect
- Airtraffic Safeguarding
- Proximity to roads, public rights of way and power lines
- Ecological and ornithological effects
- Electromagnetic interference
- Shadow flicker and reflected light
- Archaeology
- Construction and operational disturbance

Although wind clusters are smaller in scale than larger commercial windfarms, and may be associated with other, particularly industrial developments, applicants should be encouraged to follow the British Wind Energy Association Best Practice Guidelines.

1.8 Passive Solar Design (PSD)

Virtually all buildings enjoy free energy and light from the sun, the objective in PSD is to maximise this benefit by using simple design approaches which intentionally enable buildings to function more effectively and provide a comfortable environment for living or working. Not all aspects of PSD are of direct concern to Development Control, for example the use of dense materials to store heat and the details of internal layout and use of natural ventilation.

An important distinction must be drawn between the use of PSD in housing and commercial buildings. In housing the primary objectives are to capture light and heat. In the case of commercial buildings light is also important but generally excess heat is a problem during periods of high solar gain, making the main purpose of PSD the removal of excess heat while avoiding the use of air conditioning.

PSD should not be regarded as a technology in the same way as other renewable energy technologies: it is rather the application of a number of design tools and materials to improve the energy performance of a building. These tools include:

Orientation

The capture of solar gain can be maximised by orientating the main glazed elevation of a building within 30 degrees of due south. Orientation is important for housing and schools, which can make effective use of solar gain. The use of dense materials in construction will help to absorb heat during the day and release it at night.

Room layout

Placing rooms used for living and working in the south facing part of the building, and locating storage, kitchens, bathrooms, toilets, stairways and the main entrance on the north side will make most effective use of solar heat and light.

Avoidance of overshadowing

Careful spacing of buildings should seek to minimise overshadowing of southern elevations, particularly during the winter when the sun is low. On sloping and wooded sites careful consideration must be given to siting to maximise solar access. PSD principles can be readily applied to housing layouts achieving up to 35 dwellings per ha. Above this figure a degree of overshadowing becomes increasingly difficult to avoid, but this remains a worthwhile objective. *(To be added: details of software that can be used to evaluate housing layouts and assess overshadowing and PSD performance)*

Window sizing and position

In housing smaller windows should generally be used in north facing elevations. On the south elevation while larger windows increase solar gain this has to be weighed against greater heat losses in the winter and a risk of overheating in the summer. Sloping roof lights facing the sun will increase the solar radiation received.

Conservatories and Atria

Carefully designed conservatories and atria can contribute to the management solar heat and ventilation. To avoid problems of excessive heat gains and losses they should be designed and used as intermediate spaces located between the building and the external environment. Conservatories and atria can be designed to assist natural ventilation in the summer by drawing warm air upwards to roof vents. They can also be used as heat collectors during the spring and autumn. The net thermal benefits of conservatories will however be lost if they are heated for use during the winter.

Natural ventilation

This is particularly relevant to offices, schools and other public buildings. Atria and internal ventilation stacks projecting above the general roof level can be used to vent air as the building warms during the day, with cool air being drawn in through grills in the building façade. This approach obviates the need for air conditioning, which can be up to four times more energy intensive as providing heating, and makes for a more healthy and pleasant building environment.

Lighting

In offices the avoidance of deep-plan internal layouts and the use of atria, roof lights and light reflecting surfaces can help reduce the need for artificial lighting.

Thermal Buffering

In order to reduce heat losses, unheated spaces such as conservatories, green houses and garages which are attached to the outside of heated rooms can act as thermal buffers, the temperature of the unheated space being warmer than that outside.

Landscaping

Landscaping, including the use of earth bunds, is often used as part of an overall PSD approach providing a buffer against prevailing cold winds and shading for summer cooling.

1.9 Combined Heat and Power

Combined Heat and Power (CHP) is the simultaneous generation of usable heat and power usually electricity) in a single process. Through the use of an absorption cooling cycle, trigeneration or Combined Cooling Heat and Power (CCHP) schemes can also be developed. CHP is a highly efficient way to use both fossil and renewable fuels and can therefore make a significant contribution to the UK's sustainable energy goals, bringing environmental, economic, social and energy security benefits.

CHP systems can be employed over a wide range of sizes, applications, fuels and technologies. In its simplest form, it employs a gas turbine, an engine or a steam turbine to drive an alternator, and the resulting electricity can be used either wholly or partially on-site. The heat produced during power generation is recovered, usually in a heat recovery boiler and can be used to raise steam for a number of industrial processes, to provide hot water for space heating, or, as mentioned above with appropriate equipment installed, cooling.

Because CHP systems make extensive use of the heat produced during the electricity generation process, they can achieve overall efficiencies in excess of 70% at the point of use. In contrast, the efficiency of conventional coal-fired and gas-fired power stations, which discard this heat, is typically around 38% and 48% respectively, at the power station. Efficiency at the point of use is lower still because of the losses that occur during transmission and distribution. (see DUKES electricity chapter for more details)

In contrast, CHP is a form of a decentralised energy technology. CHP systems are typically installed onsite, supplying customers with heat and power directly at the point of use, therefore helping avoid the significant losses (which occur in transmitting electricity from large centralised plant to customer.
Location of CHP

CHP is a family of energy conversion processes, rather than a single technology, so it can be used to provide energy to anything from a single home to a large industrial plant, or even a whole city. Unlike conventional power plants, CHP units are sited close to where their energy output is to be used.

The main design criterion is that, to make the investment worthwhile, there must be a need for both the heat and electricity produced by the CHP unit.

In the home, a microCHP unit resembling a gas-fired boiler will provide both heat for space and water heating, as does a boiler, but also electricity to power domestic lights and appliances. MicroCHP units are a very new technology only recently appearing in the UK market, but the potential for them is as large as the number of homes in the country.

For commercial buildings and small industrial spaces, a factory-assembled, 'packaged' CHP system is appropriate. Here, an electricity generator, heat exchanger, controls and either an engine or a turbine is packaged together into a CHP unit that can be connected to the heating and electricity systems of the building.

Some building types, particularly those that need a lot of energy, or operate around the clock, are particularly suitable for CHP - leisure centres, hotels, hospitals and many others. CHP systems can, with the addition of a chiller, supply cooling for air conditioning systems as well as heating - such an arrangement is often called a 'trigeneration' system.

Homes and buildings fitted with CHP are usually also connected to the mains electricity grid, and may also retain back-up boilers, so that they are never short of an energy supply, during maintenance of the CHP plant, for example, or during periods of unusually-high energy loads.

Industrial CHP plants tend to be designed and built individually to fit the industrial process they serve. These CHP plants are based on gas turbines, steam turbines or engines, together with electricity generators and control systems. The very largest CHP plants rival traditional power-only plants in size and deliver huge quantities of energy - but at a much higher efficiency

Some industrial processes are particularly well-suited to CHP, those that use lots of heat and operate around the clock - the manufacture of paper, chemicals, food and drink products, as well as refineries, are among those that can benefit most from CHP.

Community heating systems serve whole towns, areas of cities or, in a few cases, whole cities. Here, one or more CHP plants supply heating to a grid of insulated hot water pipes that carry heat to a range of buildings, including public and private sector flats. As well as CHP plants, boilers and other sources of heat may feed heat into the grid. Buildings that take heat from the community heating system do not need their own boilers. Meanwhile, the electricity generated is used to help run the community heating plant, and within the customer buildings, or is exported to the electricity grid.

Community energy systems supply cooling, as well as heating and electricity, to buildings.[1]

[1] http://www.chpa.co.uk/

1.10 Heat Pumps

There are three important elements to a ground source heat pump:

The ground loop
This is comprised of lengths of pipe buried in the ground, either in a borehole or a horizontal trench. The pipe is usually a closed circuit and is filled with a mixture of water and antifreeze, which is pumped around the pipe absorbing heat from the ground.The ground loop can be:

- Vertical, for use in boreholes
- Horizontal, for use in trenches
- Spiral, coil or 'slinky', also for use in trenches

A heat pump
In the same way that your fridge uses refrigerant to extract heat from the inside, keeping your food cool, a ground source heat pump extracts heat from the ground, and uses it to heat your home. A ground source heat pump has three main parts:

- The evaporator, (e.g. the squiggly thing in the cold part of your fridge) absorbs the heat using the liquid in the ground loop;
- The compressor, (this is what makes the noise in a fridge) moves the refrigerant round the heat pump and compresses the gaseous refrigerant to the temperature needed for the heat distribution circuit;
- The condenser, (the hot part at the back of your fridge) gives up heat to a hot water tank which feeds the distribution system.

Location
The following issues should be considered:

- You will need space outside your house for the ground loop.
- The ground will need to be suitable for digging a trench or borehole.
- What fuel is being replaced? If it's electricity, oil, LPG or coal the payback will be more favourable than gas. Heat pumps are a good option where gas is unavailable.
- The type of heat distribution system. Ground source heat pumps can be combined with radiators but these will normally be larger than with standard boiler systems. Under floor heating is better as it works at a lower temperature.
- Want to be 100% renewable? Buy green electricity, or install solar PV or some other form of renewable electricity generating system to power the compressor and pump.
- Is the system for a new building development? Combining the installation with other building works can reduce costs.
- Have you installed insulation measures? Wall, floor and loft insulation will lower your heat demand and make the system more effective.

Air and water source heat pumps
Air and water source heat pumps use air or water respectively. They do not rely on a collection system and simply extract the heat from the source at the point of use.

Air source heat pumps can be fitted outside a house or in the roof space and generally perform better at slightly warmer air temperatures. Water source heat pumps can be used to provide heating in homes near to rivers, streams, lakes and lochs for example.

Heat distribution system
This consists of under floor heating or radiators for space heating and in some cases water storage for hot water supply. [2]

[2] http://www.energysavingtrust.org.uk/generate_your_own_energy/types_of_renewables/ground_source_heat_pumps/

1.11 Community Heating

Community energy schemes provide heat and/or power from one central source to multiple buildings. This might include homes, schools, universities, hospitals, leisure centres, prisons or offices. Schemes can range in size from one tower block with a central heat source for all the flats to citywide schemes connecting many public and commercial buildings.

Heat sources can include:

- Conventional boilers using conventional fuel such as gas or oil or renewable fuels (biomass, domestic or agricultural wastes).
- Combined heat and power (CHP) plant where the heat generated by electricity production is captured and used to generate more electricity or distributed via a heat network. About 1,300 sites in the UK utilise CHP and generate about 6 per cent of our electricity. Using waste heat produced from industrial processes e.g. distilleries.

What are the benefits?

- Low cost heating and power.
- Improved energy efficiency - a centralised plant uses energy more efficiently, significantly reducing carbon dioxide emissions and fuel costs.
- Reduced management costs and increased reliability.
- Ensure energy security through fuel flexibility.
- Enable compliance with EU Directive 19 on the Energy Performance of Buildings for any new buildings over 100m2.[3]

[3] http://www.energysavingtrust.org.uk/housingbuildings/communityenergy/

2 Summary of 2006 Building Regulations Part L

Sourced from the website of the Chartered Institute of Building Service Engineers (CIBSE)

On 15th March 2006 the ODPM published the "Building and Approved Inspectors (Amendment) Regulations 2006". These Regulations, which took effect from 6th April 2006 in England and Wales, amend Part L, Part F (Ventilation) and also Part P, dealing with domestic electrical works.

The 2006 Regulations implement Articles 3 to 6 of the Energy Performance in Buildings Directive. They introduce a legal requirement to carry out pressure testing of buildings and to commission fixed building services installations. The provision of information about the energy efficient operation of the building is also now a legal requirement.

Part L applies to England and Wales. Currently the Scottish Executive is considering proposals for amending regulations under the Building (Scotland) Regulations 2004 and the guidance provided in the Technical Handbooks on ways to comply with the building regulations in Scotland. The Scottish Building Standards Agency is currently consulting on the proposed changes and the consultation package is available from the Agency. In Northern Ireland Part F (Conservation of fuel and power) of the Building Regulations (Northern Ireland) applies.

THE 2006 BUILDING REGULATIONS PACKAGE
The ODPM has released a bundle of documents relating to Parts L, F and P. As well as the regulations, they have issued four new Approved Documents (ADs) to support Part L, and new ADs F and P. There is also an ODPM Circular, 03/2006. Although primarily intended for Building Control Bodies, the circular contains some very useful details about what the various documents include, and what the ODPM intend them to achieve or mean. It is a valuable insight into the intentions behind the regulations and Approved Documents.

Under the 1984 Building Act (which was amended by the Sustainable and Secure Buildings Act, the so-called ?Stunnell Act?, in 2004) the government is empowered to make regulations about how buildings are built, relating to health, safety, energy efficiency, sustainability and security. These requirements are set out in very summary form in Schedule 1 of the Act. Currently the requirements run from A to P. Guidance on how to satisfy each requirement is given in the Approved Documents (although it is guidance ? the Approved Documents are not legally binding). However, the Building Act is also supported by a number of secondary legal documents called Statutory Instruments, which set out additional regulations. The "Building and Approved Inspectors (Amendment) Regulations 2006" are one such set of Regulations.

As well as implementing changes to the existing provisions under Part L of the Building Act, these regulations implement, or transpose, the requirements of Articles 3 to 6 of the Energy Performance in Buildings Directive (EPBD) into law in England and Wales.

THE REQUIREMENT
The statutory requirements as stated in the revised Schedule 1 of the Building Act are relatively straightforward. The division of Part L into requirement L1 for domestic and L2 for commercial buildings has been dropped, and there is now a single requirement L1 under Part L, as follows:

Reasonable provision shall be made for the conservation of fuel and power in buildings by?

(a) limiting heat gains and losses?

(i) through thermal elements and other parts of the building fabric; and

(ii) from pipes, ducts and vessels used for space heating, space cooling and hot water services;

(b) providing and commissioning energy efficient fixed building services with effective controls; and

(c) providing to the owner sufficient information about the building, the fixed building services and their maintenance requirements so that the building can be operated in such a manner as to use no more fuel and power than is reasonable in the circumstances."

THE 2006 REGULATIONS

The requirements set out in the Schedule are a very concise summary. The 2006 Regulations are a more extended statement of what is required. They spell out in much greater detail what has to be done to comply with Part L. They amend a number of existing regulations, and they introduce several new ones.

In particular, they set out explicitly as legal requirements the requirements to carry out pressure testing of buildings, to commission fixed building services systems and to produce building log books. These were all introduced into Part L in 2002, but have been widely ignored by many in the industry, on the basis that the AD is only guidance. The Regulations are not guidance, and these provisions will now have to be met.

The amended Building Regulations now include the following:

- New requirements relating to thermal elements (Regulation 4)
- A new Part VA of the Building Regulations which covers energy performance of buildings and implements the EPBD Articles 3 to 6.
- New regulations 20B, 20C and 20D addressing pressure testing, commissioning and CO_2 emission rate calculations.

Note: Part VA, (Roman Numeral 5A) is a new Part of the Statutory Instrument as amended, not a new Part of Schedule 1 of the Building Act which defines the requirements of Parts A to P of the Regulations

New regulations relating to thermal elements and a change to energy status

New Regulation 4A applies to the replacement and the renovation of thermal elements in existing buildings and requires that when they are worked on they are brought up to the current standards. This will apply to work on walls, glazing and facades.

New Regulation 4B applies where a building previously exempt from the provisions of Part L, for any reason, changes its status. Any work connected with the change of status shall be carried out to ensure that the building complies with the applicable requirements of Part L.

New regulations for the energy performance of buildings

A new Part VA of the Regulations has been introduced. This implements Articles 3 to 6 of the EPBD and comprises new Regulations 17A to E.

Regulation 17A implements the requirement in Article 3 of the EPBD for an approved methodology for the calculation of the energy performance of buildings. The methodology currently consists of 2 approved calculation tools along with a procedure for approving alternative simulation software for use in more complex buildings. To date the Government?s Standard Assessment Procedure SAP2005 (for small dwellings), and the Simplified Building Energy Model (SBEM) (for large dwellings and most non domestic buildings) are approved.

Regulation 17B implements Article 4 of the EPBD so that minimum energy performance standards are set using the methodology approved by Regulation 17A.

Regulation 17C implements Article 5 of the EPBD. It requires that when a new building is erected it is required to comply with the energy performance standards set by Regulation 17B.

Regulation 17D implements the requirement in Article 6 of the EPBD that when an existing building over 1000 m2 undergoes extension, initial provision of or an increase in capacity of fixed building services, the energy performance of the whole building must be upgraded.

Regulation 17E defines "building" for the purposes of Part VA to mean the whole building or parts of it that have been designed or altered to be used separately.

New regulations for testing and commissioning

Regulation 20B requires that buildings are pressure tested by an approved method and achieve improved levels of compliance with energy performance standards. The Regulation also details requirements for the reporting of the results and indicates to Building Control that "certificates [from] a person who is registered by the British Institute of Non-Destructive Testing in respect of pressure testing for the air tightness of buildings" may be accepted as evidence that the requirements of this regulation have been satisfied. However, this does not ensure that the building complies with the energy performance requirements, only that the person carrying out the test is suitably qualified to do so.

Regulation 20C requires fixed building services to be commissioned and for the local authority to be given a notice confirming this, according to an approved procedure.

Regulation 20D requires notice to be given to the local authority on CO_2 emission rate calculations and compliance with Regulation 17C. Regulation 20D authorises local authorities to accept the results as evidence that Regulation 17C has been met, if the building has been constructed in accordance with an accompanying list of certificates issued by persons registered with FAERO Limited or BRE Certification Limited.

There are also a number of other amendments to the previous regulations, which need to be noted.

Part L

As was expected, the new Part L is now supported by four approved documents:

L1A (New dwellings)
L1B (Existing dwellings)
L2A (New buildings other than dwellings)
L2B (Existing buildings other than dwellings)

AD L2A: New buildings other than dwellings

As has been very widely flagged since the consultation on Part l in 2004, the elemental method of compliance is no longer applicable. The EPBD requires a whole building approach. As a result, compliance with the energy efficiency requirements is now demonstrated by a new five step procedure.

(i) Meeting a CO_2 emissions target as a requirement;
(ii) Demonstrating that key design parameters are within defined limits, including insulation standards and the efficiency of any fixed building services;
(iii) Demonstrating that the building will not be subject to excessive solar gains in summer;

(iv) Demonstrating that quality of construction, pressure testing and commissioning of the fixed building services are such that the building achieves the target CO_2 emissions.
(v) Providing sufficient information to enable the occupier to operate the building efficiently.

AD L2A also contains guidance on the treatment of shell and core development by Building Control, and a section on defined terms is included to assist in understanding the AD. A compliance checklist is included, where key information about the building can be recorded to demonstrate that compliance has been achieved. This checklist identifies the data source and allows the credentials of the person providing the evidence to be recorded.

AD L2B: Existing buildings other than dwellings
The main changes in the guidance for existing buildings are a general improvement in the performance standards for most thermal elements, controlled fittings and fixed building services when these are provided for the first time or replaced. The main exception to this is in relation to the performance standards for replacement windows, roof windows and rooflights, where the 2002 standard still applies.

Further guidance is given on construction of extensions, particularly in respect of approaches that offer more design flexibility than a prescribed set of U-values and opening areas. Large extensions may be treated as new buildings under AD L2A.

To support the new requirement relating to thermal elements (Regulation 4A), guidance is given on provision and renovation of thermal elements. It indicates those situations where a thermal element should be upgraded, such as when re-cladding a wall, as part of a material change of use, or in certain situations when carrying out a material alteration. An appendix identifies cost effective upgrade opportunities, and a list of defined terms is included.

To support the new Regulation 17D guidance is given on the consequential improvements that are required when a building over 1,000 m2 is extended, or where a fixed building service is installed for the first time, or the installed capacity of an existing fixed building service is increased.

3 Examples of Best Practice: Technology

3.1 Photovoltaics

County Hall, Llandrindod Wells, Powys

A photovoltaic (PV) array of 10.08 kWp was installed on a largely unshaded, south-facing roof on the existing headquarters building of the municipality. The electrical demands of a modern office fit well with the outputs from a PV array and the public building provides a good opportunity for demonstration and promotion of the technology. A digital display in the foyer of the building assists with the public understanding of the potential of PV.

Powys County Council, St John's Offices, Llandrindod Wells, LD1 5ES, Wales, UK Andrew.Billinglsley@powys.gov.uk or Andy@swea.co.uk (Andy Bull has now left PCC)

3.2 Solar Thermal

Plas Crug solar water heating retro-fit

Prior to the solar retrofit project, the pool and leisure centre were heated by natural gas boilers, and electricity was used for pumping, ventilation and lighting. Total energy costs were somewhere between £45,000 and £50,000 annum, making it the Council's single biggest energy user.

Typically, solar collectors work best when tilted at a 35° angle, facing south. However, swimming pool absorbers can be installed on horizontal surfaces with only small loss in efficiency, and the leisure centre roof, offering a flat, shade free area of 600m2, provided an ideal surface for the installation of such a system.

Solar absorber units, supplied by Aquasolar, were installed on 45 per cent of the roof surface, providing an absorber area of 270m², while leaving a generous portion of the roof uncovered to allow for access. The capital costs for the collector system were approximately £25,000.
Collection of useful energy on the leisure centre roof totalled 17,000 kWh during the 4 months from June to September 1999.

3.3 Biomass combustion

Llanwddyn Woodfuel Project

Llanwddyn is an isolated village at the foot of Lake Vyrnwy in North Powys. The main village consists of about 50 or so houses – 37 of which are in the Abertridwr Estate

A woodfuel boiler and district heating main has been installed to service a school. community centre and 32 surrounding houses The boiler is rated at 500 kW output for fuel at 45% moisture - 630 kW for fuel at 20% moisture. Woodchip for the system is sourced from the surrounding forestry.

The project provides significant opportunities for direct economic benefits to the local economy.

- The partnership has placed the construction contract with a local consortium, using local labour and skills.
- The administration and, fuel and O & M contracts have been placed locally.
- All revenue from the project will be retained within the local economy
- The woodfuel boiler will provide sustainable and affordable heating
- Provision of a demonstration project and educational resource for the development of further woodfuel heating projects

Dulas Wood Energy, Unit 1 Dyfi Eco Park, Machynlleth, Powys, SY20 8AX
Duncan.kerridge@dulas.org.uk

Llandrindod High School and Leisure Centre

The High School and Leisure Centre (with Swimming pool) share the same campus on the edge of Llandrindod Wells. The oil-fired central heating boilers at the High School were in need of repair and the opportunity was take to replace them with a woodchip system that would serve the school and leisure centre. Grant assistance was secured from the Wood Energy Business Scheme, administered by Forestry Commission Wales.

The fuel supply contract was secured with a small local sawmill utilising timber that might otherwise have been wasted and the chip is delivered in containers that are simply slid into place following the removal of the empty container. The inclusion of a swimming pool within the heat load is of tremendous advantage in that it provides year-round demand.

The biomass installation was accompanied by a whole range of other energy saving modifications to systems within the complex.

Powys County Council, County Hall, Llandrindod Wells LD1 5LG,
Andrew.Billingsley@powys.gov.uk

3.4 Anaerobic Digestion

South Shropshire Bio-waste Digester (The Ludlow project)

Greenfinch Ltd

The South Shropshire Bio-waste Digester was a joint demonstration project between South Shropshire District Council and AD specialists Greenfinch Ltd Early difficulties that involved soil and stones entering the digesters have been resolved by modifying the District Council's collection methodology to exclude garden waste (in wheelie bins).

The digester is fed via kerbside collection of source-segregated household kitchen waste from households in the Ludlow area of South Shropshire, and currently similar waste imported from Newtown (Powys) and Somerset. It also is currently taking in grass cuttings from a Housing Association and some commercial waste It generates renewable electricity & surplus heat. The end process digestate is used as biofertiliser for local agriculture.

- **Input – Biowaste: 4,500 tpa.**
- **Output – Solid Biofertiliser: 1,000 tpa.**
- **Output – Liquid Biofertiliser: 3,000 tpa.**
- **Output – Biogas: 630,000 cubic metres pa.**
- **Electricity – 120 kW continuous output**

3.5 Small Wind Clusters

Bro Dyfi Community Turbine

Bro Dyfi Community Renewables is a community-wind turbine co-operative, owning a 75kW wind turbine, which produces electricity that is sold to the Centre for Alternative Technology (CAT) under a power purchase agreement.

CAT purchases all the power generated (around 163 MWh each year), using about 20% of it to supply its site with electricity and hot water and exporting the rest to the local grid. The turbine is supplying the equivalent of 45 houses with electricity.

The electricity generated will slow climate change by preventing the release into the atmosphere of 70 tonnes of carbon dioxide every year.

The co-operative also uses 30% of profit generated to promote energy efficiency and intends to save an additional 345 tonnes of carbon annually by reducing local energy use.

The project provides significant opportunities for direct economic benefits to the Dyfi Valley economy.

- The work undertaken in developing the project has been carried out by members of the local community.
- The partnership has placed the construction contract with a local consortium, using local labour and skills.
- Many of the people involved in the project construction, planning, finance and legal matters and the landowner agreed for some or all of their work to be paid in shares in the project.
- The project has invested about £55,000 into the local economy (70% of the total project cost).
- The administration and O & M contracts have been placed locally.
- All revenue from the project will be retained within the local economy
- The wind turbine provides renewable electricity to the Centre for Alternative Technology, where the power demand from visitors' activities has outstripped the CAT's own internal supplies
- Provision of an additional demonstration turbine and educational resource for the public activities of Centre for Alternative Technology
- Provision of an information display detailing the wind turbine project and its output
- The project is a community-owned scheme where each shareholder has one voting share irrespective of the amount of investment, thus encouraging local responsibility
- Approximately 30% of the annual project profit will go into a community energy fund for energy efficiency measures

3.6 Energy Efficiency in Buildings other than dwellings

Dyfi Eco Park

Dulas is based in Unit 1 at Dyfi Eco Park in Machynlleth. This building is one of the most energy efficient office and factory units in Britain. Dyfi Eco Park itself is a small, rural, light industry park developed by the Welsh Development Agency on a reclaimed site. Buildings on the park are based around the principles of green/sustainable design and low-energy construction. The units have been built from locally-sourced materials with high energy efficiency. The award winning development represents an exemplar in energy and environmental performance.

Unit 1 was the first of a series of one and two storey light industrial and office units at this brownfield site in West Wales. Built to an environmentally sustainable brief, the unit and the park itself all achieve a maximum as assessed under B.R.E.E.A.M 5/93.

The total energy use/ CO_2 emissions are only 25% of B.R.E.C.S.U Best Practice targets.
Healthy and sustainable materials and finishes were used throughout, and the results of a two year objective/subject assessment by the University of East London confirmed in practice the initially predicted low running costs. Construction costs for Unit 1, a fully fitted two storey office and small assembly area, were only 25% above the W.D.A's allowance for a typical single storey industrial unit.

In 1997, Unit 1 was the first recipient of the Association for Environment Conscious Building's (ACEB) 'Sustainable Projects Endorsement Certificate'. The unit occupied by Dulas incorporates a number of energy saving features. In particular, it was constructed with a glazed south-east facing solar gable to optimize passive solar gain. Complemented by high levels of insulation, through draught-proofing and natural ventilation, this meets a high proportion of the building's heating requirements.

In addition to these features, Dulas HQ employs a photovoltaic bike shed to provide a portion of it's energy needs. The 1.44kWp installation is an integrated design providing both weather protection and solar energy, and is an example of an early G77 grid-linked system.

4 Examples of Best Practice: Policy

Powys County Council Draft UDP – Energy Developments

The Powys draft UDP incorporates a chapter dedicated to energy matters. Whilst energy generation has not been a subject that has traditionally appeared in development plans, the advent of on-shore wind farm developments has raised the profile of energy matters and most modern plans contain policies on wind farms or renewable energy projects in general. The Powys approach that separates the RE technologies and provides appropriate policy statements for each, is considered to be good practice. There is, after-all, very little similarity in planning terms between a wind turbine and a hydro installation, or a PV array and a wood pellet boiler.

Whilst developments of over 50 MW in capacity are currently outside of the town and country planning system, planning authorities are entitled to input opinion and, for instance, likely to become very involved with the drafting of planning style conditions. The opinion of the local planning authority is currently the key determinant as to whether a public inquiry is held. The Powys approach that addresses all energy issues rather than simply RE is seen as being good practice. This, of course, in the case of the Vale of Glamorgan, includes very large electrical generation capacity that exists (Aberthaw) and is mooted (Severn Barrage).

Powys County Council Draft UDP – approach to incorporation of energy matters into (non energy) developments

> **POLICY GP3 – DESIGN AND ENERGY CONSERVATION**
> ALL PROPOSALS FOR DEVELOPMENT SHOULD MAKE A POSITIVE CONTRIBUTION TO THEIR LOCAL ENVIRONMENT AND COMMUNITY THROUGH IMAGINATIVE AND GOOD QUALITY DESIGN, LAYOUT, MATERIALS AND LANDSCAPING IN ACCORDANCE WITH THE POLICIES OF THE UDP. A DESIGN STATEMENT SHALL ACCOMPANY ALL DETAILED APPLICATIONS AND WILL DESCRIBE THE ACTIONS TAKEN TO DESIGN AND ADAPT THE DEVELOPMENT TO FIT ITS LOCATION. WHEREVER PRACTICABLE, DEVELOPMENTS SHALL BE DESIGNED TO REDUCE ENERGY CONSUMPTION AND MAXIMISE ENERGY CONSERVATION THROUGH THE USE OF APPROPRIATE MATERIALS, DESIGN, LAYOUT AND ORIENTATION.
>
> Powys County Council UDP 2001-2016 Deposit Draft, October 2004

It is this generic policy that is the foundation to the approach adopted by Powys County Council in seeking to achieve a future building stock that has a far lower “carbon footprint” than that which has been achieved to date. It is this “design statement” approach that would appear to be the preferred option for the Welsh Assembly Government (draft MIPPS on Climate Change).

The County Council has recently published an Interim Development Control Guidance note (to be converted to SPG upon the adoption of the UDP) that fleshes out the generic policy and builds upon the policies of the Energy chapter of the UDP. The IDCG reiterates the need for Design Statements and gives firm guidance as to the renewable energy technologies that should be investigated in each of 6 categories of development types. In the case of solar water heating (solar thermal) and passive solar design there is a requirement for its incorporation in all developments, unless there are very sound reasons to the contrary.

This approach does not follow the English model that is based upon the pioneering work of the London Borough of Merton (see following case study). It would be speculation as to whether this is deliberate or simply a matter of timing but some may well argue that the Powys/Design statement approach may prove to be more effective. The summary matrix from the draft ICDG is reproduced below:-

7 Matrix of appropriate energy efficient measures against development types

7.1 The matrix below must be used by those preparing planning applications; it will be used as a checklist by planning officers in scrutinising development proposals and design statements.

R Required, compulsory where practicable – Planning applications not incorporating these technologies will be refused unless the non-incorporation is fully justified in the design statement.

I Investigate, these measures should be included where investigations show that such measures are practicable, fit with the site context and are appropriate to the integrated design solution.

N Not considered necessary for an application to investigate or include this measure.

Development type

A Essential Rural Workers dwellings in the open countryside, rural building conversions outside development limits, isolated building redevelopment, affordable housing for local needs in rural settlements

B Small sites / redevelopments of <5 inside development limits and rural exception schemes of <5

C Allocated / windfall / redevelopment and exceptions sites of 5 or more dwellings
D Householder applications

E Non residential buildings development / redevelopment <1000sqm

F Buildings >1000sqm

Measure	**Development Type**					
	A	**B**	**C**	**D**	**E**	**F**
Site layout and orientation, passive solar design & water management. (Water management considered in separate IDCG)	**R**	**R**	**R**	**R**	**R**	**R**
Solar thermal systems (Solar Hot Water)	**R**	**R**	**R**	**R**	**R**	**R**
Green roofs	**I**	**I**	**I**	**I**	**I**	**I**
Community heating / heat and power	**N**	**N**	**I**	**N**	**I**	**I**
Biomass fuel	**I**	**I**	**I**	**I**	**I**	**I**
Solar electric (Electricity)	**I**	**I**	**I**	**I**	**I**	**I**
Micro hydro power	**I**	**I**	**I**	**I**	**I**	**I**
Heat pump technology	**I**	**I**	**I**	**I**	**I**	**I**
Micro Combined heat and power	**I**	**I**	**I**	**N**	**I**	**I**
Small scale wind energy	**I**	**I**	**I**	**I**	**I**	**I**

London Borough of Merton (and others that have followed suit)

The planning profession has recently become familiar with the term “the Merton Rule” which relates to onsite renewable provision within new larger developments. The origin of the rule is the UDP for the London Borough of Merton that was adopted in October 2003.

“The Council will encourage the energy efficient design of buildings and their layout and orientation on site. All new non residential developments above a threshold of 1,000 sq m will be expected to incorporate renewable energy production equipment to provide at least 10% of predicted energy requirements”

The policy has been taken in one form or another by at least 80 Planning Authorities, mostly in England with many including larger residential developments and some aiming higher than 10%. Planning Policy Statement 22 was issued as central government policy advice for England in late 2004. It included the statement “Local planning Authorities may include policies in local development documents that require a percentage of the energy to be used in new residential, commercial or industrial developments to come from on-site renewable energy developments.”

Merton Council has produced a very useful summary page on its web site. See www.merton.gov.uk/living/planning/planningpolicy/10percentpolicy.htm

5 Further information

5.1 Energy Efficiency – Dwellings

According to the Building Research Establishment dwellings account for 29% of total UK energy consumption and generate approximately 38 million tonnes of carbon emissions per year (Building Research Establishment, 2000)

Energy Efficiency Best Practice in Housing (EEBPH) case studies and guidance can be found on the website of the Energy Saving Trust www.est.org.uk/bestpractice/ . The site aims to provide a source of tools and training for all stakeholders involved in the design, construction and refurbishment of domestic housing in the UK. In addition the EEBPH programme has established energy efficiency standards for domestic housing which exceed the requirements of current building regulations. These standards provide a valuable resource for local authorities, housing associations and developers who may wish to specify highly energy efficient dwellings.

An introduction to the EEBPH programme can be found at
www.est.org.uk/bestpractice/publications/detail.jsp?pk=1395
An introductory information leaflet 'Energy efficiency standards - for new and existing dwellings (GIL 72)' can be found at www.est.org.uk/bestpractice/publications/detail.jsp?pk=38

5.2 Buildings other than dwellings

Energy Efficiency Best Practice guidance documents are also available for a wide range of buildings and applications. An online library of detailed energy efficiency advice for non-residential buildings can be found on the website of the Carbon Trust www.thecarbontrust.co.uk/energy/pages/publication. Specific guidance is available by sector and by building type. It is likely that a best practice guide will exist for the large majority of proposed developments.

BREEAM – The Building Research Establishment's (BRE) Environmental Assessment Method
BREEAM, including its residential equivalent EcoHomes, is a voluntary scheme that rewards those developers of commercial and residential property who improve environmental performance through good design. BREEAM goes beyond Building Regulation requirements in order to encourage best practice and includes planning control issues such as building location, transport issues, ecology, health and building design. BREEAM results in the award of a certificate and detailed report and gives marketing advantages through a credible label promising energy efficiency, lower running costs and a healthy environment.
BREEAM is a useful benchmark environmental assessment that could be used in support of planning applications.

www.bre.co.uk

5.3 Passive Solar Design

- DETR Energy Efficiency Best Practice Programme General Information Report 27 Passive Solar Estate Layout
- Good Practice Guide 73 Energy Efficient House Design – Exploiting Solar Energy Littlefair et al. Environmental Site Layout Planning 2000

- Planning for Passive Solar Design (ADH010). This guide discusses the techniques and principles of passive solar design (PSD) as they apply to domestic buildings and other building types. Available from www.thecarbontrust.co.uk/energy/pages/publication

5.4 Renewables

- Draft 'Guide to the Integration of Renewables into Buildings' produced for the DTI and BRE,
- 'Integrating renewable energy into new developments: Toolkit for planners, developers and consultants' Faber Maunsell on behalf of London Renewables, September 2004 www.london.gov.uk/mayor/environment/energy/london_renew.jsp
- Renewable Energy Sources for Homes in Rural Environments ISBN:CE70 30 March 2004 www.est.org.uk/bestpractice/publications/detail.jsp?pk=646
- Renewable Energy Sources for Homes in Urban Environments www.est.org.uk/bestpractice/publications/detail.jsp?pk=645
- Renewable Energy in Housing: Case Studies Four Studies New Build Housing www.est.org.uk/bestpractice/publications/detail.jsp?pk=459

6 Renewables Statement of Need

The following 'Statement of Need' is set out as Annexe D of the UK Government report on the Energy Review: "The Energy Challenge":

We remain committed to the important role renewables have to play in helping the UK meet its energy policy goals. In this publication we are reiterating previous commitments we have made, not least in the 2003 Energy White Paper and Planning Policy Statement 22 on renewable energy (PPS22), on the importance of renewable generation and the supporting infrastructure. We intend this to reconfirm the UK Government policy context for planning and consent decisions on renewable generation projects. As highlighted in the 2006 Energy Review report[1], the UK faces difficult challenges in meeting its energy policy goals. Renewable energy as a source of low-carbon, indigenous electricity generation is central to reducing emissions and maintaining the reliability of our energy supplies at a time when our indigenous fossil fuels are declining more rapidly than expected. A regulatory environment that enables the development of appropriately sited renewable projects, and allows the UK to realise its extensive renewable resources, is vital if we are to make real progress towards our challenging goals.

New renewable projects may not always appear to convey any particular local benefit, but they provide crucial national benefits. Individual renewable projects are part of a growing proportion of low-carbon generation that provides benefits shared by all communities both through reduced emissions and more diverse supplies of energy, which helps the reliability of our supplies. This factor is a material consideration to which all participants in the planning system should give significant weight when considering renewable proposals. These wider benefits are not always immediately visible to the specific locality in which the project is sited. However, the benefits to society and the wider economy as a whole are significant and this must be reflected in the weight given to these considerations by decision makers in reaching their decisions.

If we are to maintain a rigorous planning system that does not disincentivise investment in renewable generation, it must also enable decisions to be taken in reasonable time. Decision makers should ensure that planning applications for renewable energy developments are dealt with expeditiously while addressing the relevant issues.

PPS22 makes clear that regional planning bodies and local planning authorities should not make assumptions about the technical and commercial feasibility of renewable energy projects, and that possible locations for renewable energy development must not be ruled out as unsuitable in advance of full consideration of the application and its likely impacts. Planning policies, in Regional Spatial Strategies and Local Development Documents, should not place unjustified restrictions on renewable developments; they must be flexible to cope with technological and other change over time. However, there will be certain areas with more readily available access to renewable resources that will be more attractive for developers, for example where windspeeds are greatest. As such, as we increase the level of renewables, in line with our energy policy goals, there will be occasions when proposals are received for renewables projects that are located closely enough together potentially to have cumulative impacts. Decision makers will have to work closely together with statutory advisers, such as English Nature, to consider the handling of assessments of the cumulative impact of such proposed developments. Cumulative effects, like the impacts of individual projects, will not however necessarily be unacceptable or incapable of reduction through mitigation measures.

The Renewable Statement of Need was further developed and emphasised within the 2007 Energy White Paper 'Meeting the Energy Challenge'. The statement set out below accompanied proposals for planning reforms concerning renewable generation:

BOX 5.3.3 RENEWABLES STATEMENT OF NEED

We remain committed to the important role renewables has to play in helping the UK meet its energy policy goals. In this publication we are reiterating previous commitments we have made, not least in the 2003 Energy White Paper and Planning Policy Statement 22 on renewable energy (PPS22), on the importance of renewable generation and the supporting infrastructure. We intend this to reconfirm the UK Government policy context for planning and consent decisions on renewable generation projects.

As highlighted in the July 2006 *Energy Review Report* [150], the UK faces difficult challenges in meeting its energy policy goals. Renewable energy as a source of low carbon, indigenous electricity generation is central to reducing emissions and maintaining the reliability of our energy supplies at a time when our indigenous reserves of fossil fuels are declining more rapidly than expected. A regulatory environment that enables the development of appropriately sited renewable projects, and allows the UK to realise its extensive renewable resources, is vital if we are to make real progress towards our challenging goals.

New renewable projects may not always appear to convey any particular local benefit, but they provide crucial national benefits. Individual renewable projects are part of a growing proportion of low carbon generation that provides benefits shared by all communities both through reduced emissions and more diverse supplies of energy, which helps the reliability of our supplies. This factor is a material consideration to which all participants in the planning system should give significant weight when considering renewable proposals. These wider benefits are not always

BOX 5.3.3 CONTINUED

immediately visible to the specific locality in which the project is sited. However, the benefits to society and the wider economy as a whole are significant and this must be reflected in the weight given to these considerations by decision makers in reaching their decisions.

If we are to maintain a rigorous planning system that does not disincentivise investment in renewable generation, it must also enable decisions to be taken in reasonable time. Decision makers should ensure that planning applications for renewable energy developments are dealt with expeditiously while addressing the relevant issues.

7 Glossary of Terms

Acronym	Organisation
Biofuels	Liquid fuels and blending components produced from biomass (plant) feedstocks, used primarily for transportation
BRE	Building Research Establishment.
BREEAM	Building Research Establishment Environmental Assessment Method – a way of assessing the environmental performance of buildings.
Carbon Footprint	A building's carbon footprint is the measure of the carbon emissions resulting from the use of that building, measured in units of carbon dioxide
Carbon Neutral	When applied to a building it means that the running of such a building is not responsible for any net carbon emissions. This is usually achieved through a combination of energy efficiency and the use of renewable energy but can also include offsetting the carbon emissions for example through tree planting offset schemes (see also zero carbon).
CCHP	Combined Cooling, Heat and Power
CCW	Countryside Council for Wales
CHP	Combined Heat and Power: the simultaneous generation of usable heat and electrical power. CHP improves energy efficiency by using the waste heat from power generation and reducing the electrical transmission losses from the grid
CSH	Code for Sustainable Homes
CT	Carbon Trust
DEFRA	Department Environment, Food and Rural Affairs
District Heating	Heating provided from a local heating or energy centre via a network of pipes to serve a number of buildings in the locality. The size of the network can vary but in practice will usually be limited to a medium sized town or districts of a large city
DTI	Department of Trade and Industry, replaced in 2007 by Department for Business Enterprise and Regulatory Reform (BERR)
EAW	Environment Agency Wales
ESCo	Energy Services Company: A company that supplies energy services to customers. Such services can include power and fuel supply, energy efficiency measures and energy audits.
EST	Energy Savings Trust
FCW	Forestry Commission Wales
LCBP	Low Carbon Buildings Program - public grant programme for small scale renewables
Microgeneration	is defined as 'the production of heat and/or electricity on a small-scale from a low carbon source' the original DTI definition classified microgeneration as below 50kW electrical and/or 45kW thermal
NOABL	Numerical Objective Analysis of Boundary Layer - A UK generic wind speed model database
OFGEM	Office of Gas and Electricity Markets - UK Regulator
PPW	Planning Policy Wales
RDA	Regional Development Agency
ROC	Renewable Energy Certificates
SA	Sustainability Appraisal
SAP	Standard Assessment Procedure
SPG	Supplementary Planning Guidance
SSA	Strategic Search Area - Areas identified as having potential for large scale wind development within Technical Advice Note 8
SWISH	Solar Water Heating in Social Housing - Welsh grant scheme (now closed)
TAN	Technical Advice Note
TER	Target Emissions Rating
UDP	Unitary Development Plan
WAG	Welsh Assembly Government
Zero carbon	A system (eg. building) whose net carbon emissions from energy use over a year would

be equivalent to zero

Basic units of Energy

Unit	Abbreviation	Value
Watt	W	equivalent to one joule per second
Kilowatt	kW	A Thousand Watts
Megawatt	MW	A thousand Kilowatts
Gigawatt	GW	A thousand Megawatts
Terrawatt	TW	A thousand Gigawatts

Units over time (power consumption)

Unit	Abbreviation	Value
Kilowatt hour	kWh	Energy consumed by a Thousand Watt load over one hour
Megawatt hour	MWh	Energy consumed by a Thousand Kilowatt load over one hour
Gigawatt hour	GWh	Energy consumed by a thousand Megawatt load over one hour
Terrawatt hour	TWh	Energy consumed by a thousand Gigawatt load over one hour