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Research: Planning for Renewable and Low Carbon Energy - A Toolkit for Planners Recommendations Report

Research Report to the
Welsh Assembly Government
July 2010

Wales Planning Policy Development Programme

This research was prepared for the Welsh Assembly Government by AECOM. This report is accompanied by two other documents the Practice Guidance 'Planning for Renewable and Low Carbon Energy - A Toolkit for Planners' and the 'Pilot Study - Pembrokeshire County Council Renewable Energy Assessment'.

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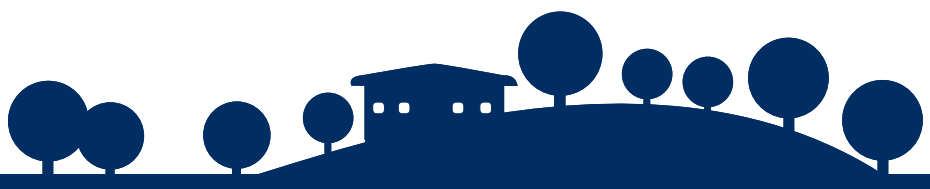

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Executive Summary

Executive Summary

The One Wales document sets out the Welsh Assembly's commitment to tackling climate change which include achieving annual carbon reduction-equivalent emissions reductions of 3% per year by 2011 in areas of devolved competence. The Assembly Government resolves that all will play the fullest part in reducing CO_2 emissions and is committed to developing a comprehensive energy strategy and a renewable energy route map to ensure understanding of what "playing a full part" will mean.

The "Renewable Energy: A Toolkit for Planners" project was commissioned by the Assembly Government in November 2008. Supported by a steering group comprised of the Assembly Government and the Energy Saving Trust, the toolkit was developed by AECOM with Pembrokeshire County Council selected for a pilot study. Environment Agency Wales and Countryside Council for Wales were key providers of data.

Considerable responsibility for delivery of a low carbon Wales rests with the various departments within local authorities, with key roles in planning, waste management, land-ownership and energy procurement. The impending review of TAN 8, revising upwards the targets for renewable energy drawn from a range of sources, will outline the potential of each of the sources supported by this toolkit.

Research associated with the development of the toolkit was divided into three components: the toolkit; a Renewable Energy Assessment for Pembrokeshire County Council [the output of the application of the toolkit to the Pembrokeshire County Council area and circumstances]; and a Recommendations Report to the Assembly Government. Although each report can be read as a stand-alone piece of research, users will find it useful to read the reports in conjunction with each other.

The challenge of developing the toolkit was to develop methods for assembling a robust evidence base whilst minimising very technical exercises and ensuring that sources of data were readily available to all local authorities in Wales. This Recommendations Report outlines the method and processes utilised for the exercise. The report also identifies which of the elements worked well and others which could be improved upon and suggests appropriate improvements.

Some of the elements commented upon in the report include the sources of data utilised, and the availability and quality of data. Other notable areas include the absence of guidance to local authorities on the weight that should be given to each local authority Renewable Energy Assessment when developing LDP policies.

Renewable Energy Assessments will vary between local authorities depending upon the nature and priorities given by councils and communities to various policy objectives. The toolkit is not a prescriptive document but illustrative, showing examples of some of the exercises that might be undertaken in order to compile a robust evidence base to support a selection of potential policy objectives.

Whilst predominantly a "toolkit for planners", it is strongly recommended that the toolkit is employed by local authorities and other public sector bodies to develop and align corporate estate, property and energy strategies with the findings of the Renewable Energy

Assessments. Use of the toolkit is not therefore restricted to the LDP process but can be employed during development of, for instance, Regional Waste Strategies.

The involvement of professionals from a range of disciplines is encouraged in the use of the toolkit. Different sections will require greater or lesser input from planners, energy managers / technicians, waste management officers, and so on. In order to avoid unnecessary time and resources, and given the nature of some of the activities included in the toolkit, there is considerable potential for national provision of information or, at the very least, cooperation between local authorities and other public sector bodies in completing various exercises [e.g. wind and biomass resource mapping].

Introduction

1 Introduction

1.1 Background

This Recommendations report forms part of a suite of three documents commissioned by the Welsh Assembly Government in November 2008. The primary document was the "Renewable Energy: A Toolkit for Planners" ("the Toolkit") document which provides comprehensive guidance to local authorities on how to prepare a Renewable Energy Assessment and the type of policies the Assessment would support. Pembrokeshire County Council piloted the Toolkit and it is their Renewable Energy Assessment (or evidence base) which constitutes the second of the suite of documents. The evidence base for Pembrokeshire can be used as a case study for demonstrating the outputs from the toolkit. This report and the two reports mentioned above can be downloaded from http://wales.gov.uk/topics/planning/planningresearch/

1.2 Research aims

The aims of the research, as set out in the original brief, were to:

- Provide a useable framework methodology for local planning authorities to help with the production of local renewable energy assessments which have clear linkages to renewable energy technologies, energy efficiency, energy conservation and low carbon, in order for them to write meaningful policies in their Local Development Plans;
- Provide local planning authorities and others with an understanding of the potential of various forms of renewable energy (including micro generation), energy efficiency and conservation measures and allow them to determine the optimum mix for their area.
- The methodology should give local planning authorities the ability to assess the potential of existing development to incorporate renewable energy, energy efficiency, energy conservation and low carbon initiatives which are appropriate.
- It must also provide a mechanism which will provide local planning authorities with the ability to consider the potential of new developments/sites contained in Local Development Plans to provide renewable energy, energy efficiency, energy conservation and low carbon initiatives as appropriate.
- Pilot the proposed framework methodology for a local authority area using real data/information as an example for others to imitate
- Provide advice on how such assessments can be kept up to date

The project team undertook the research project with the aim of ensuring the toolkit was applicable to all local authorities within Wales, though detailed work was completed with Pembrokeshire County Council, selected as a pilot study.

1.3 Aim of this report

This report aims to set out the following:

- How the initial work, in terms of the policy and literature review and the steering group discussions informed and shaped the toolkit

- The key learning points from the pilot study, in terms of which aspects of the toolkit method worked well and where improvements could be made
- The feedback from the participants in the study, in terms of the effectiveness of the methods, the format and content of the toolkit and their views as to how much of the evidence base could be prepared in-house
- How the toolkit was refined in the light of the above
- Recommendations to the Assembly Government for actions and further work required to support the effective application of the toolkit

1.4 Research team

The team was led by AECOM with support from the project steering group consisting of representatives from: members of the planning division of the Welsh Assembly Government, the Energy Saving Trust, the Design Commission for Wales and a local authority planning officer. We also acknowledge the valuable input provided by the Pembrokeshire County Council officers who participated in this research.

1.5 Report structure

Chapter two of this report sets out the methodology used to conduct the research and describes the stakeholder engagement that was carried out. Chapter three sets out the key findings of the toolkit research, particularly the outcomes from the literature and policy review (which are appended). Chapter four sets out the outcomes of the pilot study including lessons learned and the key issues. Chapter five contains conclusions and recommendations.

1.6 List of Abbreviations

See the toolkit report which can be downloaded from http://wales.gov.uk/topics/planning/planningresearch/

Research Method

2 Research Method

2.1 Introduction

The approach to the research involved seven phases with a number of elements necessitating stakeholder engagement. The phases were as follows:

1. Inception meeting and policy review
2. Literature review
3. Develop framework method
4. Selection of pilot local authority
5. Developing the toolkit
6. Stakeholder workshop
7. Dissemination event

The aim was that as the research progressed, specific issues could be identified and explored in more detail with the steering group and relevant officers for the local authority. Each of the phases is discussed in more detail below.

2.2 Inception Meeting & Policy Review

2.2.1 Inception meeting

The inception meeting was used for clarification of the brief and to discuss AECOM's proposed process for undertaking the research.

The following issues were clarified during the inception meeting and early stage discussion:

- The need for input from Planning Inspectorate (PI), renewable energy industry and development viewpoints on both the method and evidence base for the method was agreed. The Assembly Government confirmed the evidence base to be crucial in order to be able to justify policy amendment
- AECOM agreed to make available its data (on costs and benefits of LZC energy options) should the pilot local authority wish to undertake development appraisals needed to ascertain viability of targets for strategic sites
- In relation to Section 106. AECOM suggested a memo of understanding be issued to local authorities to prioritise low carbon alongside affordable housing to prevent the former being sacrificed for the latter
- It was agreed that the study should include energy from waste and heat from renewable energy
- In relation to target setting, it was agreed that for strategic sites for renewable energy and for area wide targets MW (electrical and thermal) is the preferred measure. For strategic development sites a target would be set for CO_2 reduction which could be translated into indicative MW of installed capacity
- Findings of the research should be incorporated into Regional Waste Plans that are prepared at a sub-regional level by groupings of LA's.
- The Assembly Government confirmed that particular emphasis should be given in the study to under 10MW installations attached to community facilities.
- It was confirmed that the specification for the method was to include:
  - Evidence base for selection of strategic sites

    - Selection of strategic sites for merchant renewable energy installations
    - Evidence base for new developments for setting renewable energy targets
    - Help to aid LA develop area wide targets
- A key area to focus on will be to ensure an approach that enables any resource assessment/ mapping exercise to translate into policy making and the development and adoption of targets.
- The inclusion of energy efficiency was discussed. AECOM confirmed its interpretation that:
    - In setting targets, impacts of LA energy efficiency agendas would be taken into consideration
    - The impact of Building Regulations on demand would be considered
- It was agreed that toolkit should consider in-house preparation of evidence base against use of consultants but should still: achieve increased LA awareness of the issues; enable LAs to write appropriate specifications; allow some modules to be out-sourced to consultants via appropriate briefs
- Testing with pilot local authority should provide the forum for ascertaining which aspects of the assessments LAs could prepare in-house
- Use of a toolkit and its implementation was discussed, including consideration of regional working raised in the zero carbon barriers research (see below). The need for flexibility within the toolkit was emphasised. The toolkit should contain pointers as to the direction in which LPA officers should go.
- All acknowledged the difficulty with setting area wide targets which would enable monitoring and reporting, particularly in relation to lack of LA control over meeting of targets.
- The work being carried on Low Carbon Regions, as part of the Wales spatial plan, was mentioned and may provide some overlaps with the research.

2.2.2 Policy review

The policy review built on the policy review produced by Baker Associates, partners of AECOM for the 'Barriers to Low and Zero Carbon Development' research project which can be downloaded from http://wales.gov.uk/topics/planning/planningresearch/ . The review contains a consideration of a range of policy and guidance that is relevant to the development of a renewable energy toolkit for planners in Wales.

The purpose of the review was to identify those elements of policy that related directly to this project to feed into the project team's understanding of the current situation in Wales. The review focused predominantly on Welsh Assembly Government policy but also incorporated information provided by bodies such as local authorities, consultant's reports, and work undertaken by the Environment Agency Wales (EAW), Countryside Council for Wales (CCW), Sustainable Development Commission Wales (SDC), and the Energy Saving Trust (EST).

Of particular interest was work being undertaken relating to spatial planning strategy including the emerging emphasis on 'low carbon regions' and the creation of 'low carbon

zones'. The Renewable Energy Route Map for Wales consultation paper is incorporated as is emerging Welsh Assembly Government policy relating to waste issues.

A key issue relating to the setting of carbon reduction targets at the strategic site level is the availability of a tool for evaluating allocation of resources by local authorities to competing agendas such as affordable housing. Though not included in this report, there may be potential to integrate this work-stream with, for instance, development of guidance and /or methods to enable consideration of a broader range of issues e.g. affordable housing or other priority agendas such as those identified within 'One Wales'.

2.3 Literature Review

2.3.1 Method

In order to provide a framework for the literature review, the team developed a "performance specification" for the required methodology. This was a statement of the scope of the methodology, the type of outputs required and the nature of stakeholder engagement. This specification is given below.

The literature was then reviewed against this performance specification, the aim being: to identify if any of the existing approaches used would be "fit for purpose" for the aim of the toolkit; to see what lessons could be learned about the effectiveness of other approaches and also to identify areas where new methodologies were required.

To extract key information from the review, the team used a template to record the key information relating to the approach used, the effectiveness and extent to which the method could be applicable for the toolkit. The template covered the following aspects:

- Scope
  - Objectives
  - Target audience
  - Stage in development plan document development
  - Timeframe and nature of targets
  - Level of geographical analysis
  - Types of energy, role of energy efficiency and resources/technologies assessed
  - Types of development
- Outputs
- Stakeholder engagement
- Data and sources used
- Outcomes of the study
- Applicability to WAG research

The results of the literature review are presented in appendix A.

2.3.2 Scope of Literature Review

The literature review considered the following reports and documents:

- PPS1 Supplement on Planning and Climate Change: Practice Guidance
- EDAW and Faber Maunsell's Green Energy Model (GEM)
- TCPA/CHPA report on Community Energy: Urban Planning for a Low Carbon Future

- Work for BERR (carried out by Faber Maunsell) to assess potential for district heating networks in the UK
- Defra report (in association with AEA Technology) on producing local authority heat maps
- Revision 2010 and 2020 reports (Government Office for the South West (GOSW) in partnership with the South West Regional Assembly (SWRA).
- Dover District Council – Evidence base for sustainable construction policies and testing of renewable energy capacity and feasibility for the Core Strategy 2006-2026
- Merthyr Tydfil County Borough Council – Renewable energy capacity study
- East of Exeter New Growth Point – Energy Strategy
- Camborne Pool Redruth Regeneration – Energy feasibility study
- Plymouth Renewable Energy Strategic Viability Study
- Renewable Energy in North Devon - Reviewing the Targets for 2010

These were selected because they are all examples of studies that aim to develop an evidence base (or contain best practice in how to develop such an evidence base) for setting carbon or energy targets either for strategic sites, or for area wide targets.

2.3.3 Implications of Findings for Methodology

The review identified a number of issues that were likely to have a bearing on the approach for the toolkit. These were:

- The importance of early and effective stakeholder engagement
- The importance of moving the toolkit out from just LA planning departments to engage with e.g. Local Service Boards, to act as key partners in delivery
- The benefits of LAs working together cross border on such studies and issues
- The importance of linking potential solutions for new developments with district heat and power solutions for existing buildings
- The key role that GIS can play, not just in analysing data, but communicating ideas and opportunities effectively, as well as an ongoing tool that LAs can use to assist with identifying strategic locations for EfW plant, district heat and power energy centres and so on
- The potential to consider climate change adaptation as well as mitigation

2.3.4 Contribution to Research

The results of the literature review were translated into a framework method for the Welsh Assembly Government Local Authority Renewable Energy Toolkit for evaluating the contribution of different measures to new and existing development. It was requested by the Assembly Government that the method should incorporate a diagrammatic or flow chart summary.

2.4 Framework Method

2.4.1 Overview

This section presents an overview of draft methodologies, and flow charts, for the three functions of the toolkit, namely:

- Influencing the selection of strategic sites
- Developing an evidence base to set targets for strategic sites
- Developing an evidence base to set area wide targets

The flow chart included here was one produced at a particular point in time in the development of the Toolkit and has subsequently been refined in the final Toolkit

2.4.2 Influencing Selection of Strategic Sites

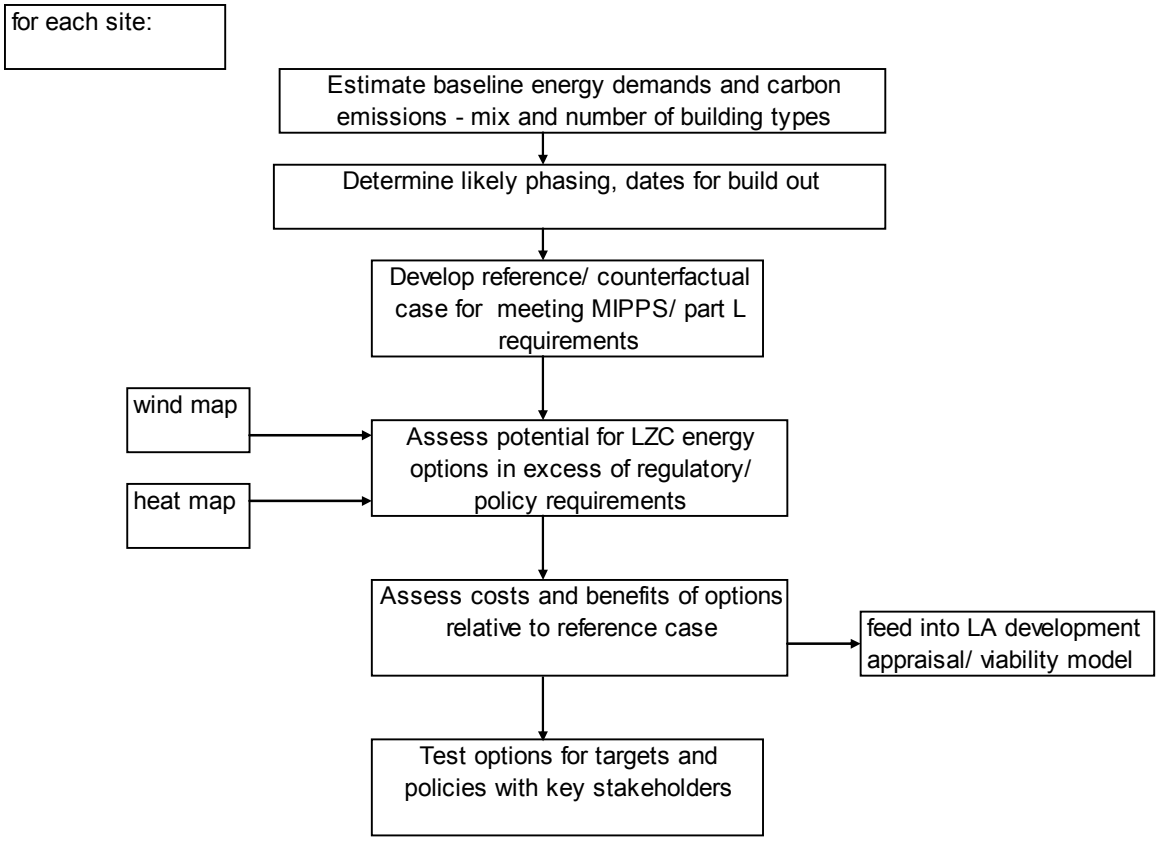
The proposed flow chart for this is shown on the next page. At the heart of this lies the creation of a GIS heat map and wind energy resource map. The abbreviation LSOA stands for Lower Super Output Area. The numbers 1, 2 and 3 in boxes relate to more detailed flow charts to show how data is derived. These are not included in this report.

The wind map and heat map that are created are also used when developing targets for area wide and strategic sites, as set out below.

2.4.3 Developing an evidence base to set targets for strategic sites

A flowchart for this is shown below. Again, the use of the heat map and wind energy resource map form critical inputs:

Figure 1: Flowchart showing method for setting energy/ carbon reduction targets for strategic sites

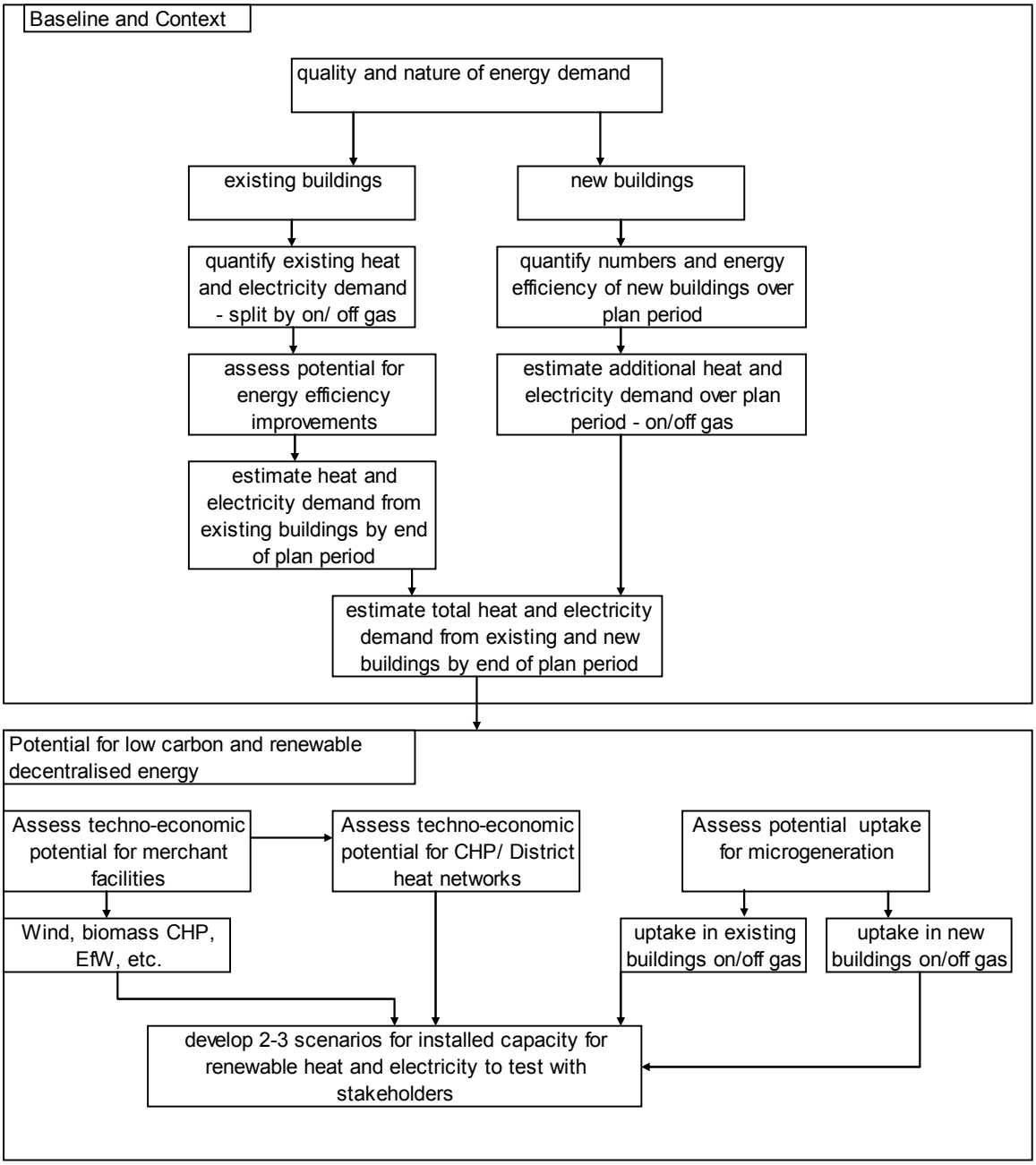


The flowchart shows that the data on costs and benefits for LZC energy options can be fed into the LA development appraisal model (such as Three Dragons) in order to assess whether the proposed targets would be viable, in combination with other infrastructure, affordable housing and other 106 requirements.

2.4.4 Developing an evidence base to set area wide targets

A flowchart for the approach to this is shown on the next page. We proposed that the approach to estimating micro-generation uptake rates be based on the data and approach developed by EST and Element Energy in relation to the UK Micro-generation strategy.

Figure 2: Flowchart for developing area wide targets



2.4.5 Contribution to Research

Following the establishment of a framework method a pilot authority could be sought with whom to pilot.

2.5 Selection of Pilot Local Authority

2.5.1 Method

A selection process was developed in order to identify a pilot local authority that, if engaged, would maximise the potential to deliver the objectives of the research. It was agreed with the steering group that AECOM should investigate potential pilot authorities.

2.5.2 Outcome

The pilot authority chosen was Pembrokeshire County Council. The selection of the pilot local authority was based on the following criteria:

- Willingness and resources to participate in further detailed study, including participation of senior officers;
- Location in respect of a National Park / coastline
- Those LPAs who were currently inviting candidate sites prior to assessment for LDP
- Have a mix of strategic sites for both renewable energy installations and new development which are likely to be found throughout Wales
- Potential for the research to influence their LDP process.

2.5.3 Contribution to Research

The identification of a pilot local authority was originally designed to facilitate the organisation of a framework testing workshop. Following discussion, it was decided that this workshop would be more productive if it was held after the data collection process when early outputs from the toolkit method could be available. The successful selection of the pilot authority enabled the team to undertake further detailed research.

2.6 Developing the Toolkit

2.6.1 Method

Building on the policy and literature review and the development of the framework methodology, data was collected to inform GIS mapping and analysis. The primary providers of data were the Welsh Assembly Government, Pembrokeshire County Council, Environment Agency Wales, Energy Saving Trust, Welsh Health Estates, VOA, Forestry Commission Wales, Office of National Statistics, BERR, and BWEA.

2.6.2 Data Collection

Wherever possible we employed datasets that are publicly available, considered to be robust, are updated on a regular basis and are from a respectable and independent source (such as a government sponsored body). A good example of such a dataset is the NOABL database (UK wind atlas) & the ONS 2001 Census.

2.6.3 Outcome

The data collection process was a key part of the research process and provided us with detailed information about:

- Issues local authorities were likely to face when undertaking this process
- Source, availability, quality and format of data
- Application of data, sensitivities and limitations

There were both constraints and opportunities identified during the process of developing the evidence base and these are summarised in the key findings.

2.6.4 Contribution to Research

The receipt of data enabled AECOM to continue with the development of the evidence base for the pilot authority and to produce a series of GIS maps and data sheets for consideration during the workshop. Specifically, receipt of data enabled the following activities:

- Develop the stakeholder workshop presentations and activities;
- Raise issues for discussion / clarification;
- Develop output maps and datasheets
- Identify key constraints and opportunities;

2.7 Stakeholder Workshop

2.7.1 Method

A facilitated stakeholder workshop involving key officers from waste and environment, energy and sustainability, planning and other relevant departments was held in Pembrokeshire on 16th September 2009 at County Hall, Haverfordwest.

The workshop was attended by 8 delegates from Pembrokeshire County Council. A list of the attendees is appended.

The workshop covered the following topics:

- Review of AECOM method
- Accessible renewable energy resource in Pembrokeshire
- Strategic sites: detailed analysis of 5 selected opportunities
- Approach to candidate sites
- The LA toolkit and target setting

During the workshop, participants considered 5 case studies relating to previously identified strategic sites and were asked to consider the opportunities and constraints related to each site. The information supplied was appraised for whether the LA would be able to reproduce the information and it was also tested whether or not the information provided at the workshop would be sufficient for target setting.

2.7.2 Outcome

The main outputs of the workshop included:

- Issues raised regarding our assessment of the available resource
- Critiques of our findings for the 5 strategic sites

- Feedback on the toolkit method and an assessment of the ability of LAs to replicate outputs
- Views on target setting and use of the toolkit outputs including fit with the LDP process
- Lists of guidance, tools and support that stakeholders would like to see.

2.7.3 Contribution to Research

The outputs from the stakeholder workshop were fed into the draft final report for discussion with the steering group.

2.8 Dissemination Events

2.8.1 Method

As part of AECOM's remit, two dissemination events are to be held, one in the north and one in the south of Wales. These dissemination events will be used to examine the principles behind the method and to train officers in the use of the toolkit.

Officers will be invited from all LPAs in addition to representatives from the Design Commission for Wales, EST Wales and WLGA. The half day workshops will be hosted by the Assembly Government on dates and at venues to be decided.

2.8.2 Intended Outcomes

The intended outcomes of the dissemination events will be:

- for key stakeholders to understand the principles behind the toolkit method and identify issues
- for key stakeholders to understand the ways in which the toolkit can be employed and to understand how to apply the toolkit.

2.8.3 Contribution to Research

The dissemination events will complete the toolkit research and ensure that key stakeholders are aware of:

- The rationale for the development of the toolkit
- The availability of the toolkit and its intended uses
- How and when to apply the toolkit

Outcomes from pilot

3 Outcomes from pilot

3.1 Introduction

The findings set out in this chapter are drawn from our experiences in developing the evidence base for Pembrokeshire County Council, including information gathered from the workshop with officers of the pilot local authority.

The chapter identifies key findings from two stages of the pilot, namely:

- Preparation of the evidence prior to the stakeholder workshop
- Results from discussion of the evidence base at the stakeholder workshop and feedback from the participants on the toolkit method

3.2 Outcomes from Pilot Study (pre-workshop)

This section of the report outlines the lessons learned from the pilot study (pre-workshop) in relation to the framework method, including the positive outcomes and those aspects that could be improved upon. The key issues / difficulties we have encountered during the development of the toolkit have been incorporated into our recommendations as have comments received during this process from key contributors.

3.2.1 Aspects of method that worked well

- **Use of LLPG data.** The LLPG data set that all local authorities hold, and are required to keep up-to-date, provided a quick and simple way of being able to identify the spatial location of different types of existing buildings. These in turn could act as potential anchor loads when in close proximity to strategic development sites.
- **The use of GIS heat mapping.** This, as hoped, proved to be a powerful tool to inform stakeholder discussions around opportunities for district heating networks in relation to strategic sites. The resulting maps provided a very visual overview of the potential opportunities which stimulated discussion among officers and resulted in many additional opportunities being suggested and identified.
- **Mapping residential heat demand density to output area (OA) level.** We felt that for strategic sites, mapping down to the level of OAs provided the level of detail required for selecting boundaries for heating networks. The use of LSOA level data would not have given this.
- **The link to fuel poverty.** The importance of linking fuel poverty into the GIS heat maps was something that was identified at the interim report stage. Although the heat maps that were discussed at the Pembrokeshire stakeholder workshop did not include a specific GIS layer for fuel poverty, they did identify clusters of social housing. From this, the housing officer was able to identify two of the areas shown adjacent to strategic sites as being areas of high fuel poverty and therefore eligible for CESP funding which could support district heat networks[1]. Given that there 284 such

[1] These LSOA areas were Llanion 1 in Pembroke Dock and Garth 2 in Haverfordwest. The qualifying criteria for CESP funding in Wales is for LSOAs ranked in the lowest 15% for Index of Multiple Deprivation.

qualifying areas[2] in Wales, this could present a major opportunity.

- **Facilitating cross-departmental working.** The identification of opportunities on the GIS maps required input from a range of officers, including those responsible for planning policy, energy management, waste, housing and GIS. The approach we followed, with a relatively high level of stakeholder engagement, gave all of these officers the space to share information, and consider the broader issues and opportunities for renewable energy deployment, outside of their immediate roles. As part of their feedback (see later in this section), the officers rated this facilitation role highly.

3.2.2 Key issues encountered

Not unexpectedly, for a study of this sort, many of the issues we encountered related to the availability, or otherwise, of the datasets required by the methodology. We have classed these issues into three groups namely: data availability; data quality and scale of data used. Each group is discussed in more detail below.

3.2.3 Data availability

There were a number of areas where datasets were not readily available to prepare elements of the evidence. These were as follows:

- **Micro-generation installations.** Data on the number of annual new installations of micro-generation systems does not appear to be systematically collected, at present. We were eventually able to obtain data from the UK government micro generation grant programmes on the number of grants that had been approved and paid for Pembrokeshire each year.
- **Commercial and industrial residual waste arisings, for energy from waste.** Accurate data relating to commercial and industrial waste was particularly difficult to obtain for a number of reasons:
  - Organisations generating considerable quantities of waste often treat this waste in-house or export the waste out-of-county
  - Waste can imported from surrounding counties and treated at EAW sites. This waste is then reported within Pembrokeshire waste figures.
  - Data is only collected for hazardous waste and wastes treated at EAW licensed facilities. The two waste streams for which data is collected overlap meaning that waste is likely to be double-counted.
  - Figures pertaining to commercial and industrial food waste were particularly difficult to isolate and no trends relating to tonnages produced or likely to be produced could be identified.
- **Definition of renewable output from energy waste.** We found that there was a lack of clear guidance for the Wales context for the current and future proportion of the residual waste stream that could be

[2] For full list see http://decc.gov.uk/Media/viewfile.ashx?FilePath=Consultations\CESP\1_20090630123736_e_@@_DECCCommunitesareasoflowincomeCESP.pdf&filetype=4

nominally classed as biodegradable[3]. In addition, there appeared to be no clear guidance for Wales as to whether the biodegradable proportion of incineration could be classed as renewable, or only advanced thermal treatment.

- **Mains gas network.** We were unable to obtain data on the extent of the mains gas network in Wales, as this dataset is, apparently, not held by the Assembly Government. This data would have been useful in identifying those areas in the County which may have been off gas with significant heat loads, and therefore perhaps being particularly suitable for using renewable forms of heating.
- **Future levels of non-residential development.** For Pembrokeshire, we were unable to access any studies on future employment land requirements. Therefore, future development had to be projected forwards from data on historical levels of new development for this sector. For public sector new build, the only data that we could obtain was in relation to new schools. In general, the extent to which projections can be made for this sector, to support micro-generation uptake modelling, will depend on whether any given local authority has carried out the relevant employment land and retail studies.
- **Proportion of existing dwellings that have solid walls, or are "hard-to-treat".** This data is not systematically recorded in Wales. The "Living in Wales" house condition survey only provides data on a sample number of homes, with the 2008 survey covering a sample of around 7,700 households in Wales. The survey reported on the level of household insulation including the level of cavity wall insulation. However, the information reported on was not clear cut and responses were categorised as 'yes all' 'yes some' 'no' 'n/a' and 'don't know'. For the purpose of the study the proportion of households with cavity wall insulation was assumed to be 'yes all', with solid wall represented by 'n/a' and non insulated cavity wall insulation as the remainder.

  We are aware of work that has been carried out by the University of Bristol and CSE for the Assembly Government to produce a fuel poverty map for Wales[4]. This dataset includes information on the age of all dwellings in Wales[5], from which it can be deduced whether dwellings are likely to have solid walls or not. This data could form a useful part of heat mapping down to Output Area level. Although we were provided with some data by CSE, this was only to LSOA level and only gave the level of fuel poverty and not the underlying information about dwelling age.
- **Energy consumption data for non local authority public buildings.** These buildings include hospitals, courts, prisons, MoD facilities, higher education institutions, Government (both Welsh Assembly and UK Government and government agencies) office buildings (such as HMRC HQ). We

[3] As this is a key criteria for determining what proportion of the output is renewable

[4] A small area fuel poverty indicator for Wales, Gordon and Fahmy, University of Bristol, September 2008, see http://wales.gov.uk/docs/desh/policy/090129fuelpovertyreporten.pdf

[5] Drawn from the RESIDATA dataset, which is used by insurance companies

were not able to obtain this information readily, and not within the timescale and budget of the study.

In England, energy consumption data for hospitals, broken down by fuel type, is available online from the ERIC returns. Information on energy use in hospitals in Wales is available online from the annual Estate Condition and Performance Reports produced by Welsh Health Estates, but this only provides aggregate energy demand, with no breakdown by fuel type, which means the heating demand must be estimated. As part of this study, we needed to contact Welsh Health Estates directly to obtain this information, and they did supply the information we required.

Although we approached a number of Government agencies to obtain energy data, none was provided (e.g. MoD)

3.2.4 Data quality and consistency

There were two key issues here, namely:

- Inconsistency between the referencing used between departments with regards to local authority data on energy in public buildings and the LLPG dataset for the same buildings. The inconsistency related to the names of buildings. This meant that correlating the spatial location of buildings with their energy demand was made more difficult.
- Inconsistency between the VOA data and the LLPG data. The issue here is that while the buildings listed in the LLPG have a Unique Property Reference Number (UPRN), the data supplied by VOA did not use the same UPRN, and therefore it was difficult to correlate the two datasets. However, we understand, that it is possible to obtain VOA data which includes the UPRNs, but that permission is required from IDeA in order to do this, who "own" the VOA data.

3.2.5 Scale of data used

When undertaking spatial analysis at a LA wide level, consideration should be given to the scale of datasets used. For example, the geographic extent of the transport network across Pembrokeshire was derived from Ordnance Survey MasterMap. On reflection this dataset, although accurate in geographic extent was too detailed for a local authority wide assessment. A 1:250,000 scale dataset, such as OS Strategi would have enabled a quicker strategic assessment to have been made. This is of particular note with regards to establishing the available wind energy resource across Pembrokeshire.

3.2.6 Other issues

Reports have been commissioned within Pembrokeshire which could have made a significant contribution to the toolkit research. Unfortunately the commissioning organisations were reluctant for us to use / cite the report

Despite requesting feedback from some key external stakeholders (MoD), none was received.

Often further study is required prior to identifying 'accessible resource' (e.g. landfill gas). Although rules of thumb are available,

some cases will be border line and may warrant the expense of further study.

3.3 Feedback from local authority participants in pilot

This section of the report outlines feedback from users about the nature of the information we provided, their views upon the toolkit's usefulness and their experiences of being involved in the process.

3.3.1 Feedback on the evidence base

Problems were found in relation to the data sources utilised for the identification of wind constraints (affecting the available resource), specifically the interference from airports and aerodromes.

The different approaches to wind farm selection, which can have a significant impact upon the 'accessible resource', were discussed. For example, one method can prioritise sites with highest likelihood of gaining planning approval' whereas another can maximise installed capacity: there may be potential / need for providing guidance in this area.

We had assumed that the energy from waste resource would be used for CHP generation, and therefore contribute to both electricity and heat targets. However, the view of the waste officer was that any energy from waste facility in the County would most likely supply high grade heat only for industrial processes. Therefore, we revised our target scenarios to assume that all of the energy output from the waste resource would take the form of heat.

Information gained from local authority officers enabled a 'rethink' on the potential of energy generation potential from poultry litter.

Discussion around the subject of target setting highlighted how local authorities were constrained. It also highlighted the importance of the corporate strategy and, potentially, strong coordination of Local Service Boards to ensure delivery via public landholdings.

- LA officers were able to add additional information, particularly plans for the future, in relation to existing buildings in the immediate vicinity of strategic sites. This helped to build a considerably 'fuller' picture.
- Discussion was entered into in relation as to whether LAs should be able to include offshore generation within their targets given their role in relation to the on-shore infrastructure required.

3.3.2 Feedback on the method

The key points raised were as follows:

- The GIS officer didn't find it too time consuming to pull the datasets together and felt that a lot of the GIS mapping could be done internally by a GIS officer, if a local authority has one.
- Local authorities will each have their own criteria / process for filtering candidate sites and, potentially, different ideas about the timing of the use of a renewable energy toolkit. It is suggested that the timing of the toolkit application and the priority given to its outputs will have a significant effect upon accessible resource.

- There was considerable discussion about how to deal with issues around wind and landscape sensitivity, and whether the resource assessment should allow for a buffer around the Park, and AONB.
- A detailed discussion regarding the point at which information about renewable energy potential and opportunities should be used as a filter for candidate sites produced considerable debate. The pilot authority felt that the timing of such an intervention should be at the latter stage of the process after environmental and proximity to services criteria had been applied.
- Landscape character is a significant issue in relation to large scale wind and an agreed approach should be devised. Despite the impact of landscape character being considerable in Pembrokeshire due to its proximity to a National Park, following discussion with Pembrokeshire County Council, the impact of wind farms on landscape character was not taken into account, nor indicated on the resource maps or included within the toolkit. In addition, proximity to Coast also impacted significantly on available resource.
- The selected approach relies heavily upon a GIS approach. It is assumed but unknown whether all of the LAs in Wales have access to a GIS officer, what their duties are and to which department they are attached. There may also be a variation in skill levels.
- The officers found it useful to have external consultants to facilitate the cross departmental discussions, and thought that this was an important element of the process.
- Translating datasets from MapInfo (the local authority's software package) into ArcInfo (the consultant's software package), although possible, was time consuming[6].
- Applications for wind turbines are likely to be concentrated in non-urban areas and can be grid connected. Target setting in this respect is less problematic than for district heating which may require cooperation of several organisations / departments. This issue highlights the importance of corporate targets potentially led by LAs via Local Service Boards.

3.3.3 Feedback on format and content of toolkit

The executive summary needs to clearly sell the value of carrying out an RE assessment at a high level. It should ocus on the key drivers to do it (WAG performance indicators, CRC, affordable warmth, zero carbon schools and buildings, etc) and make clear what the outcomes can be.

In terms of content and level of detail, it should include:

- How to do a sieving process for wind sites
- Signposting to relevant data sources – both internal to LAs and external
- Give industry standards for buffer distances for wind constraints mapping, etc.
- Provide simple step by step process
- Give estimates of staff time required, plus possible split between LA and consultant

[6] Clearly, if a local authority were to do all of the GIS mapping in-house, this would be less of an issue

- Give guidance on how many housing units are needed to make a DH viable
- Need to make clear what roles of planners are, and what roles of other LA officers/ stakeholders are. Officers thought it was important to identify the officers who could supply relevant information by their job role, rather than by a job title (as the people who are responsible for things can vary from LA to LA).
- Outline a process for how to develop targets from the evidence base
- Some LAs may not have strategic sites, so clearly that aspect may not be relevant to them

Conclusion and Recommendations

4 Conclusion and Recommendations

4.1 Introduction

In this section we show how recommendations flow from preceding chapters.

4.1.1 Preparation of an Evidence Base – Regional Aspects

During the pilot study, we were struck by how many aspects of the evidence base required could be prepared at a regional level. This could then be made available to individual local authorities to enable them to do more detailed local level work. This could have the following benefits:

- Considerable efficiency savings from avoiding individual local authorities trying to carry out similar work, both in-house, and using consultants. This would also avoid local authorities making multiple requests to (public sector) data providers.
- Enable a more consistent approach to preparing an evidence base which in turn should make it more robust
- Allow greater access to regional and national (UK) datasets that would enhance the evidence base
- Allow target scenarios for area wide installed capacity targets for each County to be produced in a way that ensured they were consistent with Wales's renewable energy targets and beyond

Those aspects of the evidence base that we recommend the Assembly Government prepare at a regional level include:

- Wind power constraints mapping and resource assessment
- Landscape sensitivity assessment to wind power to support the above
- Biomass resource mapping
- Heat mapping of existing residential heat demand density (down to OA level) and large public buildings. There is the potential for this to link up with the UK Government DEC database to obtain data on energy use for public buildings open to the public
- Collation of VOA data on non-residential floor areas, including the UPRNs to enable correlation with the LLPG data set
- Micro-generation uptake modelling
- Developing energy and carbon baselines, and projections through to 2020, for the electricity, heat and transport sectors

4.1.2 Preparation of an Evidence Base – Local Aspects

The research has highlighted that whilst many aspects of the evidence base could be collated regionally, there are still many aspects that will need to be considered at a local level. In particular, this will relate to the opportunities for DHNs within new development sites and between new and existing developments. Whilst local authorities, in using the toolkit, may be able to prepare the majority of the evidence base, it is likely to still require specialist external consultancy support to cover aspects such as the feasibility and financial modelling for DH and CHP. The Pembrokeshire officers also felt that an external consultant played a valuable role in facilitating the identification of opportunities and enabling cross-departmental working.

Therefore, (assuming that the regional aspects of the evidence base were to be provided) we recommend that the Assembly Government make funding or expert support available to local authorities to cover these two key aspects, namely: facilitation and viability assessment for DHNs. It may be that the Assembly Government could make use of or gear up existing sources of support in this area, such as the Carbon Trust Strategic Design Advice service, CESP monies or funding through the ORED.

4.1.3 Data Availability Issues

This links to the above point. If a regional evidence base were prepared, then this would cover many of the points that follow. We recommend that the Assembly Government collate and make available the following information for Local Authorities to use when preparing evidence bases, namely:

- Data on the extent of the gas network
- Data on commercial and industrial waste arisings, including food wastes
- The source data from CSE on age of dwellings in different Output Areas, and/ or the % of dwellings in any Output Area that are assumed to have solid walls
- Ongoing monitoring of micro-generation installations.
- Energy consumption data (disaggregated into different fuel types) for non-local authority public buildings, including hospitals, Universities and colleges, MoD facilities, prisons, etc.
- Data on the floor space and spatial location of larger hotels across Wales, as these are not captured in either data for public buildings or in the VOA data

4.1.4 Recommendations in relation to policy and guidance

Guidance on area wide targets

In relation to the setting of area wide renewable energy targets, it would be helpful to have clear guidance from the Assembly Government as to the nature of those targets. Key issues for clarification are as follows:

- Should renewable energy targets be in terms of installed capacity (in MW), or energy generation (in MWh), or as a % of future energy demand (i.e. in line with the UK 2020 target), or as a % carbon dioxide reduction, or all of these?
- Should the energy output from heat pumps be de-rated to allow for consumption of grid electricity, when considering the micro-generation potential
- To what extent should energy from waste be classed as renewable? Should this apply to all technologies, or only technologies that are eligible under the Renewables Obligation, i.e. pyrolysis and gasification, and anaerobic digestion. What should be taken to be the nominal biodegradable fraction for calculating the renewable element, both now and in the future?

It may be that the ongoing work for DECC[7] to prepare a methodology for carrying out

[7] Being carried out by SQW Energy and Land Use Consultants

regional renewable energy resource assessments for 2020 will clarify these issues.

Guidance on the broader corporate role of Local Authorities in delivering opportunities

It was clear from the work with Pembrokeshire that although planning can play a key role in the delivery of strategic renewable and low carbon energy projects, there are many other roles that Local Authorities can play to facilitate delivery at the same time as meeting some of their own corporate objectives. Some of these roles include:

- Using their existing buildings as anchor loads for heat networks, including any social housing
- Using their land to host energy centres, wind turbines, or other technologies
- Using procurement of new buildings and waste facilities
- Managing an allowable solutions fund for developers to help fund heat networks for existing development
- Forming a local authority wide ESCO
- Playing a leadership role to facilitate engagement of other key public sector partners, such as Health Trusts, higher education institutions, and so on

The toolkit focuses on the evidence base required for targets and therefore does not cover these aspects in detail. We recommend that the Assembly Government provide guidance on these aspects as part of the update of TAN 8.

Appendices

Appendix A: Policy Review

MIPPS 01/2005 Planning for Renewable Energy

The MIPPS sets out the Assembly Government's commitment to:

- achieving its specific targets for renewable energy (electricity) production
- maximising the opportunities for renewable energy (heat)
- where possible combining the two in combined heat and power systems
- recognising that the benefits of renewable energy are part of its overall commitment to reduce greenhouse gas emissions

To help achieve wind power energy targets in Wales seven Strategic Search Areas (SSAs) are defined in MIPPS 01/2005 and TAN8 where onshore wind energy can be delivered. Although the wind energy developments proposed in these locations will not automatically get permission, they have been identified as broadly suitable for this type of scheme. For each of the SSAs an indicative installed capacity target is given for wind energy projects to assist the local planning process to determine the likely scale of new wind development in each location. Local planning authorities, where relevant, should make policies to direct wind energy development to these locations.

Outside SSAs smaller (less than 5MW) domestic or community-based wind turbines and small or medium (up to 25MW) on urban/industrial brownfield sites, will be permitted. Local planning authorities should set policy to deliver these sites.

Under TAN 8 the Assembly Government also expects local authorities to 'encourage, via their development plans policies and when considering individual planning applications, smaller community based wind farm schemes (generally less than 5MW)

There is an expectation on local planning authorities to help facilitate renewable energy, energy efficiency and conservation. This includes the role of policy in enabling contributions to be delivered, and ensuring these are in line with national and international policy and targets. These policies, however, must be delivered in a way that considers wider sustainability implications, including impact on designated areas and local communities.

The MIPPS contains recommendations for energy policies that should be included in local development plans.

"Local planning authorities should undertake an assessment of the potential of all renewable energy resources, renewable energy technologies, energy efficiency and conservation measures and include appropriate policies in local development plans."

In making development control decisions for renewable energy development, beyond that to meet large onshore targets for wind energy, the MIPPS states that there is a need to 'encourage developers to integrate energy efficiency and conservation measures as part of the design of new development.'

MIPPS 01/2009 Sustainable Buildings

Local planning authorities should assess strategic sites to identify opportunities for higher sustainable building standards (including zero carbon) to be required. In bringing forward standards higher than the national minimum local planning authorities

should ensure that what is proposed is evidence-based and viable. Such policies should be progressed through the Local Development Plan process in accordance with relevant requirements of legislation and national policy.

Particular attention should be given to opportunities for minimising carbon emissions associated with the heating, cooling and power systems for new developments. This can include utilising existing or proposed local and low and zero carbon energy supply systems (including district heating systems), encouraging the development of new opportunities to supply proposed and existing development, and maximising opportunities to co-locate potential heat customers and suppliers.

Planning Policy Wales, 2002

The Assembly Government objectives for delivering 'infrastructure and services' includes the need to 'promote the generation and use of energy from renewable sources and energy efficiency, especially as a means of reducing the effects of climate change'.

Lifting the planning barriers to domestic energy micro-generation: proposed changes to permitted development rights (July 2007)

There are proposals to remove the requirement for planning permission for the installation of domestic micro-generation renewable energy technology, by making these part of 'permitted development' rights. 'Permitted development' rights would only extend to certain types of building and technology, subject to certain criteria.

TAN 8: Planning for Renewables Energy

TAN 8 raises the potential for community (or District) heating, recognising that 'these installations will require collaborative working between developers, energy companies and planning authorities in order to achieve significant results'. To achieve these schemes the TAN notes 'community heating networks utilising CHP or low-carbon fuels should be thoroughly investigated' in design briefs are being prepared for larger developments. These matters should also be integrated into development plan policy and supplementary planning guidance.

TAN 12: Design, 2009

"Opportunities for local and low or zero carbon energy supply such as CHPs and district heating systems can be maximised when higher densities and a mix of uses are proposed which balance energy demand over different time periods. Such as between industrial and residential or with a major institutional use such as a hospital or a leisure centre."

"All residential proposals should seek to minimise energy demand, larger schemes should investigate the feasibility of a district heating scheme especially when mixed uses are proposed for the site."

With regards to proposed commercial and employment areas *"early consideration of the need to embrace high environmental standards, low carbon aspirations and minimise the need for artificially cooled*

buildings, provide opportunities to develop shared low carbon and renewable energy options."

"Opportunities to minimise energy demand through the adoption of renewable energy or low carbon technology such as district heating schemes including CHP running on low carbon fuel, should be realised."

TAN21: Waste (November 2001)

The TAN21: Waste includes the use of waste as a fuel as a disposal option. It suggests that:

"Proposals that incorporate combined heat and power plant could contribute to district heating schemes for development such as schools or hospitals, providing these are environmentally acceptable."

Further Consultation on Planning for Climate Change (July 2008)

In identifying 'strategic sites' where there are good opportunities to go beyond targets for carbon reductions 'Particular attention should be given to opportunities for utilising existing or proposed decentralised and renewable or low-carbon energy supply systems and to encouraging the development of new opportunities to supply proposed and existing development. Such opportunities could include co-locating potential heat customers and heat suppliers.'

One Wales: a progressive agenda for the government of Wales (June 2007)

In July 2007 the Welsh Assembly Government published the programme for Government over the next four years, entitled One Wales. Commitments which have an impact on reducing carbon emissions include:

- Aim to achieve annual carbon reduction-equivalent emission reductions of 3% per year by 2011 in areas of devolved competence. This will include specific sectoral targets in relation to residential, public and transport areas.
- Commit to targets on the carbon neutrality of public buildings.
- Draw up an energy strategy which will be integrated with a planning framework, to include actions on energy efficiency, microgeneration, eco roofs, diversified renewable energy generation and biomass.
- Following production of a Renewable Energy Route Map and an Assembly Government Energy Strategy, review TAN 8, revising upwards the targets for energy from renewables, drawn from a range of sources.
- To pursue the devolution of building regulations to the Assembly.

Wales Spatial Plan

The Planning and Compulsory Purchase Act 2004 requires the Welsh Assembly Government to prepare a Spatial Plan covering the whole of Wales. The Plan, which was adopted by the Assembly in November 2004 and subsequently updated in July 2008, complements and helps to translate into practice the Welsh Assembly Government's sustainable development duty. The recent revision has given greater emphasis to climate change.

Responding to our changing climate

In 2007 the Welsh Assembly Government consulted on Responding to our changing climate. This contained a climate change adaptation action plan for Wales. Under three broad themes, the Adaptation Action Plan outlines the impacts that Wales can expect as a result of climate change and identifies the actions required to adapt to these impacts in Wales across six broad headings. The Assembly Government intend to consult on a combined Climate Change Strategy next year.

Renewable Route Map for Wales: consultation on the way forward to a leaner, greener and cleaner Wales (2008)

This is a consultation document that will lead to the preparation of a comprehensive set of climate change and energy strategies for Wales by the end of 2008. The aim is to achieve annual 3% reductions in greenhouse gas emissions from 2011 onwards through joint working across all parts of the Assembly Government.

There is an aim to achieve 'much more distributed generation of energy', with the 2007 Wales micro-generation action plan prepared to detail this.

The consultation document looks at each type of renewable energy generation technology in turn to identify how these can help contribute to overall generation in Wales. This includes maps of existing schemes. Relevant technologies include:

Wind

Focused on the SSA, although the consultation document highlights the need for more definition to be given to what is meant by 'smaller community based' developments, as these are not tied to SSA locations. Revisions for TAN8 may be necessary. There is a specific aim (7.13) for the Assembly Government to 'develop, with partners, a strategic bid for a Convergence Fund project at delivering a series of community scale wind energy generation projects access the eligible area.'

The second part of the consultation document considers matters relating to 'energy conservation and distrusted generation'. There are a variety of proposed measures for achieving energy efficiencies, one of the most significant for energy savings in new buildings is the devolution of the Buildings Regulations to give the Assembly Government control of these in Wales. The aspiration is that 'Higher standards through devolved Buildings Regulations would be aimed at delivering the aspiration for all new buildings to be zero carbon by 2011' specifically the 'Assembly Government will looking to demonstrate a path to zero carbon buildings through construction work it funds.'.

There is a emphasis on understanding the contribution that micro-generation can make to increasing renewable energy generation. There is current consultation on changes to the permitted development rights in relation to micro-generation on domestic properties. There is an intention for the Assembly Government to:

"Issue planning guidance to make micro generation easier to install; in particular for:

- *roof mounted solar heat and solar (photo-voltaic) electrical panels*
- *ground, water and air source heat pumps*
- *building mounted micro-wind electricity turbines or stand alone wind turbines*
- *biomass electricity or heat generating units, especially for larger properties or community projects.'*

Micro-generation could be expected only to deliver around 3% of the total installation generation capacity (MWe).

Micro-generation Action Plan for Wales March 2007

Micro-generation action plan has targets of:

- 20,000 micro heating systems installed by 2012, rising to 100,000 by 2020
- 10,000 micro electricity systems installed by 2012 rising to 200,000 by 2020
- 50 combined heat and power and/or district heating systems in place by 2020.

Consultation on a Bioenergy Action Plan for Wales, February 2009

The aim of the bioenergy action plan is to secure annual generation in Wales of at least 5tWh of electricity and 2.5 tWh of usable heat energy from renewable biomass by 2020.

Appendix B: Literature Review

PPS1 Supplement on Planning and Climate Change (for England)

The PPS 1 Practice Guidance requires local authorities to move beyond a 'one size fits all' approach for energy targets. Planners are required to put together a robust evidence base to support policy and targets based on an understanding of existing and future energy demands, CO2 emissions and growth scenarios. Development plan documents should identify specific opportunities for energy generation in existing and new communities. This masterplanning approach means that in some cases energy solutions may not be deliverable through standard developer applications. Opportunities for delivery by other means should also therefore be considered, such as by using public private partnerships or other local authority powers. Tailored targets for 'decentralised and renewable or low-carbon energy' should be set at the local level. These should be flexible area-wide targets that include thresholds if necessary based on the scale, nature and location of development. Where it can be justified through the evidence base local authorities are also encouraged to set higher targets for specific sites or opportunity areas. These could be expressed in terms of the Code for Sustainable Homes and may include setting energy standards in advance of changes to the Building Regulations. The PPS outlines situations where a higher percentage target could be set.

Establishing local targets with a robust evidence base

The PPS is clear about the importance of defining and measuring compliance with the target and highlights the requirement to deliver savings based on total site CO2 emissions for all end uses, not just those regulated by the Building Regulations. In establishing targets for decentralised and renewable or low-carbon energy, planning authorities should be clear about how they will define compliance with the target and the baseline against which targets will be measured. When setting targets, planning authorities should also be clear as to the relationship between percentages for renewable and low-carbon energy supply and the carbon emissions limits set out in the Building Regulations Part L.

For example, solar water heating systems installed to meet 10% of a housing scheme's total site CO2 emissions, including appliances, might result in a reduction of around 20% to the Target Emissions Rate of the homes served. A planning target based on meeting 10% of regulated emission alone might only result in a reduction in total site CO2 emissions of only 5%. The PPS refers to the London Renewables Toolkit, which was developed to help implement the renewable policies in the London Plan. This has now been re-launched by the London Energy Partnership as an electronic toolkit: the Low Carbon Designer.

The Code for Sustainable Homes uses a simple calculation to measure unregulated emissions in homes. This and other benchmarks can be built into many of the available energy modelling packages or added as separate allowances. There may also be significant additional energy demands including those for the communal lighting of car parking, or the heating and lighting of communal spaces in apartment buildings. These can often provide useful loads for decentralised electricity generation from combined heat and power and other on-site generation. Including them as

part of the baseline against which targets will be measured can be helpful in ensuring they are considered as part the energy strategy for a development.

The evidence-base for these targets needs to be robust. A basic assessment of viability will need to be applied, including an estimation of the cost of delivering the targets and supply strategies, assessed against future energy costs for residents or occupiers. The PPS refers to Climate South East, who have developed a common methodology for calculating direct emissions to aid local authorities in setting baselines, targets and indicators of progress. The importance of considering other planning requirements and site circumstances when setting site-specific targets and possible implications on masterplans is highlighted.

Meeting local targets

The different ways of realising renewable and low carbon potential in different localities are acknowledged. It notes the importance of including existing buildings and decentralised energy sources when assessing feasibility and viability, as it may be possible to link existing and new developments.

Key questions to ask when considering how to meet targets are set out. These revolve around collecting and analysing building development data for existing and proposed or potential development and assessing the local opportunities and constraints associated with potential energy sources. Local authorities are advised to seek available data from regional and local renewable and low carbon energy resource studies, strategic housing land availability studies, major applications and environmental statement or sustainability appraisals of previous plans.

The SHLAA will form part of the evidence base for the emerging Local Development Framework (LDF), and inform the identification of potential new housing sites to be allocated in the LDF. PPS3 on “Housing” sets out a new policy approach for housing, including the identification of sufficient land for the plan period of 15 years, ensuring that the first 5 years of sites are allocated and developable and that the 5-year supply is maintained as sites are developed out. Seeking such data jointly with other local authorities can be more cost effective and multi-area analysis can bring multiple benefits as opportunities associated with low carbon and renewable energy may not respect administrative boundaries. This approach is being supported by the Local Democracy, Economic Development and Construction Bill.

Different approaches will be appropriate depending on the heating, cooling and electricity demand profiles of different types of development. It will also vary across different parts of a community, depending on the land use mix, development density, age and type of building stock. Although the relevance of heat mapping is not mentioned directly in the PPS guidance, it does encourage flexibility to choose the most appropriate technology or approach for a development. BERR has commissioned Faber Maunsell to develop a UK-wide heat density map, which could play a vital role in this assessment. More detail is provided below.

The PPS sets out a clear methodology for setting decentralised and renewable or low carbon energy targets at regional and local levels. Studies such as the one for Dover

District Council have applied the methodology using an in-house (EDAW) Green Energy Model to assess the feasibility of renewable energy in the area. This work provides a robust evidence base for targets to be set for strategic allocations in the Core Strategy, but it could equally be applied to area-wide targets.

Using existing networks

To support the creation of local energy infrastructure the PPS allows for local planning authorities to use policy to require developments to connect to heat and power networks and to seek contributions from developers to help fund the infrastructure to which they will be connecting.

Southampton, which has had a geothermal network since 1986, has set up a public-private partnership. The authority's draft core strategy policy requires new developments to link in to the network which already serves a range of city centre public and private buildings. A slightly more flexible approach was adopted by Woking whose draft core strategy policy requires new developments to demonstrate a 40% reduction in CO2 emissions. In practice, this is most easily achieved by linking in to the Working CHP district heating network. Where sufficient heat density exists, large district networks could be established in the medium to long term in existing areas where they have not previously been planned. Barking Town Centre Energy Action Area is an example of such a strategy.

The strategic energy study for the Association of Greater Manchester Authorities (being carried out by Faber Maunsell with Urbed and Quantum) is seeking to go beyond the confines of planning and produce a delivery focused evidence base and advise on target setting across ten authorities. The study is using an approach developed in Community Energy: Urban Planning for a Low Carbon Future . It will identify a series of 'character areas' based on distinctive locational characteristics, including land use mix, density, age of stock and tenure. These help to define the likely technology mix since a mixed use city centre will have different opportunities than a largely residential suburb or rural village. Policy approaches and targets can be tailored to each if necessary (more detail is provided on the Community Energy Guide in section 2.3).

There are standard procedures for stakeholder engagement set out in PPS 11: Regional Spatial Strategies and PPS 12: Local Spatial Planning which should be applied when developing a renewable and low carbon energy strategy.

Performance Criteria	***Score***
Scope	3
Stakeholder engagement	n/a
Outcomes	2
TOTAL	**5**

The Green Energy Model (GEM)

EDAW, with technical support from Faber Maunsell, have recently adapted their Social Infrastructure Framework (SIF) model to map existing energy demands and show potential locations for new decentralised renewable and

low carbon energy generation. GEM has been used for a recent commission to prepare an evidence base in support of Dover's Core Strategy policy on sustainable construction and renewable energy generation (this is covered later in this review).

The model is based on EDAW's Social Infrastructure Model which has been used as an evidence base for local development document policies and targets and as a framework for assessing Section106 contributions and potential tariff payments on projects including: Milton Keynes Growth Strategy, London Thames Gateway, North Northants Strategic Investment Strategy, Thetford Growth Strategy, Norwich Infrastructure Study and the Huntingdonshire Local Investment Framework. In future it will provide a framework for Community Infrastructure Levies.

Performance Criteria	***Score***
Scope	3
Stakeholder engagement	0
Outcomes	2
TOTAL	**5**

Community energy: Urban planning for a low carbon future

This guide was produced by the Town and County Planning Association and the Combined Heat and Power Association in 2008. It was targeted at key shapers of policy and practice in local government, regeneration agencies, developers and utilities, including Energy Service Companies. It seeks to guide the audience through the planning and implementation processes for sustainable energy and introduces the concept of character areas.

The guide, which should be adapted to reflect the local context, includes the following character areas: city centre, edge of centre, inner city districts, industrial hinterland, urban extensions and rural hinterland. Character areas describe the broad context, type and form of new development by considering the character of the existing community. The character areas will help assess the potential for different supply strategies, including supplying low carbon energy to existing communities and the policy approaches and targets needed to make this happen. Character areas can also play a key role in helping to identify delivery mechanisms; local stakeholder engagement is an important part of this process.

Performance Criteria	***Score***
Scope	3
Stakeholder engagement	2
Outcomes	3
TOTAL	**8**

Heat density mapping

GIS can play an important role in the development of local renewable and low carbon energy targets. Heat density mapping can be used to illustrate current and future heat and cooling load and supply. This helps inform planning policies and can aid in the development of CHP schemes by identifying which locations are likely to be most suitable to realise the maximum environmental and economic benefit.

Heat maps can be formed using utility data (available from BERR MLSOA) or stock data (available from the Census). The BERR approach, described below, built a model of the villages, towns, cities, and conurbations in the UK. This allowed assessment of not only the potential of each area to support district heating and cooling systems (census area, post code area, etc.) but also the most appropriate type of technology. For example, using waste heat from a power station may be suitable in many areas from a density perspective, but due to the high thermal output of the station only four areas across the UK have a large enough heat load to make the installations viable.

BERR Analysis of heat density in England and Wales

The heat density of an area can be estimated using census data on house types and the physical area of the census unit used. A preliminary analysis has been carried out using the

Census data for housing in England and Wales. The numbers of dwellings of each type and an estimate of the heat demand has been calculated and plotted against the heat density for each census output area.

On the basis of previous work it is reasonable to conclude that 4.4m to 6.5m dwellings could be supplied with district heating networks (DHN) provided that a rate of return over 6% real discount rate is considered economically viable and provided that the market penetration rates assumed can be achieved in practice with only a limited discount on heat costs. Non-domestic buildings can also be supplied from DHNs where suitable density exists. This number of dwellings equates to a heat density of approximately 3000kW/km2 or above. If discount rates lower than 6% are used in the analysis the potential is much larger. A critical issue is whether the large number of mid 20th century semi-detached and lower density suburban houses can be economically connected to DHNs.

More detailed work on the design and costs of networks in the lower density suburban housing sector is recommended to establish the parameters under which the DHN could be economically attractive. In the lower density areas, micro-generation technologies (individual biomass boilers, ground or air source heat pumps, solar thermal) may be more economically viable and these are being compared in the main economic model.

Performance Criteria	***Score***
Scope	3
Stakeholder engagement	0
Outcomes	2
TOTAL	**5**

Name of Study	***Revision 2010***
Client:	Government Office for the South West & the South West Regional Assembly.
Consultant:	Consortium of consultants led by Peter Capener.
Contact details:	8a Dartmouth Avenue, Oldfield Park, Bath, BA2 1AT. 01225 446478
Date of final report:	June 2004

Performance Criteria	***Comments***
Scope	
Objectives of study	To encourage the adoption of county and sub-regional targets for renewable energy development through provision of an evidence base.
Target audience	Local authorities.
Stage in development plan process	At time of study: Sub-regions at different stages of developing energy strategies. Targets to be included as modification to Structure Plans. Used to support the Avon Joint Structure Plan which was already implemented.
Timeframe for targets	2010
Nature of targets	Targets (in MW of installed capacity) by county in the south west. Adoption of target ranges by authorities.
Level of geographical analysis	Regional and county-wide capacity analysis by sustainable energy systems.
Types of energy	Power capacity installed and electricity generation.
Role of energy efficiency	Energy efficiency and heat not addressed.
Resources/ technologies covered	Comprehensive range of technologies assessed. Includes marine energy (where locally relevant), poultry litter, energy crops and energy from waste. Little consideration of small scale renewables beyond micro-hydro.
Types of development	Focus is on new energy capacity. No consideration of integration with existing systems.

Performance Criteria	*Comments*
Outputs	GIS of wind and biomass resources spatially mapped. Includes landscape sensitivity analysis on site specific basis. Implementation of targets through consultations.
Stakeholder engagement	Engagement at multiple stages: Pre-consultation meetings – building strategic 'buy in'. Surveys – results used to plan consultation workshop and highlight issues. Workshops – outcomes used to develop scenarios for further consultation. Regional conference – discussion of delivery issues. Follow up meetings in sub-regions to facilitate adoption of targets.
Data and Sources	Regional resource assessment, Terence O'Rourke and ETSU (TORE), 2001. Regional Planning Guidance for the South West (RPG 10) published in September 2001 South West Wood Fuel Strategy. Powergen's planning led approach to site identification. Regen SW study of existing capacity. Gross Value Added (GVA) http://www.statistics.gov.uk/cci/nugget.asp?id=254
Outcomes	Provides evidence base which was used to set targets at county level in the region. These targets were subsequently incorporated into the South West Regional Spatial Strategy (still pending full adoption).
Applicability to WAG research	Comprehensive consultation process conducted at all stages. Outputs integrated into development of targets. Provides methodological process for developing GIS maps. An example of an evidence base which has been utilized to define county energy targets.

Performance Criteria	*Score*
Scope	2

Stakeholder engagement	3
Outcomes	3
TOTAL	**8**

Name of Study	***Revision 2020***
Client:	Government Office for the South West & the South West Regional Assembly.
Consultant:	Centre for Sustainable Energy, led by Peter Capener.
Contact details:	8a Dartmouth Avenue, Oldfield Park, Bath, BA2 1AT. 01225 446478
Date of final report:	June 2005

Performance Criteria	***Comments***
Scope	
Objectives of study	Extending the assumptions made in Revision 2010 to 2020, with the added analysis of building integrated energy technologies and renewable heat.
Target audience	Local and regional authorities.
Stage in development plan process	Report produced to feed into development of Regional Spatial Strategy.
Timeframe for targets	2020
Nature of targets	Regional target, in MW of installed capacity. Also, region wide CO2 reduction target for major new developments.
Level of geographical analysis	Region-wide capacity analysis by sustainable energy system with demand-side scenario testing.
Types of energy	Power capacity installed, electricity generation and heat capacity.

Performance Criteria	***Comments***
Role of energy efficiency	The importance of energy efficiency highlighted but measures and policy issues not explored in the report. The policy scenarios included a high and low energy efficiency scenario, in relation to future electricity consumption, to test whether the installed renewable electricity generation could meet (at that time, the Energy White Paper target) 20% of electricity consumption coming from renewable sources.
Resources/ technologies covered	Comprehensive range of technologies assessed. Includes locally relevant marine energy, poultry litter, energy crops and energy from waste. Renewable heat and CHP.
Types of development	Scenarios used to model future demand from new and existing stock. Integration of CHP and renewable heat with existing buildings. Recognises links between renewable heat and fuel poverty.
Outputs	GIS of renewable resources spatially mapped. Includes offshore analysis for marine and wind. Includes landscape sensitivity analysis on site specific basis. Map of off-gas grid areas and mapping of heat density in off gas areas.
Stakeholder engagement	Engagement at multiple stages, : Presentation to Regional Assembly. Workshops – identified preferred scenarios and provided sounding board for proposals. Consultation with sector experts and local 'energy champion network'.
Data and Sources	Significantly based on Revision 2010. Regional resource assessment, Terence O'Rourke and ETSU (TORE), 2001. South West Wood Fuel Strategy. Regen SW study of existing capacity. Energy White Paper: Our Energy Future – Creating a Low Carbon Economy DTI Feb 2003 Planning for Renewable Energy – A Companion Guide to PPS 22, ODPM 2004

Performance Criteria	*Comments*
Outcomes	Considered for incorporation within the Regional Spatial Strategy (RSS). Proposals for a range of planning policies to support implementation.
Applicability to WAG research	Creates well evidenced case for the targets set. Provides additional methodological process for developing GIS maps for off-grid gas areas. Modelling of market penetration of renewable heat into existing buildings.

Performance Criteria	*Score*
Scope	3
Stakeholder engagement	2
Outcomes	2
TOTAL	**7**

Name of Study	**Evidence base for sustainable construction policies and testing of renewable energy capacity and feasibility for the Dover District Council Core Strategy 2006-2026**
Client:	Dover District Council
Consultant:	EDAW/Faber Maunsell
Contact details:	The Johnson Building, 77 Hatton Garden, London, EC1N 8JS.
Date of final report:	November 2008

Performance Criteria	*Comments*
Scope	
Objectives of study	To clarify and justify the Core Strategy's policy regarding sustainable design and construction, currently set out in policy DM3 of the draft Core Strategy. Related objectives have been to analyse the potential of the strategic sites to deliver improved environmental performance and to ascertain through modelling the potential of the whole District to meet regional renewable energy targets.
Target audience	Planners of the LA and 'partners' (undefined).
Stage in development plan process	At time of study: Evidence base for Preferred Options of Core Strategy. Now: the Council is carrying out public consultation on the Core Strategy.
Timeframe for targets	2006-2026
Nature of targets	District and site-wide (4 sites) policy changes (new and revisions).

Performance Criteria	***Comments***
Level of geographical analysis	Policy recommendations were made following analysis of policy, physical and financial contexts. These were then tested on the following criteria: − District-wide capacity for renewable energy (chapter 6); − Strategic site capacity (chapter 7); − Masterplanning and urban design (chapter 8).
Types of energy	Electricity/Gas (MWh)
Role of energy efficiency	Dover is seeking to improve the existing stock (in accordance with HECA 1995) by 20% by 2015. There is not a similar approach for non-domestic at present. This has been tested using two funding scenarios (the second includes improvements to non-domestic). The importance of improving existing stock is strongly conveyed. Energy efficiency assumed to be targeted before energy generation for new development.
Resources/ technologies covered	Onshore wind power, biomass, and solar technologies feasibility tested against Growth Option 4 for district wide analysis. Tests technology mix (on-site/off-site demand for energy generation) based on market driven and character driven scenarios. Low and zero carbon strategy for strategic sites is based on further, local feasibility testing.
Types of development	Tests different levels of CSH that should be targeted (acknowledges incremental increase over time, in line with national policy) in financial assessment and for strategic sites. District wide: tests different housing type mixes (market driven and character driven scenarios). Strategic sites: 2 scenarios (market and CHP driven) to demonstrate implication of density. General implications on masterplan and urban design area also drawn out (Chapter 8).

Performance Criteria	*Comments*
Outputs	GIS: Baseline energy demand. Suitability of density by ward. Dover wind speed at 45m. Dover potential turbine sites by wind speed. Biomass agricultural and woodland. Potential biomass sites agriculture and woodland (within 5km of urban land use).
Stakeholder engagement	None carried out to date. Refers to the need to carry out stakeholder engagement, especially for potential wind turbine sites.
Data and Sources	BERR Regional Energy Statistics (http://www.berr.gov.uk/whatwedo/energy/statistics/regional/index.html) – Dover Energy demand and distribution. Development of a Renewable Energy Assessment and Targets for the South East', ETSU/AEA Technology and Terence O'Rourke, 2001. Strategic Housing Market Assessment for the East Kent Sub Region, Ecotech, August 2008.
Outcomes	Clear case for leading-edge policy. The preparation of the Development Contributions SPD allows the Council to reduce uncertainty (of policy direction and standards) and to design a suitable way to invest in carbon emission reduction and water efficiency. The Dover Carbon Management Action Plan may also play a fundamental role. Acknowledges role of National Indicators to improve corporate performance. Highlights the need for Dover to play a key role in the delivery and management of the infrastructure required to meet the policy targets, first of all by developing a funding model for inclusion in the Development Contributions SPD.

Performance Criteria	*Comments*
Applicability to WAG research	Good introduction to standards and how they will change with time at a national level. Acknowledges the need to build in flexibility. Excellent policy (and policy justification) and physical context (at the local level, including impacts of climate change) components. Adaptation is mentioned briefly but it makes sense to look at sites from an adaptation point of view when they are assessed for mitigation opportunities. This study looks at both District and Strategic targets which seems to be a very sensible approach.

Performance Criteria	*Score*
Scope	2
Stakeholder engagement	0
Outcomes	3
TOTAL	**5**

Name of Study	*A renewable energy capacity study for Merthyr Tydfil County Borough Council*
Client:	Merthyr Tydfil County Borough Council (MTCBC)
Consultant:	National Energy Foundation
Contact details:	E-mail: haithanaskar@nef.org.uk The National Energy Centre, Davy Avenue, Knowlhill, Milton Keynes, MK5 8NG. Tel: 01908 665555
Date of final report:	February 2008

Performance Criteria	*Comments*

Performance Criteria	***Comments***
Scope	
Objectives of study	This document focuses on changes to be made to the Local Development Plan Preferred Strategy to recognise importance of climate change mitigation/adaptation. Minimal reference to targets: Introduce a guideline and threshold to set target requirement for developers to reduce carbon dioxide through the implementation of relevant methods, i.e. in renewables, energy efficiency and conservation measures.
Target audience	Primarily MTCBC planning policy officers
Stage in development plan process	At time of study: Building the evidence base. Now: LDP to be adopted in July 2010. Preferred strategy consultation complete, Deposit Plan consultation completed Dec 2008, to be reviewed in June 2009 by the Council and submitted to Inspector in November 2009.
Timeframe for targets	LDP will be 2006-2021. The targets would be through to the end of 2020.
Nature of targets	Carbon dioxide saving requirements for strategic sites should be based on an increasing and incremental level of (%) reduction linked to a timetable up to the end of 2020 e.g. 5 year programme, such as 10% until the end of 2010, increasing to 15% by the end of 2010 until the end of 2015, and increasing again to 20% from the end of 2015 until the end of 2020. An incremental approach is also recommended for on-site renewables.
Level of geographical analysis	A scoping assessment was carried out to specific sites within MTCBC to explore the potential of renewables in those areas. These are strategic sites within the LDP 2006-2021.
Types of energy	The study does not distinguish between electricity/heat.
Role of energy efficiency	Local CO2 emissions should be considered as a strategic environmental issue. The Council should adopt the energy hierarchy's staged approach of reducing energy, efficient energy supply and renewable energy generation.

Performance Criteria	***Comments***
Resources/ technologies covered	Assessment of technologies was based on the guideline set out in Technical Advice Note (TAN8): i. On-shore wind technologies, i.e. small to medium sized developments on urban, industrial, brownfield sites and smaller sized generation on domestic and community based projects. ii. Biogas, from anaerobic digestion. iii. Bio-fuels for vehicles. iv. Community/ district heating. v. Energy from waste. vi. Fuel crops, including wood fuel. vii. Hydro-power. viii. Methane potential from landfill sites and coal seams/beds. ix. Solar thermal and photovoltaics.
Types of development	Need to define what constitutes a significant development (not yet done).
Outputs	No GIS was done. Strategic site analysis detailed in Annex 2 describes the situation, building structure and services, tenure and finance. It suggests potential renewable measures for the site but the assessment uses secondary, national level sources and is not comprehensive.
Stakeholder engagement	Minimal stakeholder engagement was carried out, if any.

Performance Criteria	*Comments*
Data and Sources	BERR wind speed database for 1km^2 map grid squares A study by the Centre for Sustainability (C4S) [on behalf of The Alternative Fuels Infrastructure Group] at TRL ltd5; found that though there are considerable opportunities for alternative fuel production, only two companies in Wales currently produce Bio-diesel. A study published in 2000, by SAC Agro Industrial Research Services to WAG, concluded that all fuel crops, apart from Miscanthus, don't have the economics for large area investment in Wales. Estimating the annual solar irradiation and the likely output from two different designs of photovoltaic panel is available from PVGIS, http://re.jrc.ec.europa.eu/pvgis/apps3/pvest.php#. Coal mind methane potential: A study by IMC Geophysics International Limited commissioned on behalf of NEF, ACM/DAB/Rep/ Mine Gas/S4869/825, March 2008. Surface geological maps and BGS memoirs for Merthyr Tydfil (Sheet 231) and Newport (Sheet 249) have also been examined. Also used: http://waterquality.montana.edu/docs/methane/cbmfaq.shtml.

Performance Criteria	*Comments*
Outcomes	Policies should support the development of community generation, ESCOs, co-location schemes, in terms of energy efficiency, and potential generation through CHP and other renewable technologies. Additionally, specific renewable energy generation targets for developments (at all scales potentially) need to be drawn up. These should be reinforced by providing examples in the LDP and SPG for detailed design guidance. A sustainability vision is needed for Merthyr Tydfil. The vision should also be incorporated as one of the strategic priorities of the County Council, linked directly to the regeneration agenda of the Borough Council and should be seen as important step to realise its aim. The study recommends a number of monitoring indicators, one set of which could be incremental improvement indicators relevant to: - Carbon Management (for the council assets) and the local business community. - Percentage of improvement in cutting carbon emissions as part of the Multi Area Agreement. - Scale of renewable energy generation in MTCBC (kWh/yr). - Number of new projects, e.g. in public and private sectors that are implementing renewables in their design and operations. - Eco Homes/Code for Sustainable Homes. - Threshold guideline to use renewables (%), in new build of dwellings and non-dwellings.
Applicability to WAG research	Targets seem to be the next step; they are not covered in detail in this study. Very thorough Policy Review specific to Wales, including the compendium on climate change to help develop relevant policy (the document has a status similar to a TAN). Useful map showing potential for renewable energy in the UK (Defra, not fully referenced). Case Study: North Glamorgan NHS Trust: 500kW combined heat and power (CHP) plant and energy efficient boilers; this system uses excess heat to heat the hospital.

Performance Criteria	*Score*
Scope	1
Stakeholder engagement	0
Outcomes	2
TOTAL	**3**

Name of Study	*East of Exeter New Growth Point – Energy Strategy*
Client:	East of Exeter New Growth Point Delivery Team
Consultant:	Element Energy Ltd.
Contact details:	Twenty Station Road, Cambridge, CB1 2JD
Date of final report:	21st July 2008

Performance Criteria	*Comments*
Scope	
Objectives of study	A strategic analysis of CO_2 from new developments and conception of an energy strategy.
Target audience	Local authority and project team planners.
Stage in development plan process	Produced prior to commencement of LDF.
Timeframe for targets	2020
Nature of targets	Targets based on local policy, going beyond national energy targets for new developments. Area wide and site specific for residential (CSH) and non-residential (improvement on Building Regs).

Performance Criteria	***Comments***
Level of geographical analysis	Analysis for whole Growth Area and by strategic sites within this.
Types of energy	Electricity and heat.
Role of energy efficiency	Focus on new build efficiency measures through CSH. No analysis for commercial. Document is new development-led, limited discussion on existing buildings.
Resources/ technologies covered	Wide range of energy technologies including micro-generation, heat and energy from waste. Applied to each strategic location with additional analysis on a single area, adding detail to study.
Types of development	Residential and commercial. Analysis at individual masterplan level. Negligible focus on existing buildings and networks.
Outputs	Minimal GIS, only development layout. Predictions of energy demand and potential savings. Energy Strategy tailored to each development area.
Stakeholder engagement	Recommendation for consultation in developing biomass supply chain, but none conducted as part of Energy Strategy.
Data and Sources	Supporting and delivering zero carbon development in the South West, Faber Maunsell and Peter Capener, January 2007. Sustainability Strategy Rev 16, Richard Hodkinson, October 2007. The South West Renewable Energy Atlas Wardell Armstrong, commissioned by Regen South West and GOSW. Revision 2020. Building Regulations & CSH.
Outcomes	Well developed energy strategy for the Growth Area, and recommendations for local and regional planning policy.

Performance Criteria	*Comments*
Applicability to WAG research	Strong analysis of new build potential and options for emissions reductions. Provides evidence of technical and economic viability at strategic site level. Suggests formation of PPP's and ESCo. Proposes individual strategies for different sectors.

Performance Criteria	*Score*
Scope	2
Stakeholder engagement	0
Outcomes	2
TOTAL	**4**

Name of Study	*Camborne Pool Redruth Regeneration – Energy feasibility study*
Client:	Cornwall Sustainable Energy Partnership (CESP) and Camborne Pool Redruth (CPR) Regeneration.
Consultant:	Element Energy Ltd.
Contact details:	Jupiter House, Station Road, Cambridge, CB1 2JD
Date of final report:	25th January 2006

Performance Criteria	*Comments*
Scope	
Objectives of study	Define a practical delivery pathway for a sustainable energy community in CPR, including energy options and recommendations for implementation.
Target audience	Planners within local authority, CESP and CPR regeneration.

Performance Criteria	***Comments***
Stage in development plan process	At time of study: Structure Plan 2004, pre-LDF. Now: area action plan 'Issues and Options' published February 2008.
Timeframe for targets	Targets are carbon emission and percentage improvement in comparison to base case.
Nature of targets	CPR regeneration area-wide. Measured in CO2.
Level of geographical analysis	Conducted resource availability studies. Site specific studies for key supply/demand sites. No GIS analysis included.
Types of energy	Heat and electricity (kWh).
Role of energy efficiency	Role of energy efficiency described for new build domestic and commercial development only. Range of efficiency options considered, includes abatement cost curve.
Resources/ technologies covered	District heating/CHP – includes site specific assessment. Biomass – existing supply/potential supply estimated and demands identified Energy from waste Wind – non spatial analysis Geothermal Range of micro-generation technologies
Types of development	No recognition of existing heat demand or supplies of existing housing. Does consider existing waste resource and abandoned mine for Geothermal.
Outputs	No GIS outputs.
Stakeholder engagement	No evidence of consultation.
Data and Sources	Cornwall Sustainable Energy Project: Planning Guidance, 2004.
Outcomes	Economic feasibility of a range of energy measures. Limited recommendations on implementation.

Performance Criteria	*Comments*
Applicability to WAG research	Utility limited by lack of spatial analysis and uncertainty in scale and type of regeneration. Discussion on role of ESCos and Building Control in implementation.

Performance Criteria	*Score*
Scope	1
Stakeholder engagement	0
Outcomes	1
TOTAL	**2**

Name of Study	*Plymouth Renewable Energy Strategic Viability Study*
Client:	Plymouth City Council
Consultant:	Centre for Sustainable Energy and Wardell Armstrong International.
Contact details:	3 St Peter's Court, Bedminster Parade, Bristol BS3 4AQ. Telephone: 0117 934 1400
Date of final report:	March 2007

Performance Criteria	*Comments*
Scope	
Objectives of study	Assessment of renewable energy technical potential and deliverability. Policy guidance on implementation.
Target audience	Local authority planners.
Stage in development plan process	Report suggests modifications to LDF.

Performance Criteria	***Comments***
Timeframe for targets	2016
Nature of targets	City wide, focused on new build only.
Level of geographical analysis	City wide, including biomass resource in environs. Limited application of findings to local action areas.
Types of energy	Electricity (MWe) and Heat (MWth)
Role of energy efficiency	Covers efficiency issues and highlights importance of tackling the existing stock.
Resources/ technologies covered	Onshore wind Biomass Energy from waste Solar PV and hot water Marine Heat pumps
Types of development	Promotes development of heat infrastructure and of integration with existing anchor loads.
Outputs	GIS Wind maps: constraints map; potential for building integrated; open area, industrial turbines. Biomass resource and constraints (focus on two most applicable technology types).
Stakeholder engagement	Stakeholder workshops: unguided discussion of barriers and opportunities of on site renewables. Little evidence that responses had impact on outputs.

Performance Criteria	*Comments*
Data and Sources	Local and regional planning documents (ensuring policy consistency) Merton Rule London Renewables Toolkit Revision 2020 Making ESCos work Croydon's SPG15 Renewable Energy in Devon 2004-2007 CSH/EcoHomes
Outcomes	Target for renewable energy generation from new developments and opportunity areas. Suggested revisions to LDF. Recommend establishment of a wood fuel supply chain.
Applicability to WAG research	Section on policy background. Conducted wind assessment based upon commercially available turbines. Highlights necessity of partnership with neighbouring authorities. Defines role of ESCo's and s106 in implementation. Provides information on funding sources. Methodology includes brief technology primers. Study focus on building integrated RE. Example of an evidence base in a constrained urban location.

Performance Criteria	*Score*
Scope	2
Stakeholder engagement	1
Outcomes	2
TOTAL	**5**

Name of Study	***Heat and energy mapping and decentralised energy feasibility study***
Client:	Advantage West Midlands
Consultant:	Halcrow Group
Contact details:	1 The Square, Temple Quay, Bristol, BS1 6DG
Date of final report:	April 2008

Performance Criteria	***Comments***
Scope	
Objectives of study	Establish an evidence base, review gas and electricity supply networks, identify opportunities and stimulate business opportunities.
Target audience	Planning
Stage in development plan process	Study's place in the wider policy context not made clear in document.
Timeframe for targets	2015/16
Nature of targets	None set.
Level of geographical analysis	Regional, county and lower layer super output area (LSOA).
Types of energy	Electricity, heat and gas.
Role of energy efficiency	Acknowledgement of its importance but not explored as part of evidence base.
Resources/ technologies covered	District heat and CHP

Performance Criteria	***Comments***
Types of development	Mapping of existing heat demands for both, domestic, commercial, public and industrial. No analysis of existing heat supply.
Outputs	GIS by LSOA Heat and electricity demand – non/domestic. Heat and electricity demand – non/domestic – projections to 2015/16. Gas infrastructure mapping. CHP uptake scenario testing. Economic sensitivity analysis.
Stakeholder engagement	Workshops to gain stakeholder opinions on dissemination and implementation/interventions. Although not structured into consultation, technical issues on methodological approach were raised and were reviewed for final report.
Data and Sources	Census 2001 Household Spaces and Accommodation Type (at LSOA1 level), Office of National Statistics (www.neighbourhood.statistics.gov.uk). 2006 Dwelling Stock by Council Tax Band (at LSOA level), Department of Communities and Local Government – Housing Data and Statistics Department, (www.neighbourhood.statistics.gov.uk). 2005 Annual Business Inquiry Workplace Analysis employment and workunits (at LSOA level), Office of National Statistics (www.nomisweb.co.uk). 2006 UK Business Monitor: Local Units in VAT-based enterprises (at Local Authority level), Office of National Statistics (www.statistics.gov.uk). 2006/07 UK Annual Population Survey Workplace Employment (at Local Authority Level), Office of National Statistics (www.nomisweb.co.uk). High Pressure Gas Pipeline Location, National Grid (www.nationalgrid.co.uk) 2006/07 to 2015/16. Regional Housing Completions Projections (site level), RSS Draft Preferred Option, Regional Assembly . Fifty most likely employment sites to be developed by 2021 in the West Midlands region, Advantage West Midlands. Good Practice Guide 234: Guide to community heating and CHP, Energy

Performance Criteria	*Comments*
	Efficiency Best Practice, 2002. 2004 Experimental High Level Energy Indicators (www.berr.gov.uk). Electricity and Gas consumption estimates 2005 for West Midlands Government Office (www.berr.gov.uk). 2005 Detailed Service Sector Final Energy Consumption by Sub-Sector and End Use by Fuel (www.berr.gov.uk). 2005 Detailed Industrial Final Energy Consumption by Sub-Sector and End Use by Fuel (www.berr.gov.uk). Household Gas Connections for the West Midlands (at Post Code Sector level), Advantage West Midlands. 2004 Indices of Multiple Deprivation: Central Heating Indicator (percentage of households without central heating at LSOA level), former. Office of Deputy Prime Minister (www.neighbourhood.statistics.gov.uk) . Long Term Development Statement for Central Networks West 2006 – 2011, Central Networks – A Company of E-ON. National Grid Gas and Electricity Transmissions System of England, Wales and Scotland 2007, National Grid.
Outcomes	Initial assumption was that West Midlands has little capacity for wind, marine solar etc. Focus of meeting energy and emissions targets is biomass and CHP. Report provides strong evidence base for site level action. Little detail on policy levers required to develop potential.
Applicability to WAG research	Interesting focus on rural energy issues (off-gas grid homes). Methodological approach uses detailed datasets and analysis by Standard Industrial Classification code. Provides thorough analysis of existing heat demand; it may be useful to extended this analysis to include heat supply.

Performance Criteria	*Score*
Scope	2
Stakeholder engagement	1
Outcomes	2
TOTAL	**5**

Name of Study	*Renewable Energy in North Devon - Reviewing the Targets for 2010*
Client:	North Devon DC & Torridge DC
Consultant:	Centre for Sustainable Energy
Contact details:	The CREATE centre, Smeaton Road, Bristol, BS1 6XN.
Date of final report:	3rd March 2006

Performance Criteria	*Comments*
Scope	
Objectives of study	To review the RE action plan of 2002, whose aim was provide an action plan to develop the RE potential in the districts.
Target audience	District Councils
Stage in development plan process	Pre-adoption of the LDF.
Timeframe for targets	2010
Nature of targets	Single target set across North Devon. MW capacity installed split by renewable and heat.
Level of geographical analysis	Analysis at district and at ward level.

Performance Criteria	***Comments***
Types of energy	Heat, gas and electricity.
Role of energy efficiency	Indicates necessity for energy efficiency strategy but does not state options or solutions.
Resources/ technologies covered	Wind with landscape sensitivity analysis. Tidal barrage Energy from waste Micro hydro Biomass/energy crops Building integrated renewable Anaerobic digestion Heat
Types of development	Identifies existing sources of fuel for heat but not existing heat supply.
Outputs	GIS Biomass and energy crop. Off-gas grid domestic heat loads. Wards without mains gas with managed woodlands overlaid.
Stakeholder engagement	Following an initial technical assessment the proposed scenarios were presented to stakeholders. They were also given a set of actions that had been identified for implementation of the scenarios and asked to rank them by importance. This fed into report's recommendations. The stakeholders were interested members of the local public.

Performance Criteria	*Comments*
Data and Sources	Revision 2020. North Devon Renewable Energy Action Plan, June 2002. Multiple regional and sub-regional strategy and planning documents. Energy efficiency in buildings, CIBSE Guide F, 2004. Commercial and Industrial Floor space and Rateable Value Statistics, ODPM, 2003. Annual gas consumption per household for the South West, from DTI data for December 2003. The Economic Contribution of the Renewable Energy Sector to the South West – Final Report; Nov 2005. DTI Updated emissions projections, final projections to inform the National Allocation Plan (NAP), November 2004.
Outcomes	Review has increased target from 10MW to 151MW. Broader range of technologies considered. Refinement and reassessment of which resources can be exploited.
Applicability to WAG research	A review of their existing evidence base, iterative process improving and expanding on existing data. Joint plan conducted by two authorities. Novel approach to stakeholder engagement. Provides actions for ranking by urgency/importance. Off-gas areas directly matched to wood fuel resource. Indicating potential areas for local wood fuel supply. Identifies link with fuel poverty.

Performance Criteria	*Score*
Scope	2
Stakeholder engagement	2
Outcomes	3
TOTAL	**7**

Recommendations

This aim of this literature review has been to identify elements of existing methodologies for setting low carbon and renewable energy targets that are applicable to the Wales context. In addition, other aspects that are not covered adequately in these studies have been outlined, so a fresh approach can be developed for the framework methodology.

Beyond the Local Development Framework

All studies were carried out with planning officers as the target audience. Most studies tested English Core Strategies being prepared as part of the Local Development Framework (LDF), though in the case of East of Exeter and Camborne Pool Redruth the preparation of the LDF had not yet commenced. Many of these studies have been developed as part of the evidence base required by the PPS1 Supplement and as such contain significant technical detail that may only be of limited direct interest to planners. However, a certain level of detail is necessary to underpin policy and targets so it is important that complex data is presented in such a way that planning officers can make informed decisions based upon it. The Dover study suggested changes to local policy based on technical findings in the evidence base, which is a helpful addition.

The spatial analysis undertaken as part of an evidence base will identify specific opportunities for particular energy technologies and promoting CO2 reductions. This spatial understanding will inform the scope of planning policies and setting of targets. However, experience tells us that the ideal solutions may not fit neatly into the private developer led planning applications that trigger the use of these policies or targets. Delivering a town centre district heating network, for example, may begin by linking up existing civic-owned buildings as well as individual planning proposals. Planning policy and targets in the traditional sense are poorly placed to facilitate this.

The purpose of an evidence base, therefore, should to be to inform wider action across a local authority area or group of authorities. In terms of delivery this means identifying those stakeholders who are best placed to take each opportunity forward. Planning policy and targets will be ideal for some schemes, but local authorities and their stakeholders (including Local Strategic Partnerships) will be better placed to deliver, or facilitate the delivery of, more complex proposals that cut across wider areas, particularly those that link new and existing communities (i.e. non development specific).

Developing an understanding of different character areas within an authority will also help us to identify both appropriate technologies and delivery partners and mechanisms. The Community Infrastructure Levy offers a significant opportunity for funding energy infrastructure. Currently, the CIL has not been fully explored in its application for energy. Other delivery mechanisms exist within the wider local authority context, which draw on the powers and duties available to authorities and their strategic partners. For example:

- Sustainable Community Strategy or a related energy or climate change strategy, including links back to development plan documents;

- Powers of Wellbeing which allow participation in special purpose vehicles to deliver sustainable energy services, co-ordinate investment and property investment;
- Local authority owned land sales;
- Procurement decisions;
- Local authority Initiatives such as affordable warmth and change management;
- Energy services, such as ESCOs; and
- Corporate strategies for development and investment of local strategic partners, including health and education.

Early stakeholder engagement

Most studies except Revision 2010 and Revision 2020 were very weak on stakeholder engagement. These studies included pre-consultation meetings, carried out surveys to feed into workshops and held a regional conference, with follow up meetings in sub-regions. The North Devon study presented interested members of the public with a set of scenarios which were developed following initial spatial analysis of low carbon and renewable energy potential. A series of implementation actions were prioritised by the stakeholders, which then fed into the final recommendations of the report.

It is important to define the role of stakeholder engagement in setting energy targets and to agree whether this should be carried out during the preparation of the evidence base or afterwards. For example, the evidence base may be the first step in bringing together potential members of a regional or local climate change advisory group, with meaningful involvement of business and other stakeholders who can help identify local opportunities and constraints. The value of early and broad stakeholder engagement has been established in a range of studies (such as Stakeholder Engagement in Regional Planning, prepared by the TCPA for ODPM in 2004) over a number of years. The conclusions from these have influenced PPS11 and 12. High quality engagement can help:

- Use the strategy as an early warning for key stakeholders to reduce resistance, improve understanding of their various needs and barriers, and of 'cross-cutting' benefits.
- The ability of the energy strategy to build social capital through building skills and generating income streams, demonstrable leadership through visible systems and fostering stakeholder ownership.
- Improve understanding how energy supply issues present actual barriers to broader behavioural change in the area.

The opportunities associated with low carbon and renewable energy targets need not be constrained to the realm of spatial planning. The Dover study acknowledges the role of National Indicators in improving corporate performance. An integrated approach to these targets and related issues is needed to maximise local opportunities, which may cross geographical boundaries and require wider collaboration for effective and efficient delivery. The extent to which different parts of local government and other strategic partners come together to produce and manage an evidence base and to use it to influence planning and corporate level policy and target setting, the more effective the strategy’s implementation is likely to be.

Cross-border cooperation

Some methodologies examine both area wide and site-specific targets for a region, which is a good approach, helping to ensure local opportunities are fully exploited. The PPS1 Supplement encourages local authorities to look beyond geographical boundaries and to seek opportunities to integrate new and existing development. The AGMA study, which is currently being done by Faber Maunsell, is taking steps to integrate new and existing development and to highlight links between planning and delivery. The ten local authorities that constitute AGMA co-operate on a number of issues, both statutory and non-statutory, where there is the possibility of improving service delivery by working together.

There is growing evidence of partnership working at the local level, as in the North Devon study, but this appears to be uncommon in completed low carbon and renewable energy studies to date. Studies for part of West Sussex and Derbyshire have recently been tendered, which bring together a number of district councils. This is encouraging since pooling resources to collect data from sources that are broadly similar across a sub-region or region means that a far more robust study can be undertaken. The pot of money available through Area Based Grants in England (around £22,000 per authority from CLG to help them implement the PPS1 Supplement) seems to be partly behind this move to sub-regional studies. It would be good to explore potential for this sort of cooperation at a larger (possibly WAG) scale in future, by taking the technical and spatial analysis beyond immediate administrative boundaries.

Improving the existing stock

Revision 2020 tested different development scenarios to model future demand from new and existing building stock. The Dover study strongly conveyed the importance of improving the existing stock and used two funding scenarios to demonstrate this. Improvements are particularly important in areas that have poorly performing buildings and are not expected to experience significant growth in the near future. The PPS1 Supplement reiterates this and seeks to identify ways in which planning, which traditionally has had an uneasy relationship with the existing stock due to its focus on new build, can bring new and existing communities together.

The Advantage West Midlands study has an interesting focus on rural energy issues (off-gas grid homes) which may be applicable to many parts of Wales. It is clear that evidence gathering exercises need to base their resulting energy strategies around the particular opportunities afforded by different parts of the authority area. The AGMA study's use of character areas to identify similar areas in terms of land uses, densities, tenures and so on (as proposed by Community energy: urban planning for a low carbon future) is particularly helpful in enabling us to better understand the opportunities that are suited to different types of community. Character areas can also be invaluable in helping define appropriate and location-specific delivery mechanisms. For example, a public private partnership ESCO may help to deliver a city centre district heating system whereas local authority based grants using Salix funds may be more appropriate to suburban communities.

The role of GIS: defining targets and effective communication

GIS can and should play an important role in the development of local renewable and low carbon energy targets. GIS is particularly useful for managing and presenting information. As part of this, heat density mapping can be used to help define planning policies and can aid in the development of CHP schemes by identifying where they should be located to realise the maximum environmental and economic benefit. The GEM tool that has been developed by EDAW and Faber Maunsell is useful in local and regional energy studies but has yet to be applied to a large number of studies and will undoubtedly require further refinement. However, it currently provides the opportunity to model expected growth for an area and to test it against energy efficiency improvements and uptake of technologies over time at a census output area level. This helps local authorities to define and set appropriate area-wide and strategic site targets, matching the resource potential and required infrastructure to support it.

Defining robust targets

The PPS1 Supplement outlines the importance of defining energy targets robustly so that performance can be measured against appropriate indicators. Reference to the role of the Code for Sustainable Homes and future changes to the Building Regulations in defining performance against energy targets was a useful part of the Dover Study. A strong policy review and examination of the local physical context are important components of the Dover study, which should be reflected in all methodologies.

Most of the literature on target setting at a regional and local level focuses on setting a single percentage (for a specific area or site). The Merthyr Tydfil study considers the potential for incremental targets that will become more demanding over time, as technologies become more developed and economic viability improves. This is an approach that a number of English authorities have adopted in their emerging Core Strategies, including the London Borough of Merton, and should be considered for the framework methodology.

Creating opportunities for climate change adaptation

Climate change adaptation is mentioned in the Dover Study but the methodology does not address the potential for adaptation at either an area-wide or strategic level. This seems a missed opportunity for all studies; sites that are being assessed for mitigation opportunities should be considered from an adaptation point of view too. This is particularly important in areas that will experience significant growth. Area masterplans provide a unique opportunity to build adaptive capacity and meet ambitious energy targets as part of a complementary approach to mitigation and adaptation. Adaptation can be considered by conducting a risk analysis using the UKCIP climate change scenarios and assessing the vulnerability of the local population and assets. Areas that might be appropriate for low carbon and renewable energy generation may not be appropriate for development from an adaptation perceptive; the risks of developing on a floodplain or in an area that may be more prone to subsidence due to climate change should be more fully understood before high levels of investment take place.

Merthyr Tydfil acknowledges the need for a sustainability vision in the conclusion of the study; this could be an important first step to integrate such issues. The PPS1 Supplement also sets out a methodology that regional and local planners can apply to development plan documents. This includes advice on synergies and potential conflicts between climate change adaptation and mitigation.

Appendix C: Attendees at Stakeholder Workshop

The following individuals attended the Pembrokeshire County Council Consultation Workshop, held at County Hall, Pembroke on 16th September 2009:

- Dave Harries, Environment Manager, Pembrokeshire County Council
- Louisa Cole, Corporate G.I.S. Assistant & Ordnance Survey ALO, Pembrokeshire County Council
- Bob Smith, Senior Forward Planning Officer, Pembrokeshire County Council
- Cath Ranson, Development Plans and Conservation Manager, Pembrokeshire County Council
- Steve Keating, Energy Manager, Pembrokeshire County Council
- Tony Streatfield, Inward Investment Officer, Pembrokeshire County Council
- Dan Shaw, Corporate Planning Manager, Pembrokeshire County Council
- Jim Stobbart, Customer Services Manager Private Sector Housing, Pembrokeshire County Council
- Stephen Ward, Project Director, AECOM
- Simon Hartley, Project Manager, AECOM