

### ANNEX 5 – FORECASTING SOUTH WEST ELECTRICITY DEMAND TO 2020

Table 35: Forecasts of the South West’s electricity demand by 2020

<b>Existing policy measures only – Scenario 2a</b>		<b>UK</b>		<b>SW</b>	
2003 Domestic electricity demand	1	115,761	11	11,656	GWh
2003 I & C electricity demand	2	222,785	12	13,464	GWh
2020 Domestic electricity demand	3	126,767			GWh
2020 I & C electricity demand	4	246,601			GWh
<b>All Energy White Paper measures – Scenario 2b</b>					
2003 Domestic electricity demand	24	123,986	28	12,484	GWh
2003 I & C electricity demand	25	238,614	29	14,421	GWh
2020 Domestic electricity demand	26	105,252			GWh
2020 I & C electricity demand	27	204,748			GWh
<b>GVA and household growth</b>					
2003 Households	5	25,145,000	13	2,138	Households
2020 Households	6	28,736,000	14	2,515	Households
% increase in households	7	14.28%	15	17.63%	
2003 GVA	8	768,515	16	65,497	1995 £,000s
2020 GVA	9	1,164,774	17	104,907	1995 £,000s
% increase in GVA	10	51.56%	18	60.17%	

<b>Total UK demand</b>	
2003	
38	338,546 GWh
2020	
39	373,368 GWh
2003	
40	362,600 GWh
2020	
41	310,000 GWh

<b>Total SW demand</b>	
2003	
42	25,120 GWh
2003	
43	26,905 GWh

Use of different UK forecasts has required the use of different definitions of electricity demand, resulting in the use of different figures for electricity demand. See notes and section on Understanding Electricity Demand below, for explanations.

<b>Assuming existing policy measures – Scenario 2a</b>	
Forecast in UK increase in domestic electricity efficiency = 3/(1 x 7)	19 0.96
Forecast of SW domestic electricity demand in 2020 = 11 x 15 x 19	20 13,139 GWh
Forecast of UK increase in I & C electricity efficiency = 4/(2 x 10)	21 0.73
Forecast of SW I & C electricity demand in 2020 = 12 x 18 x 21	22 15,750 GWh
<b>Forecast of total SW electricity demand in 2020 = 22 + 20</b>	<b>23 28,888 GWh</b>
<b>Forecast of percentage change in SW electricity demand</b>	<b>35 15.0% increase</b>

<b>Assuming EWP policy measures – Scenario 2b</b>	
=26/(24 x 7)	30 0.74
=28 x 15 x 30	31 10,909 GWh
=27/(25 x 10)	32 0.57
=29 x 18 x 32	33 13,071 GWh
<b>=33 + 31</b>	<b>34 23,979 GWh</b>
	36 11.6% reduction
<b>=25,120 x 36</b>	<b>37 22,509 GWh</b>

**Adjusted SW electricity demand in 2020 for EWP policy measure option**

**Notes on Methodology**

It has been assumed for the purposes of this forecast that the two key factors that will affect electricity demand to 2020, specific to the South West, are growth in household numbers and regional Gross Value Added (GVA)

Other factors relating to changes in electricity demand, e.g., efficiency in use, use of appliances, industry energy intensity are assumed to be consistent across the UK.

The forecast of electricity demand in each sector is assumed to be a product of the current regional sector demand, the growth in GVA or household growth and a factor that takes into account all other UK wide variables.

The UK factor is calculated by dividing the forecast UK demand by the product of the current UK demand and UK growth in GVA or household growth. This factor is characterised as being the increase in electricity efficiency within the sector, though in reality it also takes into account all other UK factors like increased appliance use, changes in energy intensity etc.

In carrying out this estimate, figures have had to be drawn from many different sources, all of which use a different base from which to define electricity demand. In order to make meaningful comparisons it has been necessary to increase pro rata the current South West demand figure, which represents 7.42% of the UK electricity sales figure to which it most closely relates. This % has then been applied to the other current UK demand figures, as outlined below, in order to get a comparable figure for South West demand. Whilst not 100% accurate it provides the most meaningful basis for comparison within a forecasting process that by definition has a significant margin of error.

The absolute figure for SW electricity demand calculated using the EWP policy measures assumptions (number 34) is based on a higher figure for electricity demand (than number 23). See section below on 'Understanding Electricity Demand' for explanation. In order to be able to compare the two figures, the SW electricity demand is adjusted by applying to the relative percentage change in electricity demand to the equivalent figure for South West electricity demand (25,120 GWh).

**Notes on Sources****Existing policy measures only**

Existing electricity consumption in South West (number 42) taken from March 2005 Energy Trends (electricity sales) and increased pro rata to take into account on site generation within industrial and commercial sector, to make it compatible with existing UK consumption (number 38) taken from DUKES table 5.5 (final consumption - users) and forecast of UK demand, see below.

March 2005 Energy Trends [http://www.dti.gov.uk/energy/inform/energy\\_trends/dec\\_04.pdf](http://www.dti.gov.uk/energy/inform/energy_trends/dec_04.pdf)

2020 forecast of UK electricity demand, assuming existing policy measures only (number 39), taken from Annex 4 of Updated Energy and Emissions Projections November 2004 - Addendum: Projections beyond 2010. The figure has been increased to take into account of electricity consumption within Iron and steel industry (figure excluded from overall forecast in Updated Energy and Emissions paper). Iron and steel figure taken from DUKES and increased by % forecast in Updated Energy and Emissions Projections paper. See section below on Understanding Electricity Demand

Annex 4 of Updated Energy and Emissions Projections

November 2004 - Addendum: Projections beyond 2010. <http://www.dti.gov.uk/energy/sepn/euets.shtml#uepaddendum>

**All Energy White Paper measures**

Existing electricity consumption in South West (number 43) taken from March 2004 Energy Trends (electricity sales) and increased pro rata to make it compatible with the figures for existing (number 40) and forecast (number 41) UK electricity consumption referred to in the Energy White Paper associated document, Estimates of Primary Energy Demand and Electricity Generation - DTI note, which refer to gross electricity generated (major power producers). Energy White Paper figures from 2001. Figure used here taken from DUKES table 5.6 for 2003. See section below on Understanding Electricity Demand

Digest of United Kingdom Energy Statistics (DUKES) <http://www.dti.gov.uk/energy/inform/dukes/dukes2004/index.shtml>

Energy White Paper associated document [http://www.dti.gov.uk/energy/whitepaper/est\\_energy.pdf](http://www.dti.gov.uk/energy/whitepaper/est_energy.pdf)

**GVA and household growth**

GB households taken from ODPM website. Scottish figures extrapolated from 2011. 2003 figure extrapolated between 2001 & 2006.

NI households taken from Household Projections for NI 2002-2025, NI Statistics & Research Agency, Jan 2005 (Principal projection)

SW households taken from ODPM website

ODPM website link -

[http://www.odpm.gov.uk/stellent/groups/odpm\\_control/documents/contentservertemplate/odpm\\_index\\_hcst?n=1572&l=3](http://www.odpm.gov.uk/stellent/groups/odpm_control/documents/contentservertemplate/odpm_index_hcst?n=1572&l=3)

SW and UK GVA projections taken from RDA spreadsheet - summary info on second worksheet

## Understanding Electricity Demand

As a result of having to use two different forecasts for UK electricity demand for the two scenarios, see data sources above, two different definitions of electricity demand have also had to be used to ensure internal consistency within the calculations. The figures for South West electricity demand have been adjusted pro rata to make them consistent with the assumptions behind the UK figures.

Table 36 below illustrates the relationship between the various electricity consumption figures used within the electricity demand forecasts contained within scenarios 2a and 2b.

**Table 36: Relationships between electricity demand assumptions 2003**

	GWh	DUKES table ref. <sup>40</sup>	Notes
<b>Total electricity supply</b>	<b>400,780</b>	<b>Table 5.3</b>	
<i>Minus</i> electricity generated by 'other generators'	-36,019	Table 5.3	
<i>Minus</i> net imports	- 2,160	Table 5.3	
<b>Electricity generated by 'major power producers'</b>	<b>362,600</b>	<b>Table 5.3 &amp; table 5.6</b>	This corresponds to the figure of 354,000 GWh for 2001 quoted in the Energy White Paper associated document and is the figure used as UK electricity demand for 2003 within scenario 2b
<i>Minus</i> energy industry use	-31,413	Table 5.3 & table 5.5	32,515 GWh (table 5.3) minus 1,102 GWh (table 5.5) of iron and steel consumption counted as energy industry use
<i>Minus</i> system losses	-29,862	Table 5.3	
<i>Minus</i> statistical difference between supply and demand	-960	Table 5.3	
<b>Electricity consumption by 'final users'</b>	<b>338,546</b>	<b>Table 5.5</b>	This figure is used as UK electricity demand for 2003 within scenario 2a
<i>Minus</i> sales from other generators	-17,252	Table 5.3	
<i>Plus</i> energy industry use supplied by public distribution system (major power producers)	+4,841	Table 5.5	
<b>UK electricity sales</b>	<b>325,033</b>	<b>Table 5.5</b>	This is the UK figure closest in equivalence to the corresponding SW demand figure contained within the March 2005 Energy Trends
<b>SW electricity sales</b>	<b>25,546</b>		From March 2005 Energy Trends. Represents 7.42% of UK electricity sales.

<sup>40</sup> Data taken from Digest of United Kingdom Statistics (DUKES) 2004, DTI.

## ANNEX 6: FORECASTING HEAT DEMAND

As there is no UK % target for renewable heat, there is less political sensitivity, compared to electricity demand, about the precision with which estimates of heat demand by 2010 and 2020 were made. For this reason, a slightly simpler methodology, which is explained below, was used to establish estimates of SW heat energy demand for 2010 and 2020.

An estimate of future total UK energy demand by sector, for 2010 and 2020 is shown in the table below. As with annex 5, the demand figure for 2020 assumes that all of the measures set out for energy efficiency in the Energy White Paper are implemented.

**Table 37: Projections for Total UK Energy Supplied (000's GWh) UK, split by sector:**

Sector	2003 (from DUKES)	2010	2020 with EWP measures
Industry	312	325	253
Domestic	446	389	320
Services	143	163	152
<b>Total</b>	<b>900</b>	<b>877</b>	<b>725</b>

From this total energy supplied data, an estimate was made of how much of this was for heat (covering space and water heating, as well as industrial process heat and drying). The resulting estimated proportions of the energy shown in table 37 used for heat are shown in the table below:

**Table 38: Estimate of % sectoral energy supplied used for heating for UK (000's GWh)**

Sector	% of energy supplied used for heat	2003	2010	2020 with EWP measures
industry	77%	312	325	253
domestic	80%	446	389	320
services	63%	143	163	152
<b>Total</b>		<b>900</b>	<b>877</b>	<b>725</b>

Finally, this data was applied pro-rata to provide figures for the South West. The same figures and approach were used as for electricity demand, as explained in annex 5. Domestic heat energy supplied was applied pro-rata on the basis of the % of UK households that are in the SW. Services and Industry heat energy supplied was calculated pro-rata on the predicted SW GVA as a % of the UK GVA.

**Table 39: Estimate of energy supplied used for heating for SW (000's GWh)**

Sector	2003	2010	2020 with EWP measures
industry	26	28	23
domestic	33	33	28
services	12	14	14
<b>Total</b>	<b>71</b>	<b>76</b>	<b>64</b>

## Sources:

- Sectoral splits of energy end use taken from PIU Energy Review background paper "Energy productivity to 2010 - potential and key issues"  
<http://www.strategy.gov.uk/downloads/files/PIUd.pdf>
- Data for UK energy demand on as supplied basis, broken down by sector, for 2003 taken from the Digest of UK Energy Statistics (DUKES)  
<http://www.dti.gov.uk/energy/inform/dukes/dukes2004/index.shtml>
- Data for total energy demand, split by sector, for 2010 and 2020 taken from supporting analysis for Energy White Paper "Sectoral energy and emissions projections in the energy white paper" [http://www.dti.gov.uk/energy/whitepaper/projections%20\\_wp.pdf](http://www.dti.gov.uk/energy/whitepaper/projections%20_wp.pdf)
- Data on Household projections and GVA as for annex 5

## ANNEX 7: ON-SITE GENERATION

### Analysis from London Renewables Toolkit of % carbon saving vs. impact on build cost

#### What do the graphs tell us?

The following graphs illustrate the annual carbon savings and cost increase on base build for each technology relevant to the individual development scenarios. Technologies to the left of the vertical dashed line and above the bottom horizontal dashed line will meet the 5% target for reduction of carbon emissions without placing an undue burden on developers. Those above the middle horizontal dashed line (and to the left of the horizontal line) will generate savings of 10% or more and those in the top left hand section of each graph will meet a target of 15% carbon emission savings without adding more than 5% to the base build cost (i.e. these are the most effective technologies for the specific development).

On several graphs some technologies register as unsuitable for particular developments as their % carbon savings are slightly under the 5%, 10% or 15% criteria, or their % cost increase is slightly above the 5%, 10% or 15% criteria. In reality, these technologies may be suitable if the circumstances are more favourable than those of the feasibility study figures. (e.g. the PV panel selected costs less than the average used in this study).

Additionally, it may be possible to install 2 types of low cost technology to generate a target, instead of one larger technology.

#### Development details

The graphs are based on feasibility studies carried out as part of London Renewables' 'Integrating renewable energy into new developments: Toolkit for planners, developers and consultants'. The findings are based on modelling scenarios and should therefore only be used as an illustrative guide.

Building types and location scenarios were selected to reflect typical examples of the more common developments coming forward for planning consent in the South West. Build costs do not include land purchase costs as these would vary greatly from site to site.

Developments are all classified as 'major', i.e. a minimum of 10 housing units and 1,000m<sup>2</sup> of non-domestic building.

Technologies were selected based on: location, energy uses in the building (applicable to hot water demand and cooling demand only, as surplus electricity can be exported to the grid), size and type of development and issues such as roof space for solar applications. In some situations, technologies not considered in this study for a particular development type may actually be suitable in practice. Therefore, technologies should not be excluded without consideration at the initial planning stage.

The following table details build cost assumptions made when calculating the percentage cost increase resulting from the installation of renewable energy technologies.

**Table 40: Build cost assumptions**

Development	Build rate cost*	Total build cost
Central retail block	£850 / m <sup>2</sup> GIFA	£2.5m
Small retail unit	£750 / m <sup>2</sup> GIFA	£1.0m

<b>Prestige office</b>	£1,800 / m <sup>2</sup> GIFA	£7.9m
<b>Standard office</b>	£1,400 / m <sup>2</sup> GIFA	£5.8m
<b>Infill naturally ventilated office</b>	£1,200 / m <sup>2</sup> GIFA	£1.6m
<b>Hotel</b>	£2,200 / m <sup>2</sup> GIFA	£6.6m
<b>Care homes &amp; sheltered housing</b>	£1,200 / m <sup>2</sup> GIFA	£3.6m
<b>Medium density housing</b>	£1,100 / m <sup>2</sup> GIFA	£4.2m
<b>Infill medium density housing</b>	£1,400 / m <sup>2</sup> GIFA	£1.6m
<b>Residential tower</b>	£1,600 / m <sup>2</sup> GIFA	£9.7m
<b>Primary or secondary school</b>	£1,200 / m <sup>2</sup> GIFA	£3.6m
<b>Sports centre / health club with pool</b>	£2,100 / m <sup>2</sup> GIFA	£6.3m

\* = building type + location type

Further notes can be found after the graphs

### Technology costs

The additional capital cost rate for each size of the individual renewable technologies is given below:

**Table 41: Additional capital costs for individual renewable technology**

<b>Technology</b>	<b>Capital cost rate (extra)<sup>a</sup></b>
<b>GSHP (50%)</b>	£800 / kW
<b>GSHP (100%)</b>	£800 / kW
<b>GSHP (85%)</b>	£1,000 / kW
<b>Ground cooling (50%)</b>	£200 / kW
<b>Ground cooling (100%)</b>	£200 / kW
<b>SWH (50%)</b>	£400 / m <sup>2</sup> panel
<b>SWH (5%)</b>	£400 / m <sup>2</sup> panel
<b>SWH (10%)</b>	£400 / m <sup>2</sup> panel
<b>SWH (15%)</b>	£400 / m <sup>2</sup> panel
<b>Biomass heating (33%)</b>	£200 / kW
<b>Biomass heating (50%)</b>	£200 / kW
<b>Biomass heating (100%)</b>	£200 / kW
<b>Biomass CHP (33%)</b>	£2,720 kW
<b>Biomass CHP (50%)</b>	£2,720 kW
<b>Wind (5%)</b>	£1,000 / kW
<b>Wind (10%)</b>	£1,000 / kW
<b>Wind (15%)</b>	£1,000 / kW
<b>PV (rooftop) (5%)</b>	£850 / m <sup>2</sup> panel
<b>PV (rooftop) (10%)</b>	£850 / m <sup>2</sup> panel
<b>PV (rooftop) (15%)</b>	£850 / m <sup>2</sup> panel
<b>PV (cladding) (5%)</b>	£85 / m <sup>2</sup> panel
<b>PV (cladding) (10%)</b>	£85 / m <sup>2</sup> panel
<b>PV (cladding) (15%)</b>	£85 / m <sup>2</sup> panel

<sup>a</sup> Marginal cost of the renewable technology, i.e. cost of renewable system minus the cost of any conventional technology or building components replaced.

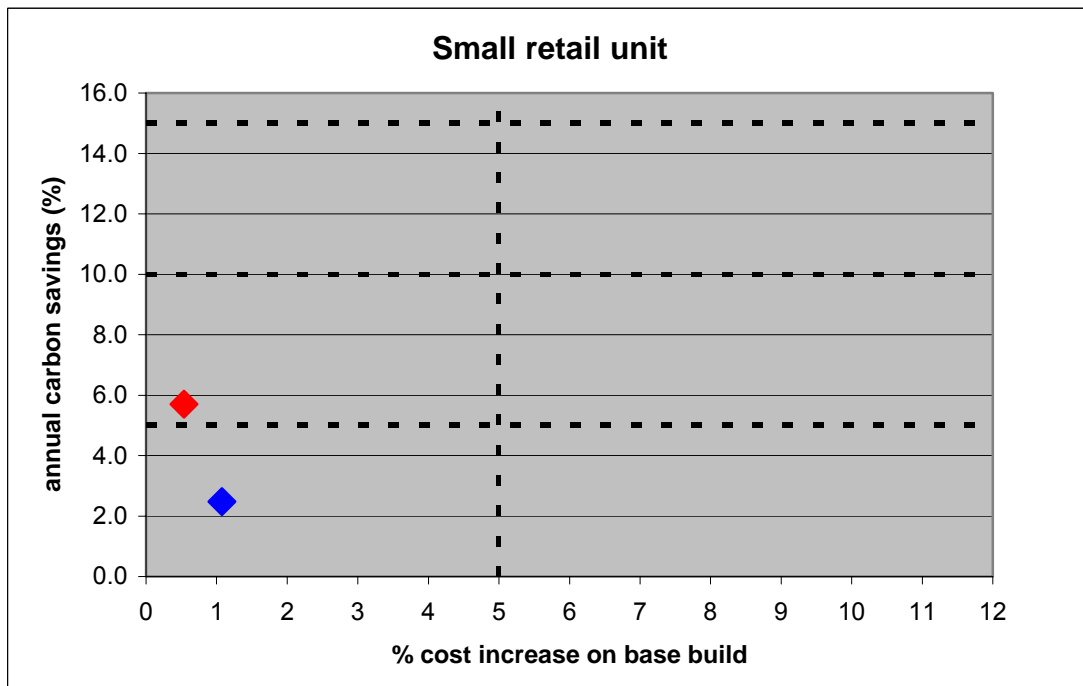
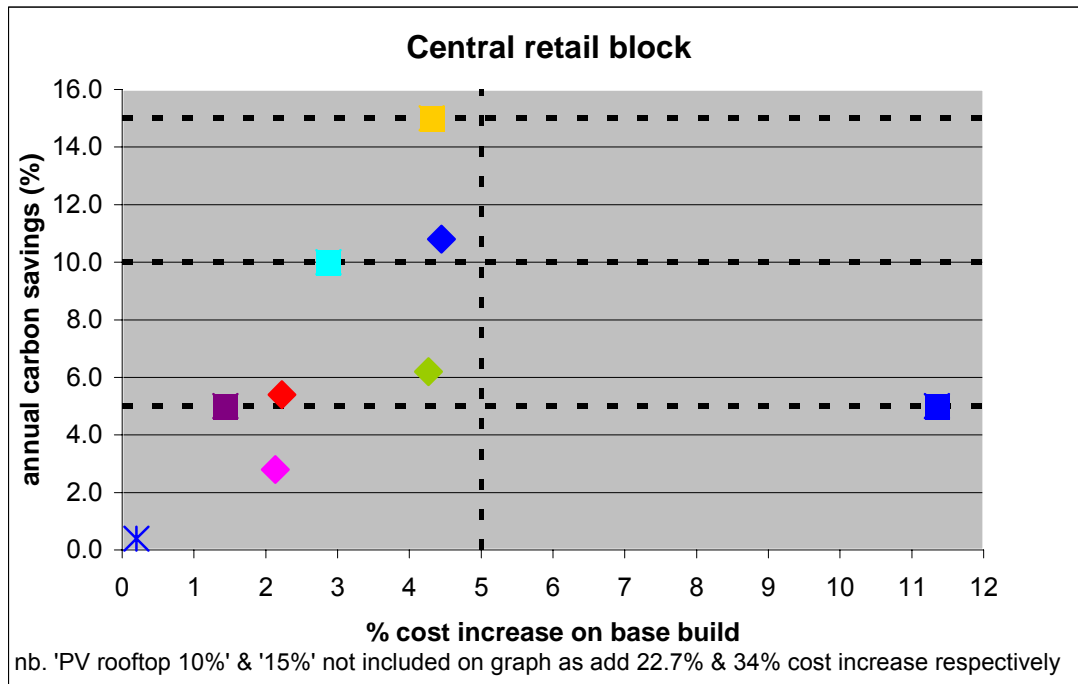
<sup>b</sup> Costs of technologies are based on estimates of current market prices, obtained from a number of sources. They are for general guidance only and accurate calculations should be carried out for each installation.

Technology options

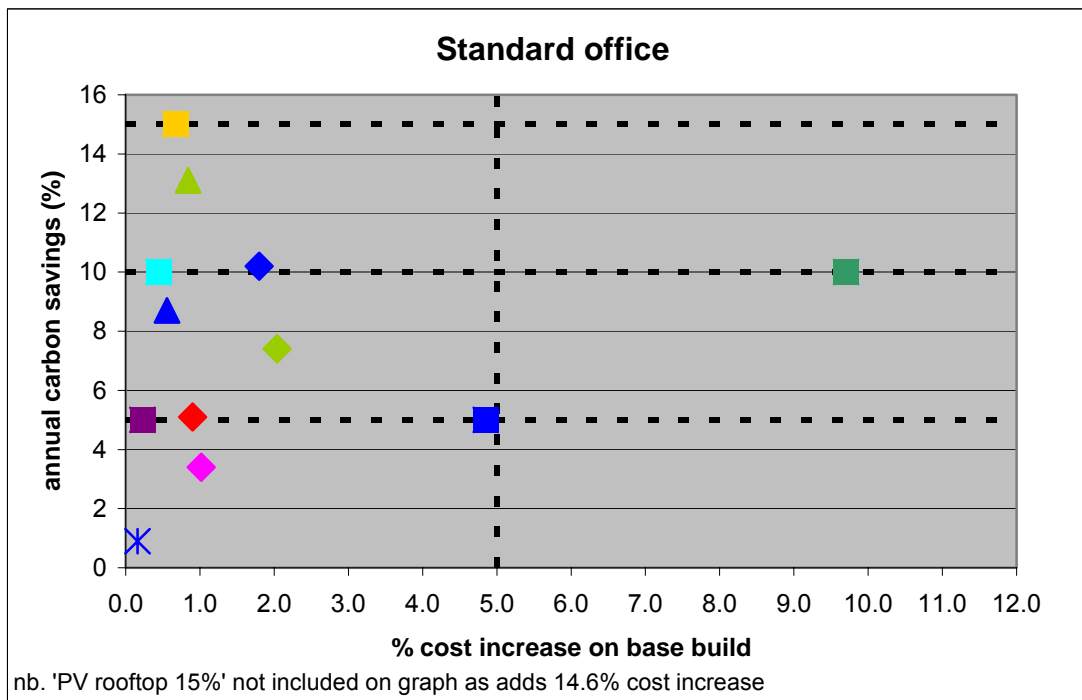
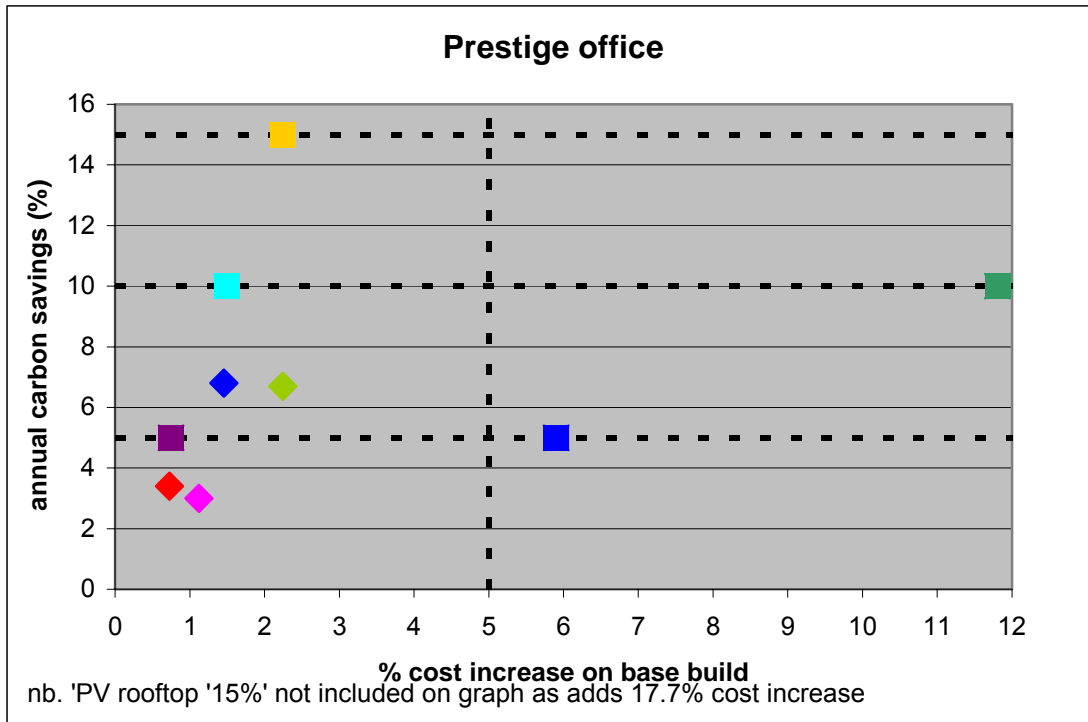
Full details of the technology options, based on the legend accompanying the graphs:

<b>Legend</b>	<b>Definition</b>
<b>GSHP (50% / 100% / 85%)</b>	Ground source heat pump (GSHP) will provide 50% / 100% / 85% of the annual space heating and domestic hot water demand
<b>Ground cooling (50% / 100%)</b>	Ground cooling system will meet 50% / 100% of the annual cooling demand
<b>SWH (50% / 5% / 10% / 15%)</b>	Solar water heating (SWH) installation will meet 50% / 5% / 10% / 15% of the annual DHW demand
<b>Biomass heating (33% / 50% / 100%)</b>	Biomass heating system will meet 33% / 50% / 100% of the annual SH and DHW demand
<b>Biomass CHP (33% / 50%)</b>	Biomass CHP unit will meet 33% / 50% of the annual SH and DHW demand
<b>Wind (5% / 10% / 15%)</b>	Wind turbine/s sized to reduce annual carbon emissions by 5% / 10% / 15%
<b>PV (rooftop) (5% / 10% / 15%)</b>	PV (rooftop) installation sized to reduce annual carbon emissions by 5% / 10% / 15%
<b>PV (cladding) (5% / 10% / 15%)</b>	PV (cladding) installation sized to reduce annual carbon emissions by 5% / 10% / 15%

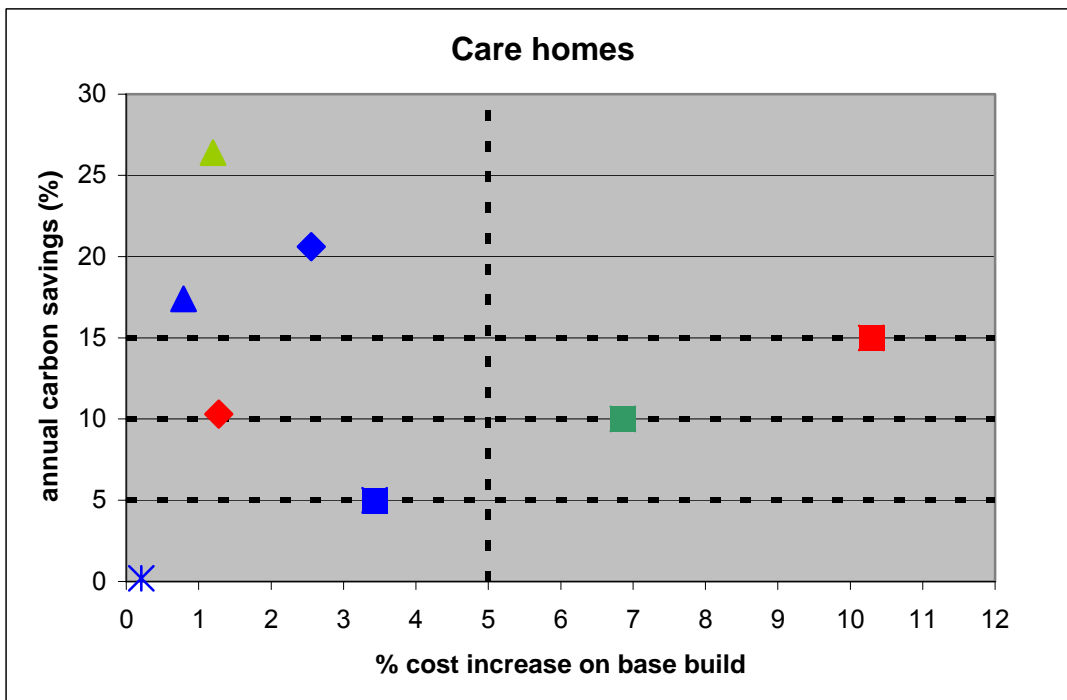
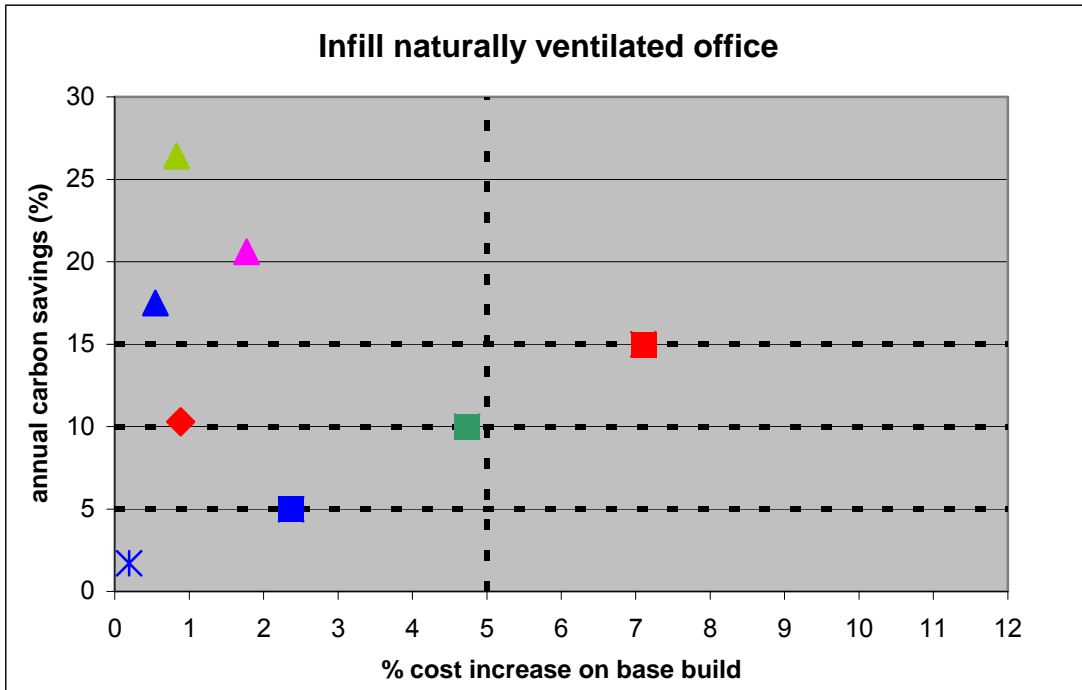
**Figure 25: Graphs illustrating % of carbon saving vs. impact on build cost - all technologies & build types**



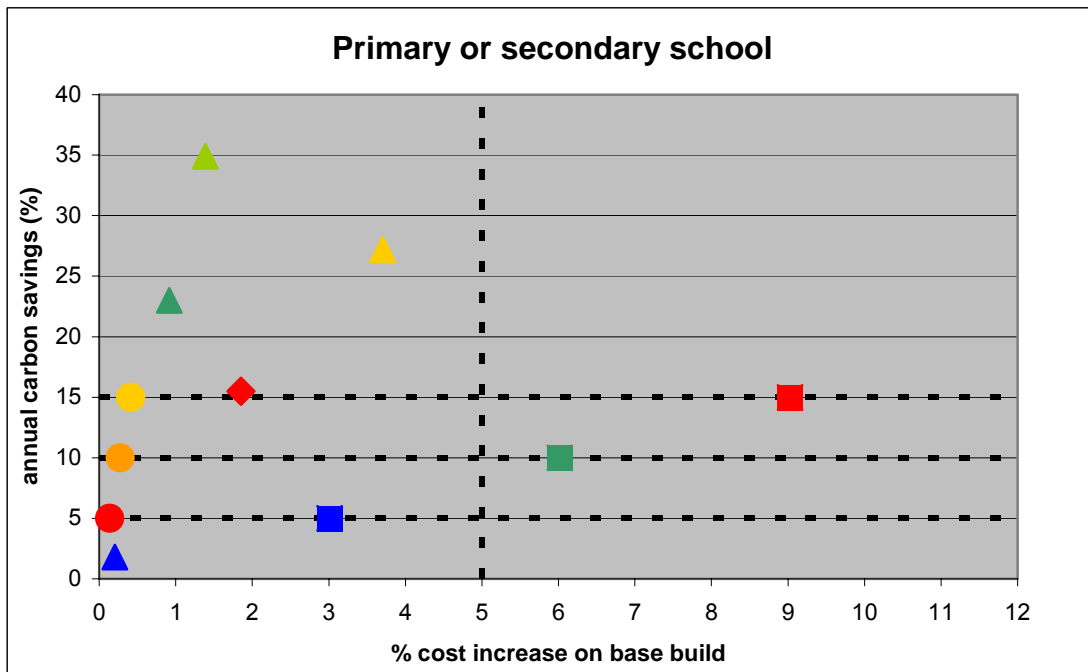
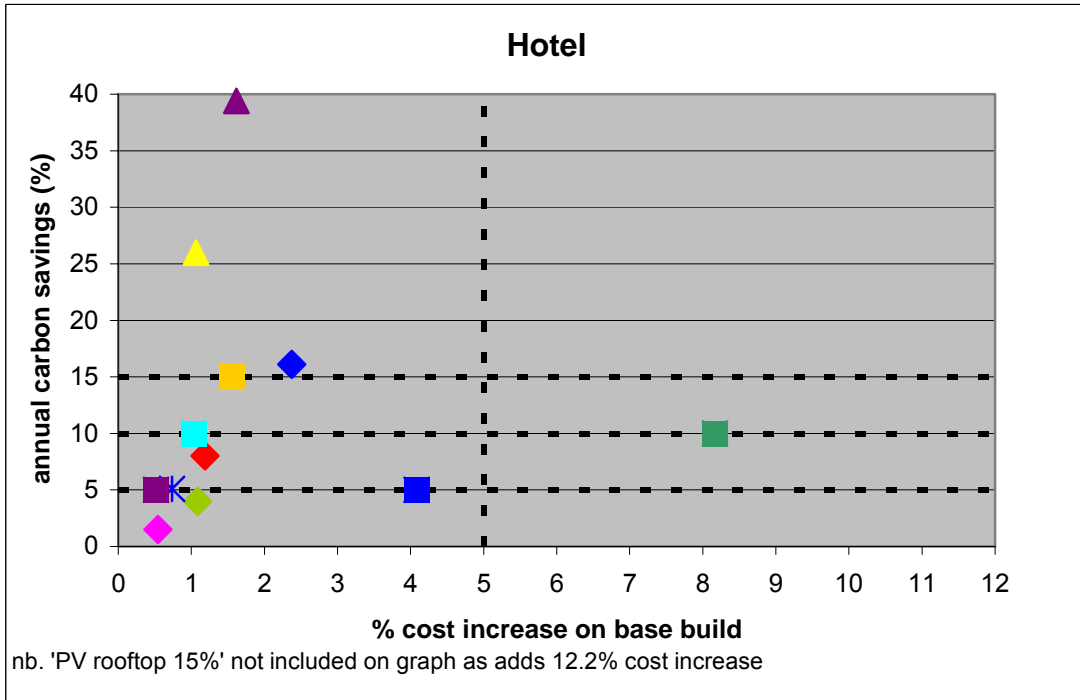
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| ◆ GSHP (50%)            | ▲ Biomass heating (33%)  | ■ PV (rooftop) (5%)   |
| ◆ GSHP (100%)           | ▲ Biomass heating (50%)  | ■ PV (rooftop) (10%)  |
| ◆ GSHP (85%)            | ▲ Biomass heating (100%) | ■ PV (rooftop) (15%)  |
| ◆ Ground cooling (50%)  | ▲ Biomass CHP (33%)      | ■ PV (cladding) (5%)  |
| ◆ Ground cooling (100%) | ▲ Biomass CHP (50%)      | ■ PV (cladding) (10%) |
| ✕ SWH (50%)             | ● Wind (5%)              | ■ PV (cladding) (15%) |
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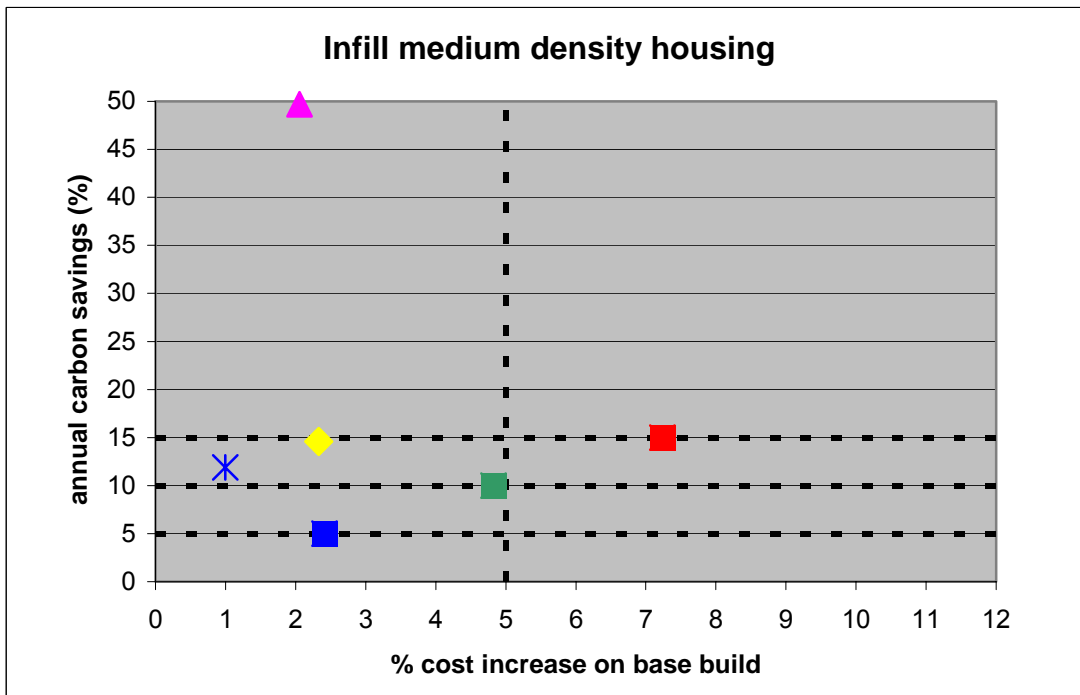
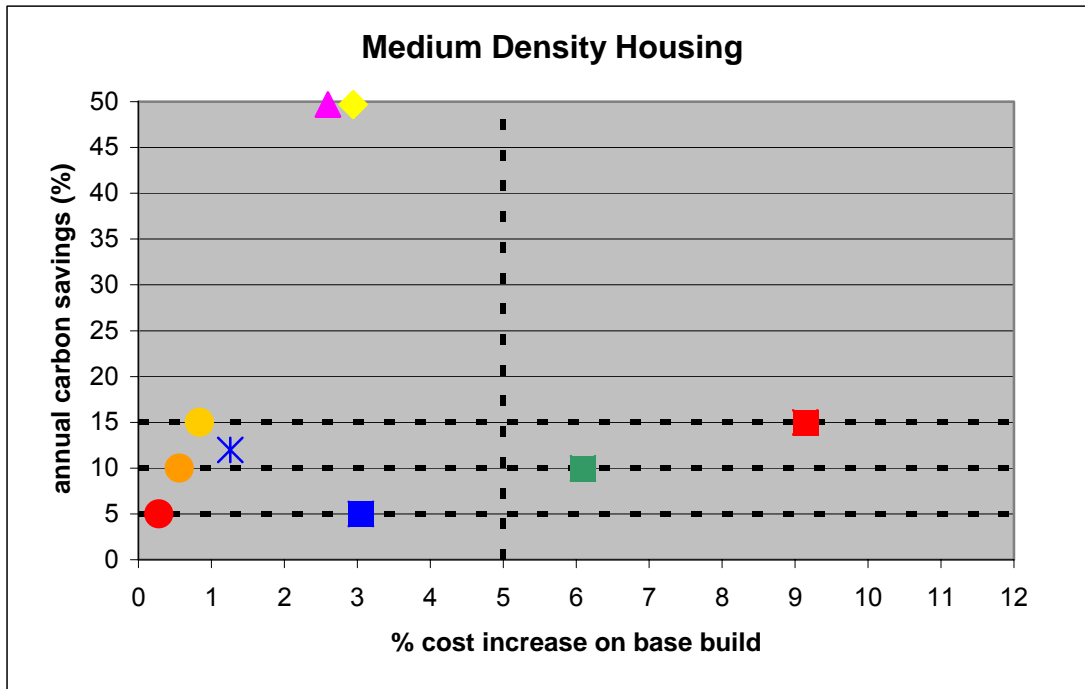
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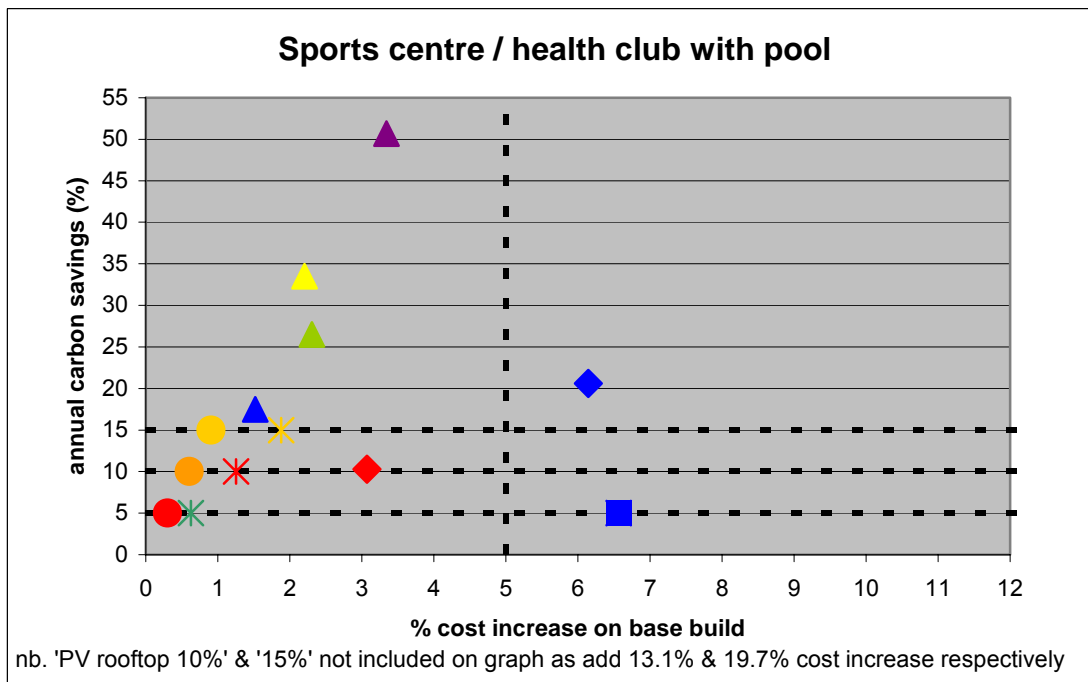
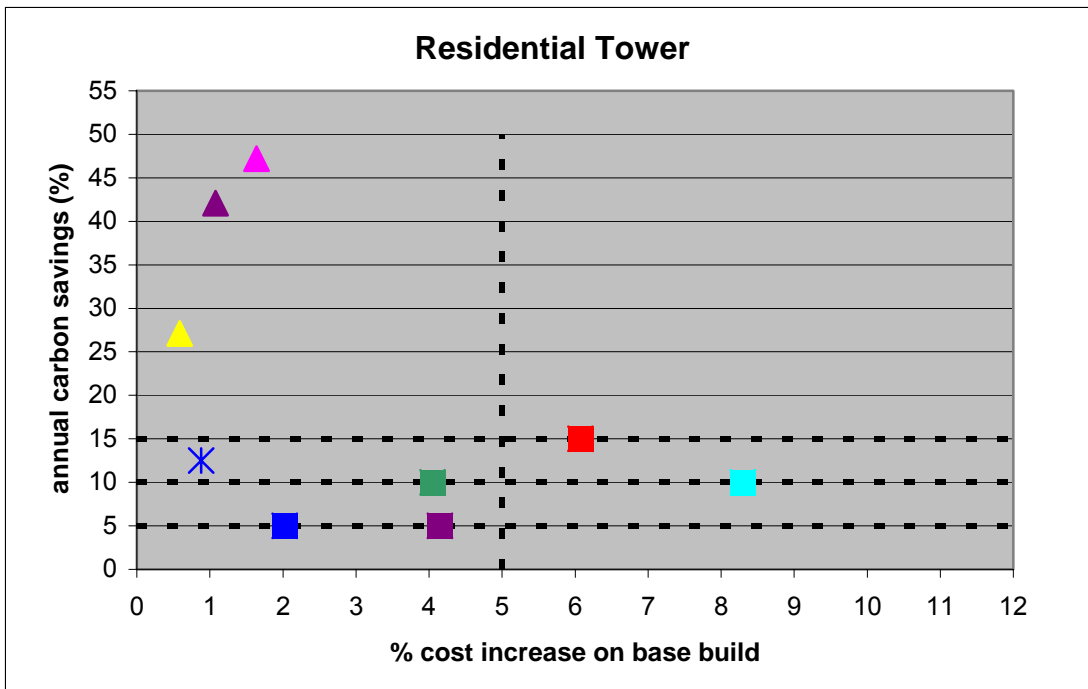
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| ✕ SWH (50%)             | ● Wind (5%)              | ■ PV (cladding) (15%) |
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|                         | ● Wind (15%)             |                       |



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| ◆ Ground cooling (100%) | ▲ Biomass CHP (50%)      | ■ PV (cladding) (10%) |
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|                         | ● Wind (10%)             |                       |
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| ◆ Ground cooling (100%) | ▲ Biomass CHP (50%)      | ■ PV (cladding) (10%) |
| ✕ SWH (50%)             | ● Wind (5%)              | ■ PV (cladding) (15%) |
|                         | ● Wind (10%)             |                       |
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| ◆ GSHP (85%)            | ▲ Biomass heating (100%) | ■ PV (rooftop) (15%)  |
| ◆ Ground cooling (50%)  | ▲ Biomass CHP (33%)      | ■ PV (cladding) (5%)  |
| ◆ Ground cooling (100%) | ▲ Biomass CHP (50%)      | ■ PV (cladding) (10%) |
| ✕ SWH (50%)             | ● Wind (5%)              | ■ PV (cladding) (15%) |
| ✕ SWH (5%)              | ● Wind (10%)             |                       |
| ✕ SWH (10%)             | ● Wind (15%)             |                       |
| ✕ SWH (15%)             |                          |                       |

## Notes for tables

### Central retail block

1. All renewable energy system data is calculated on the basis of Sales Floor Area
2. Reference development costs are quoted in Gross Internal Floor Area
3. PV: total system size is constrained by available roof and/or facade area
4. PV: several different types of PV are available with varying costs and performance characteristics. Site specific costs will depend on system selection.
5. PV Cladding: assumes PV replaces high quality, high cost cladding, e.g. marble. The cost / m<sup>2</sup> shown is the over cost on high quality cladding.

### Small retail unit

1. All renewable energy system data is calculated on the basis of Sales Floor Area
2. Reference development costs are quoted in Gross Internal Floor Area
3. The scenario consists of 5 retail units each with a sales area of 200m<sup>2</sup>, giving the total net and gross areas shown in the scenario data box

### Prestige office

1. All renewable energy system data is calculated on the basis of Treated Floor Area (TFA)
2. Reference development costs are quoted in Gross Internal Floor Area
3. Base costs include Category A fit-out but exclude tenants fit-out
4. PV: total system size is constrained by available roof and / or façade area
5. PV: several different types of PV are available with varying costs and performance characteristics. Site specific costs will depend on system selection.
6. PV Cladding: assumes PV replaces high quality, high cost cladding, e.g. marble. The cost / m<sup>2</sup> shown is the over cost on high quality cladding.

### Standard office

1. All renewable energy system data is calculated on the basis of Treated Floor Area (TFA)
2. Reference development costs are quoted in Gross Internal Floor Area
3. Base costs include Category A fit-out but exclude tenants fit-out
4. PV: total system size is constrained by available roof and / or façade area
5. PV: several different types of PV are available with varying costs and performance characteristics. Site specific costs will depend on system selection.
6. Wind: the use of wind generators will require detailed site analysis

### Infill naturally ventilated office

1. All renewable energy system data is calculated on the basis of Treated Floor Area (TFA)
2. Reference development costs are quoted in Gross Internal Floor Area
3. Base costs include Category A fit-out but exclude tenants fit-out
4. PV: several different types of PV are available with varying costs and performance characteristics. Site specific costs will depend on system selection.

### Hotel

1. All renewable energy system data is calculated on the basis of Treated Floor Area
2. Biomass CHP: small system sizes (below, e.g. 50kWe) are unlikely to be available
3. Biomass CHP: this is still (in 2004) an emerging technology and requires detailed investigation
4. PV: total system size is constrained by available roof and / or façade area
5. PV: several different types of PV are available with varying costs and performance characteristics. Site specific costs will depend on system selection.

### Care homes

1. All renewable energy system data is calculated on the basis of Treated Floor Area (TFA)
2. PV: total system size is constrained by available roof and / or façade area
3. PV: several different types of PV are available with varying costs and performance characteristics. Site specific costs will depend on system selection.

#### Medium density housing

1. Both renewable energy system data AND reference development costs are quoted on the basis of Gross Internal Floor Area (GIFA)
2. Biomass heating: cost of district heating network not included
3. PV: several different types of PV are available with varying costs and performance characteristics. Site specific costs will depend on system selection.
4. Wind: the use of wind generators will require detailed site analysis
5. Wind: it is assumed that private wire is not practical due to market regulations so power generated is exported to the grid. However, renewable energy generated from sources within the cartilage of the site can be included in calculations of carbon emission reductions

#### Infill medium density housing

1. Both renewable energy system data AND reference development costs are quoted on the basis of Gross Internal Floor Area (GIFA)  
Biomass heating: cost of district heating network not included
2. PV: several different types of PV are available with varying costs and performance characteristics. Site specific costs will depend on system selection.

#### Residential tower

1. Both renewable energy system data AND reference development costs are quoted on the basis of Gross Internal Floor Area (GIFA)
2. Biomass heating: cost of communal heating pipework not included
3. Biomass CHP: small system sizes (below e.g. 50kWe) are unlikely to be available
4. Biomass CHP: This is still (in 2004) an emerging technology and requires detailed investigation
5. PV: total system size is constrained by available roof and / or façade area
6. PV: several different types of PV are available with varying costs and performance characteristics. Site specific costs will depend on system selection.
7. PV: as cladding it is assumed that material replaced is low cost therefore net cost of PV is taken as full cost

#### Primary or secondary school

1. All renewable energy system data is calculated on the basis of Treated Floor Area (TFA)
2. PV: several different types of PV are available with varying costs and performance characteristics. Site specific costs will depend on system selection
3. Wind: the use of wind generators will require detailed site analysis

#### Sports centre

1. All renewable energy system data is calculated on the basis of Treated Floor Area (TFA)
2. Biomass CHP: this is still (in 2004) an emerging technology and requires detailed investigation
3. Solar water heating: discretionary system sizing used for this building type to reflect increased potential for application of the technology
4. PV: total system size is constrained by available roof and / or façade area

5. PV: several different types of PV are available with varying costs and performance characteristics. Site specific costs will depend on system selection.
6. Wind: the use of wind generators will require detailed site analysis.

**Table 42: Summary of viable renewable energy technologies for consideration within an on-site generation requirement**

**Summary based on meeting 5% carbon emission reduction in on-gas areas < 5% build cost increase**

	Central retail block	Small retail block	Prestige office	Standard office	Infill naturally ventilated office	Hotel	Care homes & sheltered housing	Medium density housing	Infill medium density housing	Residential tower	Primary or secondary school	Sports centre / health club with pool
GSHP (50%)	✓	✓	X	✓	✓	✓	✓				✓	✓
GSHP (100%)	✓	✓	✓	✓	✓	✓	✓				✓	X
GSHP (85%)								✓	✓			
Ground cooling (50%)	X		X	X		X						
Ground cooling (100%)	✓		✓	✓		X						
PV (rooftop) (5%)	X		X	✓	✓	✓	✓	✓	✓	✓	✓	X
PV (rooftop) (10%)	X		X	X	✓	X	X	X	✓	✓	X	X
PV (rooftop) (15%)	X		X	X	X	X	X	X	X	X	X	X
PV (cladding) (5%)	✓		✓			✓				✓		
PV (cladding) (10%)	✓		✓			✓				X		
PV (cladding) (15%)	✓		✓			✓				X		
Biomass heating (33%)				✓	✓		✓				✓	✓
Biomass heating (50%)				✓	✓		✓				✓	✓
Biomass heating (100%)								✓	✓	✓		
SWH (50%)	X			X	X	✓	X	✓	✓	✓	X	
SWH (5%)												✓
SWH (10%)												✓
SWH (15%)												✓
Wind (5%)				✓				✓			✓	✓
Wind (10%)				✓				✓			✓	✓
Wind (15%)				✓				✓			✓	✓
Biomass CHP (33%)						✓				✓		✓
Biomass CHP (50%)						✓				✓		✓
<b>Total number of viable technologies</b>	3	1	3	5	3	4	3	5	4	4	4	5

Data taken from feasibility studies in London Renewables Toolkit

**Summary based on meeting 10% carbon emission reduction in on-gas areas < 5% build cost increase**

	Central retail block	Small retail block	Prestige office	Standard office	Infill naturally ventilated office	Hotel	Care homes & sheltered housing	Medium density housing	Infill medium density housing	Residential tower	Primary or secondary school	Sports centre / health club with pool
GSHP (50%)	X	X	X	X	✓	X	✓				✓	✓
GSHP (100%)	✓	✓	X	✓	✓	✓	✓				✓	X
GSHP (85%)								✓	✓			
Ground cooling (50%)	X		X	X		X						
Ground cooling (100%)	X		X	X		X						
PV (rooftop) (5%)	X		X	X	X	X	X	X	X	X	X	X
PV (rooftop) (10%)	X		X	X	✓	X	X	X	✓	✓	X	X
PV (rooftop) (15%)	X		X	X	X	X	X	X	X	X	X	X
PV (cladding) (5%)	X		X			X				X		
PV (cladding) (10%)	✓		✓			✓				X		
PV (cladding) (15%)	✓		✓			✓				X		
Biomass heating (33%)				X	✓		✓				✓	✓
Biomass heating (50%)				✓	✓		✓				✓	✓
Biomass heating (100%)								✓	✓	✓		
SWH (50%)	X			X	X	X	X	✓	✓	✓	X	
SWH (5%)												X
SWH (10%)												✓
SWH (15%)												✓
Wind (5%)				X				X			X	X
Wind (10%)				✓				✓			✓	✓
Wind (15%)				✓				✓			✓	✓
Biomass CHP (33%)						✓				✓		✓
Biomass CHP (50%)						✓				✓		✓
<b>Total number of viable technologies</b>	2	1	1	3	3	3	2	4	4	4	3	5

Data taken from feasibility studies in London Renewables Toolkit

**Summary based on meeting 15% carbon emission reduction in on-gas areas < 5% build cost increase**

	Central retail block	Small retail block	Prestige office	Standard office	Infill naturally ventilated office	Hotel	Care homes & sheltered housing	Medium density housing	Infill medium density housing	Residential tower	Primary or secondary school	Sports centre / health club with pool
<b>GSHP (50%)</b>	X	X	X	X	X	X	X				✓	X
<b>GSHP (100%)</b>	X	X	X	X	✓	✓	✓				✓	X
<b>GSHP (85%)</b>								X	X			
<b>Ground cooling (50%)</b>	X		X	X		X						
<b>Ground cooling (100%)</b>	X		X	X		X						
<b>PV (rooftop) (5%)</b>	X		X	X	X	X	X	X	X	X	X	X
<b>PV (rooftop) (10%)</b>	X		X	X	X	X	X	X	X	X	X	X
<b>PV (rooftop) (15%)</b>	X		X	X	X	X	X	X	X	X	X	X
<b>PV (cladding) (5%)</b>	X		X			X				X		
<b>PV (cladding) (10%)</b>	X		X			X				X		
<b>PV (cladding) (15%)</b>	✓		✓			✓				X		
<b>Biomass heating (33%)</b>				X	✓		✓				✓	✓
<b>Biomass heating (50%)</b>				X	✓		✓				✓	✓
<b>Biomass heating (100%)</b>								✓	✓	✓		
<b>SWH (50%)</b>	X			X	X	X	X	X	X	X	X	
<b>SWH (5%)</b>												X
<b>SWH (10%)</b>												X
<b>SWH (15%)</b>												✓
<b>Wind (5%)</b>				X				X			X	X
<b>Wind (10%)</b>				X				X			X	X
<b>Wind (15%)</b>				✓				✓			✓	✓
<b>Biomass CHP (33%)</b>						✓				✓		✓
<b>Biomass CHP (50%)</b>						✓				✓		✓
<b>Total number of viable technologies</b>	1	0	1	1	2	3	2	2	1	2	3	4

Data taken from feasibility studies in London Renewables Toolkit

## Assumptions on technology mix for meeting on-site generation target

### Residential

Based on current costs and energy outputs, the hierarchy of technologies, in £/tonne of carbon saved, is as follows:

**Table 43: Hierarchy of building-integrated technology based on current costs and energy outputs**

Technology	typical installed cost /kW	Annual energy output /kW (kWh)	Annual carbon saved/kW (kg)	£/kgCO <sub>2</sub> saved
biomass heating (individual domestic stoves/boilers)	£400	1260	266	1.5
biomass heating (centralised boiler for community heating or non-domestic heat loads)	£500	1260	266	1.9
wind	£3,000	2628	1130	2.7
heat pumps (non-domestic)	£1,000	2500	221	4.5
solar water heating	£1,190	595	126	9.5
heat pumps (domestic)	£1,333	1995	131	10.2
PV	£6,000	800	344	17.4

All of the assumptions are given later in this annex. The assumption is that developers, all other things being equal, will choose to use the technologies that have the lowest £/tonne of carbon saved.

This clearly shows that biomass community heating is likely to be the most cost-effective technology. However, there are some major constraints to using this technology, a key one being the need management of the system, centralised metering and billing, and the attitude of potential house buyers.

Wind is next in the hierarchy<sup>41</sup>. However, application of this technology is likely to be severely constrained by the lack of a suitable wind resource at many sites (in built up, urban areas), as well as issues such as noise, and visual impact.

It is assumed that a logical approach, and an approach to be encouraged, is that for major developments, developers will target the social housing component for renewable energy supply. In practice, this will mean having an RSL, or local authority partner on board at the early stages of a development, who will have agreed in principle to any proposed measures. The advantages of such an approach are numerous, namely:

- Social landlords are in a position to take on the management, administration and metering and billing for providing community heating – or would be willing to engage an heat-ESCO to do so. This would be necessary for community heating.
- From the end of 2005, the Housing Corporation will require all new social housing build to meet EcoHomes standard Very Good – this will further incentivise RSLs to consider renewable energy options as a way of reducing carbon emissions
- Social landlords have an interest in reducing running costs for their tenants, and in helping to reduce fuel poverty - renewable energy systems, particularly those with no running costs

<sup>41</sup> The cost figure for wind is based on stand-alone wind turbines in the range of 2.5-15kW. Projected installed costs for roof mounted wind turbines (1-1.5kW) are lower than this, in the range of £1-2,000/ kW.

(solar water heating and PV) can help in this. For this reason, RSL's can take a longer term view, and look at whole life costs, rather than just considering upfront capital costs

- Heat pumps and community heating provide a way for social landlords to reduce the costs of annual boiler servicing and inspection, and therefore they are already showing considerable interest in these technologies for these reasons (e.g. use of heat pumps on social housing in Cornwall)
- RSL's are likely to be able to bring additional funds to assist with the capital cost of renewable energy systems, or will have greater access to grant funds (e.g. EST community energy, EEC funding)

Therefore, the logic that has been applied is that developers will first aim to meet their 10% target through the provision of renewable heat to social housing, looking first at the option of biomass community heating, then heat pumps, and then solar water heating, in order of the £/tonne hierarchy. Only after these options have been explored, will a developer then look at how the remainder of their target can be met within other non-social housing dwellings on a site.

The key assumptions for the numbers of residential new build development are given in the table below:

**Table 44: Assumptions for number of residential new build developments**

No. of new build dwellings to comply per year	25000	
% of new build that is major development	70%	
No. of new dwellings as part of major developments	17500	
% social housing	10%	
No. of new social housing dwellings per year	1750	
Level of on-site generation target	10%	measured as saving in CO2 emissions
Total delivered energy for new build	148,554,082	kWh
Total baseline CO2 emissions for new build	34,549,499	kg/year
Target for CO2 reduction	3,454,950	kg/year

The figure of 10% social housing is the current level of new build social housing, taken from the Draft Regional Housing Strategy for the SW. For social housing, the suggested split between technologies, based on 2000 new social home per year in the SW being built as part of major developments, is as follows:

## Social housing

**Table 45: Technology mix for social housing**

Technology	No. of dwellings served/ year	Fraction of heat needs met	annual energy output (kWh)	Annual CO2 saving (kg)	installed MW/ year
PV	0		0	0	0.00
Wind	0		0		0.0
Solar water heating	438	50%	546,875	115,451	0.9
Heat pumps	438	95%	2,909,375	171,828	1.3
Biomass heating (individual boilers)			0		0.0
Biomass heating (centralised boiler for community heating)	438	100%	3,062,500	581,875	2.19
Renewable heat from CHP	438	100%	3,062,500	581,875	2.19
			<b>Totals</b>	<b>1,451,030</b>	<b>6.6</b>
			<b>% of total required</b>	<b>42.0%</b>	

The rationale for the mix is as follows:

Community heating, either from a centralised biomass boiler, or heat from renewable CHP, is likely to be the most cost-effective, at suitable sites. However, the number of suitable sites will be limited by:

- The proximity of a CHP generation plant
- The density of the heat load, extent of mixed development, and hence the economic viability of developing community heating
- The willingness of RSL to take on the management of a community heating network, or to engage with an heat-ESCO to do this

For this reason, only half of the new social housing dwellings will have community heating, from either larger scale renewable CHP, or biomass heating.

For the remaining dwellings, the next logical choice would be the use of heat pumps and solar thermal. The use of solar thermal will be restricted to those dwellings that have roof area facing between south east and south west. Assuming that 50% of remaining homes have suitable roof orientation, and lack of over shading, then the assumption is that these would be fitted with solar water heating panels. The other 50% would be fitted with heat pumps. It should be noted that both of these technologies would require hot water storage tanks to be fitted.

The use of individual stand-alone biomass boilers for each property has been assumed to be impractical for the following reasons:

- The size of the heat load is too small for boiler sizes on the market (<15kW)
- The only biomass stoves that are available burn either pellets or logs.
- For urban areas, which is where the vast majority of major development, if not all, will take place, logs are not likely to be cheaply available. Given current price predictions, pellets, even purchased in bulk, are unlikely to be competitive with mains gas, and therefore would not be viable in new build that can be connected to the gas mains.

For the remaining non-social housing, the suggested technology mix is as follows:

## Remaining non-social housing

**Table 46: Technology mix for remaining non-social housing**

Technology	No. of systems installed	Fraction of heat needs met	annual fossil energy saved (kWh)	Annual CO2 saving (kg)	installed MW/ year
PV	1000		1,600,000	688,000	<b>2.00</b>
Wind	16		252,288	108,484	<b>0.10</b>
Solar water heating	3831	50%	7,449,167	1,010,958	<b>8.0</b>
Heat pumps	500	95%	3,325,000	196,375	<b>1.5</b>
Biomass heating (individual boilers)	0		0	0	<b>0.00</b>
Biomass heating (centralised boiler for community heating)	0		0	0	<b>0.00</b>
Renewable heat from CHP	0		0	0	<b>0.00</b>
		<b>Totals</b>		<b>2,003,817</b>	<b>11.64</b>
		% of total required		58.0%	

The rationale for this is:

- Developers will avoid the use of community heating, due to the management complexities involved
- Although wind is one of the most cost-effective technology, viable deployment will be limited to only a very few sites
- Developers will be assumed to favour solar water heating, over and above heat pumps, as the technology is relatively well known and understood, and will be easier to “sell” to house buyers
- It is assumed that solar water heating will be restricted to only those dwellings that have both suitable roof orientation and lack of overshadowing, as well as having a hot water tank – this is taken to be 25% of the homes
- The split between PV and heat pumps is more arbitrary. The maximum number of PV systems that could be installed, assuming that this is only on south facing roofs that don't already have solar water heating, is 25%, which would be 4500.

## Non-domestic

The key factors for the quantity of annual new build are given below.

% of new build that is major development	70%	
Level of on-site generation target	10%	measured as saving in CO <sub>2</sub> emissions
Total baseline CO <sub>2</sub> emissions for new build	19,990,180	kg/year
Target for CO <sub>2</sub> reduction	1,999,018	kg/year

A suggested breakdown of the technology mix for non-domestic new build is given in the table below. This has been split down into the five sub-sectors that are expected to have significant employment growth in the SW over the next 15 years. Data on the number or m<sup>2</sup> of new building are not available. Therefore, the split by technology is given in terms of the relative contribution to meeting the CO<sub>2</sub> reduction target for that sub-sector.

**Table 47: Technology mix for non-domestic new build**

Technology	offices	health/ social	education	retailing	hotels and catering	CO2 saved (kg/year)	annual fossil energy saved (kWh)	installed MW/ year
PV	50%	10%	20%	30%	20%	635,812	1,478,633	1.85
wind	5%	10%	20%	5%	0%	160,684	373,683	0.14
solar water heating	5%	5%	0%	0%	20%	91,088	431,469	0.72
heat pumps (non-domestic)	15%	25%	20%	20%	20%	376,059	1,979,257	1.70
biomass heating (individual domestic stoves/ boilers)	0%	0%	0%	0%	0%	0	0	0.00
biomass heating (centralised boiler for community heating or non-domestic heat loads)	10%	25%	20%	20%	20%	339,058	1,784,517	1.27
Renewable heat from CHP	15%	25%	20%	25%	20%	396,317	2,085,879	1.49
<b>Totals</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>1,999,018</b>	<b>8,133,438</b>	<b>7.18</b>
Total annual emissions for subsector new build (kg)	7,400,153	2,651,217	3,845,621	4,051,636	2,041,551			

The suggested split by technologies is only very much informed guesswork. The rationale is as follows:

- For offices, where electricity demand is a relatively high component of total energy use, and where there is potential to offset cladding costs from BIPV, PV is assumed to have the greatest share of the mix.
- Hotels and catering have high hot water demand, and generally a good match in the SW between the summer months and high demand for hot water, and therefore solar water heating has a greater share in this sub-sector. Conversely, retailing and education have relatively low demand for hot water.
- Schools are likely to have the greatest potential for wind power; hence wind has the greatest share of CO<sub>2</sub> reduction in this sub-sector.

**Summary of total estimated new renewables capacity from new build (residential + non-domestic)**

The summaries below assume that the on-site generation policy will be phased in gradually over time, starting first with large scale strategic developments. An estimate of how this phasing-in would work, and the impact in annual installed capacity is given in the tables, based on the technology mix given in section 6.

**Table 48: Estimated new renewables capacity from new build – electricity**

	Year	% BUILT major developments meeting policy requirement	PV (or PV/ roof mounted wind turbines)		Stand alone wind turbines		Total Electricity	
			Annual Capacity Installed (MW)	Total installed capacity (MW)	Annual Capacity Installed (MW)	Total installed capacity (MW)	Annual Capacity Installed (MW)	Total installed capacity (MW)
	<b>2005</b>	0	0.00	0.00	0.00	0.00	0.00	0.00
	<b>2006</b>	0	0.00	0.00	0.00	0.00	0.00	0.00
Start	<b>2007</b>	30%	1.15	1.15	0.07	0.07	1.23	1.23
	<b>2008</b>	40%	1.54	2.69	0.10	0.17	1.63	2.86
	<b>2009</b>	70%	2.69	5.39	0.17	0.33	2.86	5.72
	<b>2010</b>	90%	3.46	8.85	0.21	0.55	3.68	9.40
	<b>2011</b>	90%	3.46	12.31	0.21	0.76	3.68	13.08
	<b>2012</b>	90%	3.46	15.78	0.21	0.98	3.68	16.75
	<b>2013</b>	90%	3.46	19.24	0.21	1.19	3.68	20.43
	<b>2014</b>	90%	3.46	22.70	0.21	1.41	3.68	24.11
	<b>2015</b>	90%	3.46	26.17	0.21	1.62	3.68	27.79
	<b>2016</b>	90%	3.46	29.63	0.21	1.83	3.68	31.47
	<b>2017</b>	90%	3.46	33.10	0.21	2.05	3.68	35.14
	<b>2018</b>	90%	3.46	36.56	0.21	2.26	3.68	38.82
	<b>2019</b>	90%	3.46	40.02	0.21	2.48	3.68	42.50
	<b>2020</b>	90%	3.46	43.49	0.21	2.69	3.68	46.18

Note on table:

For PV installed capacity, there is the potential for the market share of PV to become partially occupied by roof mounted wind, should the latter prove to be viable. The precise split between the technologies cannot be estimated at this stage.

**Table 49: Estimated new renewables capacity from new build - heat**

			Solar water heating		Heat pumps		Biomass heating (centralised boiler for community heating)		Renewable heat from CHP		Total Heat	
	Year	% major developments meeting policy requirement	Annual Capacity Installed (MWth)	Total installed capacity (MWth)	Annual Capacity Installed (MWth)	Total installed capacity (MWth)	Annual Capacity Installed (MWth)	Total installed capacity (MWth)	Annual Capacity Installed (MWth)	Total installed capacity (MWth)	Annual Capacity Installed (MWth)	Total installed capacity (MWth)
	2005	0%	0	0	0	0	0	0	0	0	0	0
	2006	0%	0	0	0	0	0	0	0	0	0	0
<b>Start</b>	2007	30%	2.91	2.91	1.36	1.36	1.04	1.04	1.10	1.10	6.40	6.40
	2008	40%	3.88	6.78	1.81	3.16	1.38	2.42	1.47	2.57	8.54	14.94
	2009	70%	6.78	13.56	3.16	6.32	2.42	4.85	2.57	5.15	14.94	29.88
	2010	90%	8.72	22.28	4.07	10.39	3.12	7.96	3.31	8.46	19.21	49.09
	2011	90%	8.72	31.00	4.07	14.45	3.12	11.08	3.31	11.77	19.21	68.30
	2012	90%	8.72	39.72	4.07	18.52	3.12	14.19	3.31	15.08	19.21	87.52
	2013	90%	8.72	48.44	4.07	22.58	3.12	17.31	3.31	18.39	19.21	106.73
	2014	90%	8.72	57.16	4.07	26.65	3.12	20.43	3.31	21.70	19.21	125.94
	2015	90%	8.72	65.88	4.07	30.72	3.12	23.54	3.31	25.01	19.21	145.15
	2016	90%	8.72	74.60	4.07	34.78	3.12	26.66	3.31	28.32	19.21	164.36
	2017	90%	8.72	83.32	4.07	38.85	3.12	29.77	3.31	31.63	19.21	183.57
	2018	90%	8.72	92.04	4.07	42.91	3.12	32.89	3.31	34.94	19.21	202.78
	2019	90%	8.72	100.76	4.07	46.98	3.12	36.01	3.31	38.25	19.21	221.99
	2020	90%	8.72	109.48	4.07	51.04	3.12	39.12	3.31	41.55	19.21	241.20

Note on table:

The contribution from pellet stoves and boilers is not shown as it is assumed to be minimal. This is because the vast majority of major development is expected to be in on gas areas, where the cost of pellets would be higher than mains gas for heating

## Assumptions used for on-site generation scenarios

### General

all costs are before grants		
fossil fuel base case new build gas condensing boiler, efficiency	90%	provides both space and water heating
carbon emissions for gas	0.19	kg/kWh
carbon emissions for grid electricity	0.43	kg/kWh
assumed average annual space and hot water demand for social housing	6300	kWh to 2005 building regs, based on NHER estimate of gas consumption
assumed annual average electricity demand	1500	kWh
estimated annual average CO <sup>2</sup> emissions per dwelling	1975	kg/year
boiler replacement rate	6.7%	assumes replace every 15 years

### Heat pump

assumed average size of heat pump unit for new social housing	3	kW thermal
assumed average size of heat pump unit for retro fit	5	kW thermal
annual fraction of domestic space and hot water demand met by heat pump	95%	assumes top up heating from electricity
heat pump domestic new build full load annual running hours	1995	
heat pump non-domestic full load annual running hours	2500	assumes top up heating from mains gas
CoP for heat pump	3.5	overall average, allowing for water heating in summer
assumes that top-up is provided from electricity based on standard installed costs of £4,000 for a 3kW unit		
assumed load factor domestic	0.23	
assumed load factor non-domestic	0.29	

### Solar water heating

for solar water heating, peak rating for 1m <sup>2</sup> collector assumed to be	0.7	kW	i.e. 70% peak efficiency - c.f. Aton panel, Imagination solar, 2kW for 2.7m <sup>2</sup>
assumed average domestic annual hot water demand	2500	kWh	
annual useful solar fraction for solar water heating system	50%		assume displacing mains gas
assumed average size of collector	3	m <sup>2</sup>	
typical size of domestic solar water heating system	2.1	kW	assuming 3m <sup>2</sup> of collector area
assumed load factor	0.07		

**Wood fuel/ community heating**

assumed average size of new build community heat exchanger	5 kW	3 bed semi is 8kW for 1998 regs, from NHER modelling
full load running hours for community heating	1260	for domestic load
full load running hours for non-domestic loads	2500	
annual fraction of space and hot water demand met by community heating	100%	
cost of heat main	£75.00	per m
estimate of length of heat main per dwelling	10	m
installed cost of heat exchanger, heat meter and connection to heat main for each dwelling	£500	
assumed load factor	0.14	for domestic load
assumed load factor for retro-fit to social housing, assume	0.29	for non-domestic loads
	50%	of biomass installations for wood chip community heating
average size of domestic retrofit boiler/ heat exchanger	20 kW	

**Wind**

cost for wind is based on 6kW grid connect system

typical size of wind turbine	6 kW
capacity factor for wind turbine	0.3

**PV**

typical size of household PV system	2 kWp	from discussion with EST
capacity factor for PV	0.09	

## ANNEX 8: OUTCOMES FROM STAKEHOLDER MEETINGS

### Notes from peer review meeting – Monday 14<sup>th</sup> March 2005, CREATE Centre, Bristol

List of attendees:

Ian Bright	Somerset CC
Tim Horwood	Cornwall CC
Meyrick Brentnall	Gloucester City Council
David Robins	North Somerset Council
Mike Twomey	GOSW
Pete Grigorey	Environment Agency
Mark Ellis-Jones	WWF SW
Lesley Seymour	Future Foundations
Cheryl Cowlin	Regen SW
Stuart Todd	SWRA
Julie Higginbottom	M Baker (Property Services) Ltd
Rob Niblett	Gloucester County Council
Richard Pymm	DARE
Alastair McMahon	CSE
Stephen Ward	CSE
Peter Capener	Independent Consultant
Martin Holley	CSE
Amy Hammond	CSE

### **Renewable electricity session**

#### Scenario 2 – Technologies overdeveloped?

- Wind – low base (50MW) – political
- Wind
- Waste - uncertainty over what happens to residual waste?
- competition with MBT?

#### Which technologies to bridge the gap

- Energy from waste
- Building-integrated renewables
- Tidal lagoon – link to coastal defence
  - ⇒ could link to wind turbines
  - ⇒ habitats directive?
- Biomass – no strong view
- Need to be pro-active in promoting wind
- Wave / tidal – discuss with industry – how will growth work

#### Issues for further investigation

- Look at knowledge shortfalls among planning decision-makers
- Give developers closer steer on where to site (not just wind)
  - ⇒ landscape sensitivity work
  - ⇒ clearer framework
- Wind – need for greater consultation

- What happens if target not met?
  - ⇒ Target is not policy
- Can we identify sites for wind?
- Further discussion with waste and marine industry

## Renewable heat session

### Heat: Scenario 2 Plus?

#### Heat: Technologies

- What about on gas areas?
- Higher penetration rates for scenario
- Regional target?
- Role of carbon emissions trading?
- More emphasis on heat pumps
- Wood chip for district heating / hospitals? (in on gas areas?)
- Solar water heating developed further
- Representing electricity demand for HPs

#### Heat – Issues to explore

- District heating in on gas areas
- Development in on gas areas
- Untreated wood waste – ratio heat to electricity
- Cost of gas
- Arboricultural waste?
- Sustainable harvesting?
- Reduction in cost from new build?

## On-site generation session

### Level of target?

- Higher target so achieve lower
- Target large developments first
  - ⇒ Identifying strategic sites
- Is there anything we can drop off developers list
- Potential increase in prices for sale
- Demonstrate demand
- Need evidence base

### Policy conflicts

- CO2 enables link to other issues
- Affordable homes – how targets for AH measured?
- Bringing together elements of sustainable development
- Need to provide indoor on how it links to SD
- Housing agenda and health
- Waste
- Conservation / heritage
- Energy efficiency / siting
- Link to sustainable communities agenda

### Issues for further investigation

- Links to carbon trading

- Existing retro-fitting
- Life cycle
- Energy assessment procedure

**General: planning implications**

- Energy from waste become key performance indicator
- Link to CC adaptation – run-off, coastal defence

**Notes from peer review meeting in Taunton, 15<sup>th</sup> April 2005**

## List of attendees:

Ian Bright	Somerset County Council
David Rapley	Wiltshire County Council
Tim Horwood	Cornwall County Council
William Wallace	North Dorset District Council
Meyrick Brentnall	Gloucester City Council
David Robins	North Somerset Council
Jackie Young	Plymouth City Council
Mike Twomey	GOSW
Neal Whitehead	GOSW
Pete Grigorey	Environment Agency
Mike Birkin	FOE (representing REN)
Mark Ellis-Jones	WWF SW (Link to ESG)
Don Alder	M Baker (Property Services) Ltd
Cheryl Cowlin	Regen SW
Craig Frost	SWRA
Stuart Todd	SWRA
Peter Capener	Consultant
Stephen Ward	CSE

## Summary of comments on draft planning policies:

Section	Comments	General agreement (✓), agree to disagree (X)
1 Background	Reduce length	✓
2.1 Renewable electricity	Replace should with will in E1 & E2 – need to be more positive	✓
	E1 – take out as no time for implementation given timescales for LDD? REvision 2010 has already encouraged adoption of these targets therefore not new to the region. RSS will only be confirming current practice	X ✓
	2020 target – need for sub-regional breakdown? ~ do it now or in future? Put in SPD? Review in 5 years? <b>Draft RSS should flag review to produce sub regional breakdown within 1-2 years within explanatory text</b>	✓
	Merge E1 & E2 together	✓
	Use 950 instead of 947 (balance of views seemed to be for scenario 2b, so figures will change accordingly)	✓
	<b>Should there be policy for off shore? YES</b>	
2.1.2 offshore	RSS should not be limited to just land-use planning issues	✓
	Marine spatial planning ( <i>may have a bearing in future</i> )	
	Policy can demonstrate political support ( <i>i.e. support will be needed from LPAs for on-shore grid cables as well as possible grid reinforcement</i> )	✓
	Policy has to be linked to on-shore implications e.g. move	✓

	E4(i) as separate policy?	
2.2 Renewable heat	Need definition of Renewable Heat- Glossary of terms?	✓
	Explain importance of heat beyond focus on renewable electricity – <i>general agreement on need to explain what renewable heat is, how it is different to renewable electricity, and why it needs a separate target</i>	✓
	Link to PPS22 ref. to energy not just electricity – this will provide extra justification for heaving a target in RSS	✓
	Emphasise potential link to social policies (regeneration/fuel poverty)	✓
	Link to 10 GW CHP target? ( <i>could provide extra justification for having renewable heat target in RSS</i> )	?
	Link to urban regeneration	✓
	Emphasise more important role for planners ( <i>i.e. in matching heat loads to renewable CHP – suggest put this point straight after targets/ policy</i> )	✓
	<b>Yes to heat targets in RSS</b>	✓
	Give heat breakdown in table – ( <i>to give people more info on how target is composed</i> )	✓
	Agreed that renewable heat section real opportunity to give SW flavour – therefore should cover benefits to region from renewable heat	✓
	Table 5, too much detail? – this can be cut down	✓
	Link to biodiversity and energy crops	✓
<b>Section 3</b>	Should there be SPD to support RSS – yes	✓
	Adapt E4 (d) – adding appropriate scale – consult with National parks? / AONBs - uncertainty as to whether to have specific figures on scale within text	✓
	Note that green belts intended to protect setting of historic towns	✓
	Need policy on community scale schemes ~ need to add degree of community involvement as criteria as well as reference to social and environmental benefits, currently in intro para	✓
	Word 'within' for E4 (b) is useful PPS22 – uncertain whether it takes into account proximity to designated areas	?
	E4 – re-phrase so that describes characteristics of development	✓
	Add something on urban areas – need to link to urban regeneration	✓
	Too bland – need greater clarity in order to aid interpretation	?
	Cumulative impact - need more guidance at local level within LDDs though reference here would be useful ~ covered under E4(a)?	✓
	Make reference to flood risk within E4	✓
	Use of 'positively encourage' – incorrect! ~ should come from criteria. Refer to targets instead	✓
	Need more regional flavour for criteria e.g. agricultural diversification, urban regeneration	✓

<b>Section 4</b>	Do not represent technologies on map, clear message is that there are few specific areas within region for any of the main technologies - key point needs to be made that all LPAs need to think about wind	✓
	Technology development in the SW will be very dispersed	✓
	Use pie chart map for 2010 plus constraints opportunities map, including urban regeneration areas, PUAs, designated areas etc and then text to describe the spatial distribution for key technologies to 2020	✓
	<b>Lose spatial map as currently stands</b>	✓
Sec 5.1	Energy hierarchy	✓
	Show Energy hierarchy as diagram	✓
	not just social housing refer to sustainable building code – be aware of repeating national policy	✓
	Link to sustainable development strategy	✓
	Refer to national code for sustainable building and Future Foundations	✓
	Define major developments earlier	✓
	Energy assessments for all developments – ‘deemed to satisfy’ route for small developments	✓
	Policy should apply to all developments	✓
Policy E5	All developments and not ‘seek’ ‘should put into effect’	✓
	2 <sup>nd</sup> para – add text for small developments and ‘deemed to satisfy’	✓
	Refer to WWF/ FF/ BRE code	✓
5.2	Building-integrated RE	
	“Developers should take into account” paragraph needs balance – e.g. say something like ‘There are costs as well as benefit’	✓
policy E6	Remove word “Viable” – all developments ‘will’ not should.	✓
	<b>Agreed to Carbon based target</b> – complex but needs explanation  <i>(carbon based policy as follows: "Where viable all developments should include a proportion of their energy supply from renewable sources. Major developments will be expected to provide, as a minimum, sufficient on-site renewable energy to reduce carbon dioxide emissions from energy use on-site by 10%.")</i>	✓
	Impact of charging fuel mix on undue burden over time? <i>(need to explore this is broader work)</i>	✓
	Green tariffs don't count – link to on-site generation only <i>(need to pin down definitions of what constitutes “on-site”)</i>	✓
	Remove 2nd paragraph (re: LDDs), unless LPAs want to go higher	✓
	For minor developments, need lighter touch policy – potential for a ‘deemed to satisfy’ type approach	✓

	LDDs should deal with smaller development	✓
	Major developments defined in RSS. Use current definition (i.e. the one used for London) – LPAs can define their own thresholds to suit their circumstances	✓
5.2.1	Remove and place In supplementary doc	✓

## **REvision 2020: Notes from meeting with Western Power Distribution (WPD), 24<sup>th</sup> March 2005**

**Location: WPD offices, Bristol**

### **Present**

WPD: Christian Hjelm, Phil Mann – Primary System Design Engineers

Regen SW: Keith Gillanders

Project Team: Peter Capener, Stephen Ward

### **Meeting notes**

#### **1. Clarification of key issues (relating to grid connection in WPD area, covering Cornwall, Devon, former Avon, Somerset)**

##### *1a. Maximum size of connection for offshore renewables into existing grid*

For North Cornwall coast, west of Indian Queens substation, limit for connecting offshore devices to existing northern 132kV line likely to be 60-100 MW – the higher figure for power factor close to unity. 30MW of this earmarked for Wave Hub. Other connections in the same area would reduce this capacity.

Would potentially be possible to connect 100MW offshore array by running dedicated 132kV line from Indian Queens substation out to coast – e.g. Newquay. This would be a wooden pole mounted line. Cost ~ £10 million.

Such a line would be classed a “sole use asset”, i.e. developer would have to pay full cost, but would get a refund if another user were to connect to same extension within 5 years. No need to apply to Ofgem for this investment, as covered by developer, and so not passed on to wider consumers.

For east Cornwall (east of Indian Queens) it may be possible to connect 50-100 MW of capacity to each 132kV line (one in north and one in south).

##### *1b. Capacity of existing grid to absorb total proposed renewable electricity capacity for 2020*

No major connection issues with targets proposed (as long as generation connected in small clusters and dispersed across the South West as indicated by tables shown in meeting), except for the north half of Devon, which could be major bottleneck. Northern part of Devon could potentially have 300MW of renewable capacity connected by 2020, with combination of tidal stream, wave, onshore wind and energy crop biomass CHP. Because of voltage rise and capacity issues, this might require re-inforcement of the National Grid (NGC) 400/132kV transformer substation at Alverdiscott. There is, on average, a 5 year leads in time for NGC to plan their works.

#### **2. Suggestions for regional actions**

- Finance joint study (NGC/ WPD) into re-inforcement requirements for grid network in North Devon area
- Role for Regen SW in brokering discussions between offshore developers for possible shared ownership of 132kV spurs to coast

- Need for Local Planning Authorities to start approving wayleaves for overhead grid connections (pole mounted), to avoid additional cost burden of underground cable (approx. 10 times as expensive)
- Need for further discussions with MoD to explore use of coastal zone between Pyworthy and St Tudy – this would open up use of 132kV grid line in that area for developers to connect to.

## Commentary on changes to Draft Renewable Energy Planning Policies (longer document)

Section	Recommendation from:
<p><b>Section 1 Background</b></p> <ul style="list-style-type: none"> <li>• General background reduced in length</li> <li>• Extra section on electricity and heat</li> </ul>	<p>Workshop Workshop</p>
<p><b>Section 2 Targets</b></p> <p><i>S 2.1</i></p> <ul style="list-style-type: none"> <li>• Combined policy E1 and E2</li> <li>• Replaced ‘should’ with ‘will’</li> <li>• Incorporated sub regional targets within policy</li> <li>• Used 847 MW (scenario 2b figure) not 947 MW (scenario 2a figure) as 2020 target</li> <li>• Added more specific link with current RPG target</li> <li>• Added policy on offshore focussing on grid connection</li> <li>• Added need to develop sub regional 2020 targets, to text</li> </ul> <p><i>S 2.2</i></p> <ul style="list-style-type: none"> <li>• Add link to PPS22 to help justify heat target</li> <li>• Used the heat target to provide more of a SW flavour</li> <li>• Used specific figures for heat target</li> <li>• Added more detailed technology breakdown to support target</li> <li>• Added link to social policies including fuel poverty, regeneration</li> <li>• Added technology mix table</li> <li>• Removed original table 5 and incorporated key points within new intro section</li> <li>• Role of LPAs in helping to match heat load to CHP emphasised – key issue for meeting target</li> </ul> <p><i>Not Covered</i></p> <ul style="list-style-type: none"> <li>• Link to CHP target not included, as target is a national one with no regional equivalent, therefore considered to not add any meaningful weight.</li> </ul>	<p>Workshop Workshop Steering group/project team Workshop</p> <p>Steering group/project team Workshop Workshop</p> <p>Workshop Workshop Steering group/project team</p> <p>Workshop</p> <p>Workshop</p> <p>Workshop Workshop</p> <p>Workshop</p> <p>Project team</p>
<p><b>Section 3 Development Criteria</b></p> <ul style="list-style-type: none"> <li>• Difficult to develop criteria that add anything to PPS22 without going into areas best dealt with by LDDs, therefore criteria reduced significantly to focus on three issues of particular importance to region, designated areas, cumulative impact and minimising environmental impact.</li> <li>• Flood risk added to list of impacts to be dealt with</li> <li>• Added emphasis on this being only part of picture alongside other issues highlighted within PPS22 and LDDs.</li> <li>• Added stronger weighted support for the need to take into account wider benefits as material consideration.</li> <li>• Added reference to opportunity for National Parks/AONBs to develop their own RE policies</li> </ul>	<p>Steering group/project team</p> <p>Workshop</p> <p>Steering group/project team</p> <p>Workshop</p>

<p><i>Not covered</i></p> <ul style="list-style-type: none"> <li>• Adding positive criteria into list – considered not the place for positive criteria, e.g. urban and regeneration opportunities. Better flagged up elsewhere, e.g. under spatial guidance.</li> <li>• Positive criteria to encourage development were not flagged up in this list because criteria will apply to all developments and not all developments may reasonably be expected to meet them. May therefore restrict rather than promote development</li> <li>• Adding regional flavour to criteria difficult when by definition these criteria should apply to whole region. Regional flavour pulled out in spatial guidance and targets.</li> <li>• Reference to community scale schemes not added due to problems of defining community scale</li> <li>• Reference to green belts not added in text as green belt criteria taken out</li> <li>• Rewording suggested by MB very helpful but in the end superseded by decision to cut down criteria significantly and place in context of PPS22 and LDDs</li> <li>• Reference to targets in policy deemed unnecessary due to other policies</li> </ul>	<p>Steering group/project team</p> <p>Steering group/project team</p> <p>Steering group/project team</p> <p>Project team</p> <p>Steering group/project team</p> <p>Steering group/project team</p> <p>Steering group/project team</p>
<p><b>Section 4 Broad Areas</b></p> <ul style="list-style-type: none"> <li>• Broad areas map removed and replaced with opportunities &amp; constraints map and text providing spatial guidance</li> <li>• Emphasised fact that technology development within the region will be very dispersed without any identifiable areas for technologies</li> <li>• Pie chart map for 2010 targets retained.</li> </ul>	<p>Workshop</p> <p>Workshop</p> <p>Workshop</p>
<p><b>Section 5 Sustainable Energy Use within New Development</b></p> <ul style="list-style-type: none"> <li>• Energy Hierarchy diagram was introduced but then removed as it seemed to give too much prominence to the hierarchy.</li> <li>• Section reduced in length and sub sections merged with section 5.2.1 removed (though if the longer document becomes SPD then this could usefully go back in)</li> <li>• Two policies combined into one</li> <li>• Policy in this area placed more clearly within the context of wider government and regional initiatives and building codes</li> <li>• Policy now applies to all developments but target applies only to major developments</li> <li>• Policy says all development will ‘comply’ rather than ‘seek to’</li> <li>• Word viable removed from policy</li> <li>• Policy expressed in terms of carbon</li> <li>• 2<sup>nd</sup> para in BIR policy removed referring to LDDs</li> <li>• Reference to costs as well as benefits added in text</li> <li>• Defined more clearly what constitutes on site</li> <li>• Specifically excluding green tariffs as these could be removed as soon as development has passed</li> <li>• Assumed that LDDs should deal with approaches to small development</li> <li>• Emphasised that LPAs can define their own lower thresholds</li> </ul>	<p>Steering group/project team</p> <p>Workshop</p> <p>Steering group/project team Workshop</p> <p>Workshop</p> <p>Workshop Workshop Workshop Workshop Workshop</p> <p>Project team</p> <p>Workshop</p> <p>Workshop</p>

<p>(but not higher)</p> <p><i>Not Covered</i></p> <ul style="list-style-type: none"> <li>Reference to defining a ‘deemed to satisfy’ route for small developments not included as needs further investigation, though could be of value if it could be made to work</li> </ul>	<p>Project team</p>
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**Comment on development of core policies document**

Explanatory text reduced to minimum to support each policy. Text selected in discussion with steering group.

Section 5 giving spatial guidance doesn’t have a policy and was therefore excluded from the core policies document. However, it may be considered that this provides helpful SW specific guidance that could be re-introduced in some form within RSS if space allows.

**Commentary on additional points raised by participants following meeting**

<p>Distinguish between distribution and transmission when referring to the grid</p> <p><i>This was considered a level of detail that would require significant explanation within a document already restricted in length. However distinction will be made more clearly within the full consultants report (draft does this partially, final report will do so more fully)</i></p>
<p>Reference to PPS1 paragraph</p> <p><i>Referring to this paragraph would not be simple, as it would require further explanation of the relationship with building regs and how this policy does not “replicate, cut across, or detrimentally affect matters within the scope of other legislative requirements”. Again space works against such an approach.</i></p>
<p>Use integrated sustainability assessments</p> <p><i>To require such an approach will require wider discussions within the RA and is beyond the scope of this project.</i></p>
<p>Use RPG Annex A definition of major development</p> <p><i>RPG definition is for a development requiring a transport assessment or a residential development over 100 households. This would seem to be setting the threshold a lot higher than has been discussed to date.</i></p>
<p>LPAs promoting exemplar projects is discriminatory and unrealistic</p> <p><i>This paragraph (second para on pg 15) could be removed if it is considered inappropriate by others. It was felt to be helpful to emphasise the LPAs potential leadership role in promoting good practice, it doesn’t mean to say that developments have to be funded by the public sector.</i></p>
<p>More specific reference to urban areas</p>

<p><i>Opportunities for urban development clearly highlighted within the revised section on spatial guidance.</i></p>
<p>Supporting use of green tariffs</p> <p><i>A policy that requires on site generation could be diluted by enabling the requirement to be met by green tariffs, when there is no way of ensuring that the tenants of the building will continue to use the tariff concerned.</i></p>
<p>Provide clarity around reference to BRE codes</p> <p><i>Addressed within the explanatory text in section 5</i></p>
<p>Use text to emphasise national policy and broader context</p> <p><i>Addressed within the explanatory text in section 5</i></p>
<p>Rewording of development criteria as proposed by MB</p> <p><i>See comment under section 3 above</i></p>

## ANNEX 9: REVIEW OF OTHER RSS POLICIES ON RENEWABLE ENERGY AND THEIR IMPLICATIONS FOR THE SOUTH WEST

### Part 1: Review

All the following RSS and RPG drafts were prepared prior to the publication of the PPS22 Companion Guide, also RPG for the West Midlands and the Partial Review of RPG13 predate the finalisation of PPS22. RPG published prior to 2004 has not been included in this overview, with the exception of RPG for the South West.

#### 1. East of England draft RSS, 2005

*Policy ENV8: General policy on renewable energy and energy efficiency*

- Requires developers to maximise efficiency through design etc
- Requires energy consumption statements on developments over 1000 sq m or 50 dwellings
- Requires all developments above the same threshold to provide at least 10% of their energy requirements from renewables
- Specifies sustainable locations for development
- Encourages use of landfill gas
- Encourages community based schemes
- Renewable energy targets for 2010 and 2020 are included in the supporting text and are not the subject of a specific policy

*Appendix C: Renewable energy generation: locational principles and criteria*

*Principles:*

- LDDs should adopt the “regional energy hierarchy” in descending order of priority: first reduce the need for energy use, second use it more efficiently, third use renewable energy, fourth use clean and efficient fossil technology
- A spatial approach should be used to “guide broad locations for particular developments e.g. wind.” Policies in LDDs should be related to sub-regional growth areas, settlements outside growth areas, non-designated landscapes, designated landscapes
- Small scale community-based schemes are most likely to be permissible in areas which are within or close to settlements, within suitable landscapes, close to the origin of the energy source, close to groups of buildings in rural areas.

*Area-based criteria*

- Other policies in RSS are relevant to the location of renewable energy projects, such as landscape character
- Sustainable Communities Plan growth areas: as these areas will see most development their potential for energy efficiency, CHP and renewables should be used to the greatest possible extent
- Settlements outside the growth areas: less development proposed but still many opportunities to combine it with the use of renewable and energy efficient technology.
- Non-designated landscapes: seen as the principle locations for large scale developments associated with wind, biomass and agricultural wastes, and for smaller schemes using hydro, sewage gas etc. Biomass combustion plant to be as close as possible to the source of the fuel.
- Designated landscapes: not suitable for large scale renewable energy projects, especially wind. Small scale projects with mitigation may be acceptable

*Technology-based criteria*

- LDDs should specify detailed criteria covering energy efficiency standards, locational criteria for specific renewable energy technologies
- Guidance is provided in respect of six technologies.

## 2. South East draft RSS 2005

Proposals for renewable energy were considered during 2003/4 and have been fed into the most recent draft of South east RSS

### *Policy EN1 Design for energy efficiency and renewable energy*

High standard of efficiency through design are required, LDDs may use a variety of measures including:

- Assessments of energy demand in new development
- Attainment of high efficiency ratings
- Use of on-site renewable resources
- Promotion in the large scale growth areas

### *Policy EN2 CHP*

### *Policy EN3 Renewable energy targets*

- Sets out minimum targets by installed capacity and share of capacity for 5 year periods to 2026
- Identifies the most significant resources by technology

### *Policy EN4 Sub-regional targets*

- Provides sub-regional targets for 2010, 2016 and 2020
- Proposes the use of detailed assessments of local potential, use of community based schemes, encouraging local supply chains, raising awareness

### *Policy EN6 Development criteria*

- LDDs should contain criteria policies to support the development of renewables
- Lists five broad criteria

In addition RPG9 for the South East identifies broad sub-regional targets using pie diagrams to show the relative size of the resource by sub-area and how it is made up of the four main technologies

## 3. Yorkshire and the Humber RSS based on the selective review of RPG12, December 2004.

### *Policy R12 Energy generation transmission and supply*

- Sets out targets for the installation of renewable energy generation capacity by 2010 as minima, by sub-region and with an overall regional total.
- LDDs should include criteria policies to be applied in securing the sub-regional targets, which will need to take account of designated areas.
- Encouragement of CHP projects
- Encouragement of clean coal technologies

*Other policies provide some context for the development of renewables:*

- Policy S4 deals with urban and rural design issues
- Policy S5 deals with Climate Change and the need to reduce greenhouse gas emissions
- Policy S6 deals with the sustainable use of physical resources
- Policy N3 deals with landscape character

#### 4. Draft RSS for North East England, November 2004

##### *Policy 41 Sustainable energy use*

- Requires a range of strategies to achieve higher efficiency ratings

##### *Policy 42 Renewable energy generation*

- Commitment to the achievement of a 10% target for the region
- Sets minimum sub-regional targets for installed renewable energy capacity

##### *Policy 43 Planning for renewables*

- Sets out 13 criteria for the assessment of renewable energy projects

##### *Policy 44 Onshore wind development*

- Identifies broad areas considered suitable for the development of major wind farms, which are also shown on the Key Diagram

#### 5. RPG11 for the West Midlands June 2004

##### *Policy EN1 Energy Generation*

Sets out the framework for LDDs:

- Encourage the development of renewables
- Provide spatial guidance
- Identify criteria including eight specified criteria

##### *Policy ENV2 Energy Conservation*

- Sets out the framework for LDDs:
- Minimise energy demands through design
- Encourage CHP and district heating

##### *Other points:*

- RPG11 does not include a target for renewable energy but encourages development that will contribute to the national 10% target, and suggests that the region could possibly generate 15% of its energy from renewables
- Provides a general description of the technologies most relevant to the region.

#### 6. Partial Review of RPG13 for the North West, March 2004

##### *Policy ER13 A framework for sustainable energy*

- Includes the Energy Hierarchy in policy and a diagram in text
- Local authorities should set an example in initiating their own projects

##### *Policy ER14 Energy efficiency*

- Includes CHP
- Includes energy efficiency through good design, layout etc
- Text includes reference to the use of Supplementary Planning Guidance to cover design issues, materials, layout etc.

##### *Policy ER15 Renewable energy*

- Sets a minimum target for renewable energy supplied in the region by 2010.
- Includes four criteria
- Includes encouragement for building-integrated renewables
- Supporting text includes sub-regional targets to 2010

## 7. The London Plan, February 2004

### *Policy 4A.7 Energy efficiency and renewable energy*

- Supports energy efficient and renewable technology

### *Policy 4A.8 Energy assessment*

- Energy assessments will be required in respect of major developments, which should show what steps have been taken to apply the Mayor's energy hierarchy: using less energy, using renewable energy and supplying energy efficiently.

### *Policy 4A.9 Renewable energy*

- Major developments are to demonstrate how a proportion of energy will be generated from renewables

### *Policy 4A.10 Supporting the provision of renewable energy*

- Support for the development of a least one large wind farm
- Borough UDPs to identify sites for wind and other renewable developments

## 8. RPG10 for the South West, September 2001

### *Policy RE6 Energy generation and use*

- Support national target to reduce greenhouse gas emissions by 12.5%/20%
- A minimum of 11-15% of electricity production to come from renewable sources by 2010
- Encourage community-based projects, CHP/DH, energy efficiency in new build and redevelopment  
Development plans should:
  - Specify criteria for assessing renewable energy projects, to help in balancing benefits against impacts
  - Promote energy conservation through design, layout etc

## Part 2: Implications

### 1. Energy Hierarchy and Energy Use Assessments

The Energy Hierarchy included within the East of England draft RSS and the North West RPG Partial Review contains a logical series of four preferences that puts minimising the use of energy and efficiency at the apex. The Hierarchy referred to in the London Plan is shorter and surprisingly places energy efficiency after renewable energy.

The use of an Energy Hierarchy has been coupled with the use of Energy Assessments for major developments in the London Plan.

An Energy Hierarchy has a certain value in helping to set the context for renewable energy planning policy but it also has limitations. In particular:

- The majority of measures to achieve energy efficiency fall outside the planning system – insulation standards, boiler and appliance efficiency standards, etc. Planning can influence efficiency and overall use of energy to some degree: at the broadest level through the way in which development is located and by reducing car use; and at a detailed level by encouraging the use of passive solar design principles in individual buildings, estate layouts etc.
- There is nothing in Government policy which requires that energy efficiency should precede the development of renewable energy. The two are seen as progressing in tandem. Some campaigning groups opposing the development of renewables, particularly wind farms, will stress that efficiency should come ahead of renewables. It may be fair to argue that there is little

point in generating renewable energy which will be wasted through inefficiency, but in reality we need both measures; efficiency and renewables. The approach taken by PPS22 is that renewable energy projects should be positively encouraged where they satisfy criteria policy. If an Energy Hierarchy is introduced into South West RSS it must be properly explained to ensure that it is not used as a reason to hold up renewable projects in favour of efficiency measures.

The London Plan and East of England Draft RSS require that major developments present an Energy Use Assessment as part of the planning process. In the case of London this is then used to see if the Energy Hierarchy is being followed. An Assessment can also help in seeing how far a particular development can meet a proportion of its needs from on-site renewables. Policies to support the use of on-site renewables are encouraged by PPS22 para 8.

Major development must be defined. This could be done with reference to the General Development Order 1995, 10 or more dwellings, site area of more than 0.5 hectares for housing or one ha for other purposes, development of a building of 1,000 square metres or more. Alternatively a customised definition could be introduced.

#### **Suggestions for the South West RSS:**

- **Include an Energy Hierarchy along the lines used in the East of England draft RSS/North West RPG13 Partial Review in text to support an overarching sustainable energy policy.**
- **Include some qualifications to make it clear that energy efficiency and the development of renewables are expected to proceed in tandem.**
- **Introduce a requirement that major developments (of a defined scale) should submit an Energy Use Assessment alongside the planning application. These should examine compliance with the Energy Hierarchy and identify how much energy can be supplied by on-site renewables.**

## **2. Regional renewable energy targets**

Yorkshire and the Humber RPG12 Selective Review, South East Draft RSS, and the North East draft RSS contain within policy a regional target for renewable energy for 2010 broken down between sub-regions. The East of England draft RSS has targets for 2010 and 2020 for the region as a whole but not for sub-regions, this is in text rather than policy. The North West Partial Review has sub-regional targets for 2010 in text and a policy commitment to an overall regional target.

PPS22 para 2 requires the inclusion of targets for renewable energy within RSS for 2010 and 2020, para 5 says that these can be broken down into sub-regions but not between technologies. Targets should be minima and revised upwards once achieved. Neither PPS22 nor its Companion Guide specify whether targets should be in policy or text, but the implication is that they should be in policy.

It could be argued that putting a target in policy is less flexible than having indicative figures in text. The reverse argument is that as targets are minima there is an expectation that they are flexible and should be exceeded. Having targets in policy gives them greater weight in relation to the preparation of LDDs and development control decision making.

While PPS22 says that “fixed” technology targets should not be included within RSS because of rapidly changing technology its Companion Guide, para 3.14 says that it will be helpful to include supporting evidence that sets out the anticipated contribution of different technologies. If it is clear that particular technologies have a major role to play up to 2010 and 2020 it is important that this is made clear to facilitate public debate on RSS. This approach has been taken in South East draft RSS which identifies key technologies, and in North East draft RSS

which having identified on-shore wind as the single most significant technology goes on to provide a specific spatial policy.

#### **Suggestions for the South West RSS:**

- **Regional and sub-regional targets should be included within policy.**
- **Supporting text should make it clear that the figures are minima and not ceilings.**
- **The relative importance of the main technologies and how this is likely to change in broad terms up to 2020 should be described in the supporting text.**
- **If spatial guidance is required for a particular key technology it should be provided in policy**

### **3. Criteria policies**

Yorkshire and the Humber RSS does not contain any criteria policies specifically designed for renewable energy but relies upon a number of its more general policies elsewhere and requires LDDs to undertake the task of setting out these policies. East of England draft RSS requires LDDs to include criteria policies by location based on suggestions contained within its appendix.

A number of regions have set out criteria policies at RPG/RSS level, in particular the South East, the North East and the North West.

Criteria developed in the documents reviewed above tend to cover similar ground and are focused on safeguarding generic planning concerns such residential amenity, road safety, national designations etc. In addition there are examples of regionally specific policies, dealing with particular world heritage sites for example.

PPS22 para 7 makes it clear that criteria policies should be set out within RSS and therefore implies that it is not sufficient to simply require LDDs to do this job. PPS22 contains material relevant to the preparation of criteria policies covering national designations, green belts etc. The PPS22 Companion Guide offers advice on drafting criteria policies at RSS level. At LDD level the Companion Guide, para 4.6 suggests that criteria policies should be focused on key local issues.

#### **Suggestions for the South West RSS**

- **A series of criteria policies should be prepared for South West RSS which will cover both generic and regionally specific guidance, and provide a framework for LDDs.**

### **4. Broad areas and spatial guidance**

PPS22 para 7 says that criteria policies (developed at regional and sub-regional levels) should be used to identify Broad Areas where the development of different types of renewable energy may be considered appropriate. The Companion Guide provides more detail in Chapter 3, para 3.4 describing the interplay between the assessment of resources conditioned by criteria policies and how this process can be used to generate targets and identify Broad Areas. It can be argued that without some spatial reference points it is difficult to explain to the public what achieving a particular target will mean on the ground. The Companion Guide Figure 3.1 illustrates the process making the point that Broad areas should only be identified using symbols and not definable boundaries. The Guide provides examples of spatial guidance provided in the South East and North East.

Identifying Broad Areas along with criteria policies and targets provides RSS with a “complete package” which the public and interest groups can readily understand and respond to.

East of England draft RSS includes a further approach to providing spatial guidance. Its Appendix C relates its overall spatial development strategy to the development of renewable energy, so that major growth areas are seen as key opportunities for renewables. Although levels of development in the South West will not be as great as those in the East of England a similar approach could be taken to making a significant effort to introduce on-site renewables into growth areas.

Some of the other spatial guidance in the East of England RSS could probably be better handled by criteria policies in the South West. In particular criteria can be set out for designated and non-designated landscapes and developments in settlements outside growth areas.

#### **Suggestions for the South West RSS**

- **RSS could identify the main strategic Broad Areas within which renewable energy development must progress if the regional targets are to be achieved.**
- **These areas could be shown using symbols, distinguishing between different technologies and be included within the Key Diagram or an equivalent map of the region.**
- **Major growth areas could be identified as an opportunity for the introduction of on-site renewable energy technology**

#### **5. On-site renewables**

PPS22 para 8 supports/encourages the use of policies requiring that a proportion of the energy required by new developments should be met from on-site resources.

The London Plan and draft RSS for the East of England and the South East also take this approach. The PPS22 Companion Guide provides examples of policies requiring the consideration of on-site renewables

#### **Suggestions for the South West RSS**

- **South West RSS should include an on-site renewable energy policy**

## **ANNEX 10: PROPOSED PLANNING POLICIES AND EXPLANATORY TEXT**

### **SOUTH WEST REGIONAL SPATIAL STRATEGY**

#### **1 BACKGROUND**

##### **1.1 Introduction**

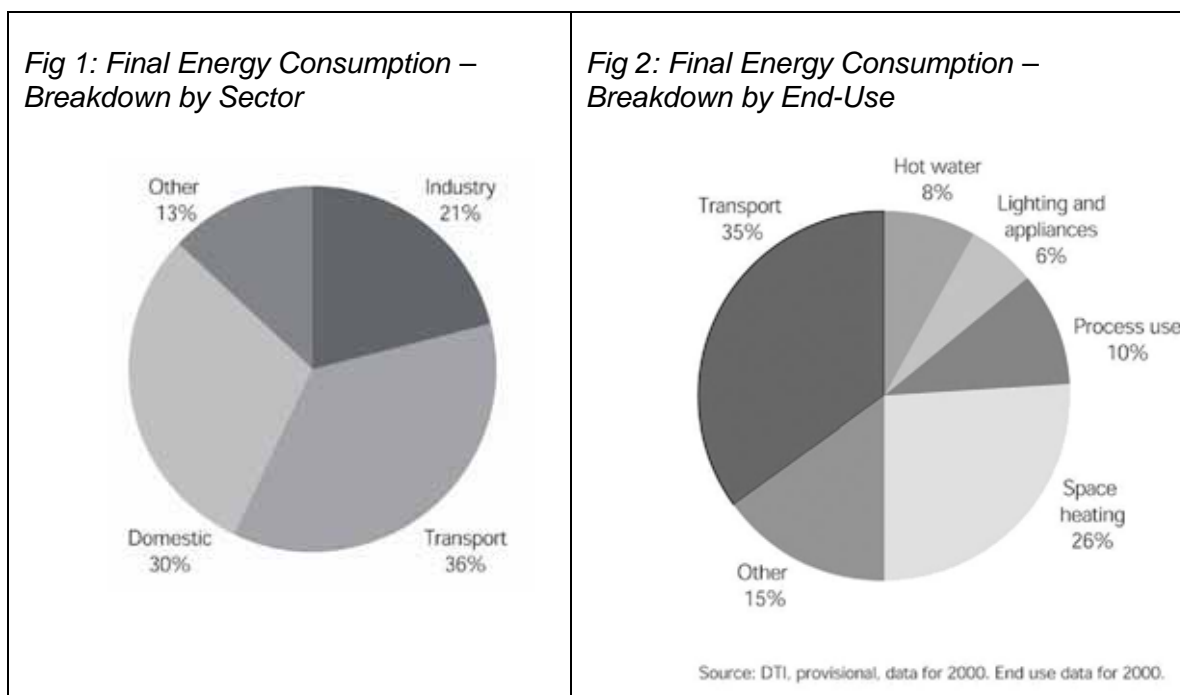
The availability of energy is central to maintaining and enhancing the South West's way of life. It is widely taken for granted and expected to continue to underpin the region's economic, domestic and transport future. However during the period covered by RSS two major challenges will affect the way in which energy is perceived and planned for. The first challenge is Climate Change which has a global reach but requires locally and regionally based action to put into effect national and international commitments. The second challenge concerns the UK's shift from being virtually energy self sufficient to becoming ever more dependant upon external supplies of oil, coal and gas.

Both of these challenges are recognised by the Government, the 2003 Energy White Paper "Our Energy Future – Creating a Low Carbon Economy" sets out a strategy to minimise energy use and pollution and move towards an increasing proportion of energy generated from indigenous renewable sources. The White Paper's four goals are to: cut the UK's CO<sub>2</sub> emissions by 60% by 2050, with real progress by 2020; maintain the reliability of energy supplies; promote competitive markets in the UK and beyond, helping to raise the rate of sustainable economic growth and improve our productivity; and ensure that every home is adequately and affordably heated. These goals will contribute to and go beyond the United Nations Framework Convention on Climate Change and its Kyoto Protocol to reduce greenhouse gas emissions, which contribute to global climate change.

##### **1.2 The Difference Between Electricity and Heat**

Energy essentially comes in two forms – electricity, or heat, and they are qualitatively different. The former produces a flow of electrons that can be used to power electronic and electrical devices. The latter is generally produced by combusting a fuel (e.g. gas or oil) to release heat energy. Electricity is a higher grade form of energy, and this is reflected in the difference in the price paid for it by end users.

Because of the qualitative difference between these two types of energy, they are produced using different types of technology and are used to meet different end uses. The graphs below (taken from the Energy White Paper) show a typical split for final energy consumption in the UK by sector and by end use. These splits would be similar for the South West.



End uses require energy either in the form of heat or electricity. Of the end uses shown in the figure, after excluding transport, the majority of energy required is in the form of heat, for providing hot water, and space heating for buildings. As heat energy forms such a large part of energy demand, it is important that the RSS policies should support the development of renewable forms of heat as well as electricity.

For this reason, this document sets out separate targets and policies for renewable electricity and renewable heat. The use of renewable energy for transport is not covered as part of these policies, and is dealt with in the transport section of the RSS.

### 1.2.1 Defining Renewable Heat

The term “renewable heat” refers to heat produced from the following (not an exhaustive list):

- Solar water heating
- Biomass heat only, using wood fuel.
  - Wood fuel can be sourced from forestry residues, clean recycled wood waste, arboricultural residues, or energy crops (short rotation coppice). The fuel can take the form of logs, wood chips, and pellets.
- Heat from renewable Combined Heat and Power (CHP)
  - This would include heat from energy from waste, anaerobic digestion, and biomass CHP
- Ground source heat pumps

## 2 REGIONAL AND SUB-REGIONAL RENEWABLE ENERGY TARGETS

### 2.1 Renewable Electricity Targets

#### 2.1.1 Electricity from Onshore Renewables

Achieving the commitments set nationally within the 2003 Energy White Paper will require at least 40% of electricity to be generated from renewable sources by 2050. In the shorter term the Government is committed to the achievement of 10% renewable electricity by 2010 and is aiming for 20% by 2020.

The South West, a region that imports far more electricity than it produces, has made a good start and has a range of renewable energy installations. However, in 2005 only about 3% of the region's electricity demand is currently met by these indigenous renewables. Regional Planning Guidance (RPG 10) set a 2010 target for renewable electricity based on a percentage of generation within the region. This target formed the basis for the work done to establish the 2010 target outlined within policy E1. The detailed relationship between these figures is outlined within *[RSS associated document title]*.

#### Policy E1 Renewable Electricity Targets

Local Development Documents will include policies and development proposals which contribute to the achievement of the following targets:

- a) By 2010 a minimum target of 509-611 MWe installed generating capacity, from a range of onshore renewable electricity technologies;
- b) By 2020 a minimum target of 847 MWe<sup>49</sup> installed generating capacity from a range of onshore renewable electricity technologies. This onshore target, together with offshore renewable electricity capacity, will help to provide at least 20% of the Region's electricity demand by 2020.

The RSS policy framework, complemented by Local Development Documents, will facilitate the achievement of the minimum sub-regional targets by 2010 outlined in table 1:

**Table 1: 2010 Onshore Renewable Electricity Targets**

Sub-region	Installed Electricity Generating
Former Avon	35-52
Gloucestershire	40-50
Wiltshire	65-85
Somerset	61-81
Devon	151
Dorset	64-84
Cornwall	93-108 <sup>50</sup>
<b>Total</b>	<b>509-611</b>

<sup>49</sup> The renewable electricity capacity approved through the planning process will be monitored through the local planning authorities' annual monitoring review. Capacity installed will be monitored by the Regen SW annual survey

<sup>50</sup> Cornwall County Council adopted the bottom end of the range within their structure plan

The targets outlined within table 1 have been consulted upon and agreed by the counties and/or sub regions as part of the REvision 2010 Project.

Map 1 in section 4 suggests one way in which these 2010 targets may be met, though **the actual technology mix itself is not part of the targets and is provided for indicative purposes only.**

The 2020 target was developed and consulted on as part of the process of developing the RSS. Discussions have been held with key regional and sub regional stakeholders identified by the Regional Assembly and the renewable energy industry.

Table 2 outlines one way by which the 2020 target could be met in terms of potential technology mix. **The technology mix is not part of the target and is provided for indicative purposes only.** The assumptions that form the basis of this analysis can be found in the full report at *[insert website address when established]* and are summarised in *[RSS associated document title]*.

Table 2: 2020 Onshore Renewable Electricity Targets

Onshore technologies	MWe	GWh
Onshore wind	550	1,445
Energy crops/FR	100	788
Building Integrated Renewables	50	131
Hydro	15	66
Energy from waste (eligible for RO)	100	832
Anaerobic Digestion	2	17
Landfill Gas	30	250
<b>Total</b>	<b>847</b>	<b>3,529</b>

Further work on establishing appropriate sub regional targets for 2020 (as opposed to the 2010 sub regional targets already outlined within this document) will be taken forward as an early review of this RSS.

Planning has a key role to play in facilitating the development of renewable energy and the achievement of the Policy E1 targets. PPS22 states that planning policies at regional and local level should promote and encourage rather than restrict the development of renewable energy resources. Local authorities should collaborate and engage with communities, the renewable energy industry and other stakeholders to assist in the achievement of targets through measures such as:

- detailed assessments of local potential, including within local authorities own estate
- promoting district heating CHP schemes
- supporting the development of the renewable energy industry within the South West
- encouraging the development of local supply chains, especially for biomass
- raising awareness and understanding of renewable energy amongst local authority officers, members and the wider community
- encouraging community involvement with and where appropriate ownership of renewable energy schemes

### 2.1.2 Electricity from Offshore Renewables

The South West has one of the best wave and tidal resources within the UK. As a result, offshore renewables are likely to be increasingly developed off the South West coast after 2010, and could play a significant part in achieving the 20% renewable electricity target by 2020. However in order for the 2020 target to be met it seems likely that there will need to be some

strengthening of the grid to accommodate the offshore capacity from marine technologies such as wave and tidal stream.

Within the 2010 targets it was anticipated that there may be relatively small wave and tidal demonstration devices amounting to some 6 MWe in place by 2010. Offshore wind was also expected to make a contribution of 50 MWe towards meeting the 2010 regional target. Both these assumptions now seem unlikely. With regards wave, it is expected that the Wave Hub will be operating by 2010 with some 20 MWe capacity installed. However, it is likely that other parts of the country that are more favourable for offshore wind will be exploited first and given the timescales to 2010 any offshore wind seems unlikely.

The role of the planning system in encouraging offshore renewables is limited to associated developments on the landward side of the low water mark. Relatively modest onshore connections will facilitate the capture of very significant offshore resources. It is vital that local planning authorities approach the planning and control of these associated developments in a positive manner.

### **Policy E2 Offshore Renewable Energy Projects**

**Local Planning Authorities should encourage the development of offshore renewable energy resources by facilitating connections to the electricity grid<sup>51</sup>**

The relatively modest contribution from offshore technologies by 2010 will have grown considerably by 2020 to 400 MWe as indicated within table 3:

*Table 3: Offshore Renewables Target by 2020*

<b>Offshore technologies</b>	<b>MWe</b>	<b>GWh</b>
Offshore wind	50	153
Wave	250	723
Tidal stream	100	289
<b>Total</b>	<b>400</b>	<b>1,165</b>

This assumes the commercial proving of wave and tidal technologies early within the next decade together with government support to ensure commercial viability. The total offshore capacity assumes a relatively small contribution from offshore wind. If this is to occur it is likely to be within the Bristol Channel where depth of water will not make development too expensive, as is the case in most other parts of the region.

A significant shift in technology mix is anticipated between the 2010 and 2020 renewable electricity targets. For 2010 it is assumed that less than 10% of the target will be met by offshore technologies. By 2020 it is expected that just over 30% of the target will be met by offshore technologies. The rate of growth of onshore wind will fall from a 600% increase in capacity between now and 2010, to a less than 60% increase in capacity between 2010 and 2020. The justification for these assumptions, together with a summary of all other assumptions is outlined within *[RSS associated document title]*.

### **Meeting 20% of Electricity Demand by 2020**

When taken together, the capacity from onshore and offshore technologies will generate approximately 20% of the region's electricity demand. However this estimate is totally dependent on the assumptions made for how electricity demand will change between now and 2020.

<sup>51</sup> The level of offshore capacity installed within the region will be monitored through the RDA Wavehub project and DTI consents

The estimate of 2020 electricity demand in the South West used in table 4 assumes a high level of energy efficiency in line with the assumptions within the Energy White Paper alongside increased demand for electricity from growth in housing and GVA in the South West. The detail behind these estimates is set out in *[RSS associated document title]*

Table 4: Total Renewable Electricity Target by 2020

	MWe	GWh
Onshore technologies	847	3,529
Offshore technologies	400	1,165
Total	1,247	4,694
% Regional Electricity Demand		20%

## 2.2 Renewable Heat Targets

While there are currently no Government targets for heat production from renewable sources this situation is expected to change during the RSS period. The Government commissioned a Biomass Task Force in October 2004 to look at measures to support biomass energy in the UK, including biomass heat.

PPS 22 talks about increasing the deployment of “renewable energy” in general, which is taken to cover both renewable electricity and renewable heat. It is worth noting that the European Commission (EC) White Paper on Renewable Energy Sources sets out a comprehensive strategy and action plan to achieve the ambitious goal of doubling the renewables’ share of the European Union’s total energy supply, from 6 per cent to 12 per cent, by 2010. This includes renewable heat as well as electricity.

There is considerable potential in South West for the production of heat from renewable sources, and the South West has a lot to gain from harnessing its renewable heat resources. Some of the factors that mean that the SW has more to gain than perhaps other regions are:

- the SW has the best solar resource in the UK;
- 9.8% of the SW land area is covered by forests and woodland, providing a significant resource of forest residues that can be used for biomass heating;
- the SW has a small but established installer base for renewable heating technologies, as well as a manufacturer of ground source heat pumps;
- the SW has a high proportion of off-gas areas – for example, 18% of households are off-gas. This increases the economic potential for renewable heating;
- there is existing support for renewable heat within the South West Renewable Energy Strategy, the Woodland Renaissance programme and the AONB management plans;
- there are a number of exemplar projects that can be built on, including the RDA and Countryside Agency funded Bioscope project, to support biomass heating.

Some of the benefits that the region can gain from increasing the use of heat from renewable sources are:

- enhanced woodland management, leading to increased biodiversity
- converting wood wastes into a resource
- using renewable heating systems as a measure to reduce fuel poverty in “hard to treat homes” in off-gas areas
- local income from wood fuel supply
- improving the economics of renewable Combined Heat and Power (CHP), and assisting in delivery of renewable electricity targets
- reduced heating running costs for tenants, social landlords, and owner occupiers

- helping to reduce carbon dioxide emissions from new buildings, particularly as part of major urban regeneration
- helping to reduce carbon dioxide emissions from existing buildings by retro-fitting renewable heat systems, particularly through the installation of biomass boilers.

In order to encourage the use of these resources, particularly in strategic and other major developments a renewable heat target has been introduced into RSS.

### Policy E3 Regional Renewable Heat Targets to 2010 and 2020

The minimum targets for the generation of heat from renewable sources outlined within table 6 should be achieved by the use of appropriate resources and technologies:

Table 5: Regional Targets for Renewable Heat by 2010 and 2020

Timescale	Installed Thermal Capacity (MWth)
2010	105
2020	503

There is a key role for local planning authorities within the region in ensuring a synergy between sites for major new developments, and the location of renewable CHP generators, to ensure that the heat from the latter can be effectively used, for example as part of community heating systems.

These targets were developed and consulted on as part of the process of developing the RSS. Discussions have been held with key regional and sub regional stakeholders identified by the Regional Assembly and the renewable energy industry.

The assumptions that form the basis of this analysis can be found in the full report at xxxxx and are summarised within *[RSS associated document title]*. The table below shows how these targets could be achieved, based on a preferred scenario as outlined within *[RSS associated document title]*. **However, the actual technology mix itself is not part of the targets and is provided for indicative purposes only.**

Table 6: Indicative breakdown of how targets could be met

Technologies	2005 (MW)	2010 (MW)	2020 (MW)
Woodfuel heating	3	47	247
Heat pumps	2	21	107
Solar water heating	4	35	138
CHP (where heat is usefully used) from AD, EfW or biomass	0	8	42
<b>Total MW</b>	<b>9</b>	<b>111</b>	<b>534</b>
<b>Total MW after de-rating for heat pumps</b>	<b>8</b>	<b>105</b>	<b>503</b>

For the purposes of target setting, the figure for heat pumps was de-rated (using a factor of 0.71) to allow for the use of non-renewable electricity to drive heat pump systems.

These targets are challenging, but achievable, on the basis that:

- A policy for on-site renewable energy generation in new build is put in place, as set out in policy E6. This will directly stimulate installation of new renewable heat systems

- The UK government puts in place measures to support the economic value of renewable heat (e.g. a renewable heat obligation), OR fossil fuel prices (for oil and mains gas, in particular) rise at the high end of forecasts

The targets equate to roughly 0.2% of SW heat demand (excluding transport) by 2010 and 1.4% by 2020 assuming that the full range of energy efficiency measures set out in the Energy White Paper are put into place.

### 3 DEVELOPMENT CRITERIA FOR RENEWABLE ENERGY

Renewable energy proposals should be positively encouraged by planning authorities and assessed using the criteria set out in Policy E4. Local Planning Authorities may prepare Local Development Document criteria policies, which focus on key local issues, within the framework provided by national guidelines and RSS. Regional SPD on Renewable Energy [*RSS associated document title*] also contains detailed guidance relevant to Local Development Document preparation.

The integration of wind and biomass production proposals into the region's varied landscapes will require careful consideration. The location and design of proposals should be informed by landscape character assessments. In areas where a number of proposals come forward during the same timescale, or a development is proposed near to existing developments, cumulative effects must be assessed following the steps set out in the PPS22 Companion Guide, (paragraph 5.24).

Within nationally designated areas, small scale renewable energy proposals will be considered favourably subject to Policy E4. In the case of wind developments, large scale wind farms are considered inappropriate and even modest scale proposals could result in a disproportionate degree of landscape impact. Proposals for more than one wind turbine, or a turbine with a hub height of 25 metres or more, are unlikely to be acceptable within the region's designated areas. The settings of designated areas are important and need to be protected from inappropriate development. In assessing renewable energy proposals close to a designated area their potential impact will be a material consideration. National Park Authorities may develop their own policies for the types of renewable energy technologies that they see as suitable for their area.

Internationally designated sites and areas of nature conservation significance are protected by specific legislation. The purposes of designation will vary considerably between sites and may not be in conflict with particular forms or scales of renewable energy development. The key test in assessing a proposal is the extent to which it might affect the integrity of the designation.

Minimising any impacts caused by noise, odour, traffic, discharges to the air and watercourses, and waste disposal will be important particularly in relation to nearby residential areas and individual dwellings. Local Development Documents may wish to include more detail on compliance with these requirements.

PPS22 makes it clear that the wider benefits of renewable energy projects must be given significant weight as material considerations regardless of scale. These benefits could include: CO<sub>2</sub> reduction, the diversification of local rural economies, the creation of new jobs, particularly in biomass production and processing, and support for the regeneration of urban areas, including industrial and brownfield sites.

**E4 Development Criteria for Renewable Energy**

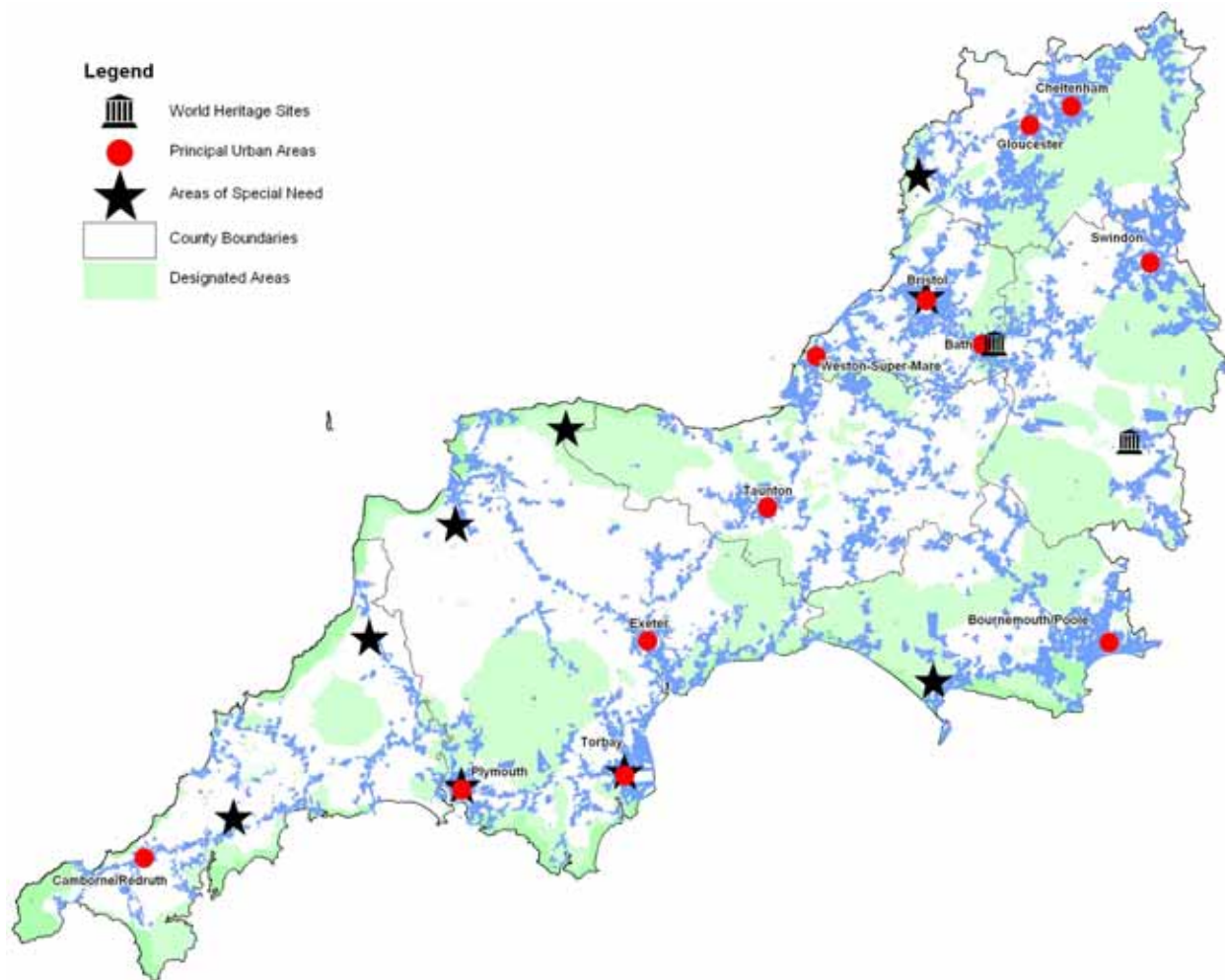
**Local Planning Authorities should consider the following regional criteria alongside the full range of issues outlined within PPS22 and local criteria contained within Local Development Documents:**

- a) Within the region's nationally and internationally recognised designations, schemes should be of an appropriate scale and not compromise the objectives of the designation;**
- b) Renewable energy schemes should not have a significant adverse cumulative impact in conjunction with other similar developments;**
- c) Schemes should minimise and deal satisfactorily with any impacts resulting from construction and operation including air quality, landscape and visual impact, atmospheric emissions, noise, odour, water pollution, flood risk, and the disposal of waste;**

**The wider environmental, community and economic benefits of proposals, whatever their scale, (e.g. carbon reduction, job creation etc) are material considerations that should be given significant weight in determining planning applications.**



## Map 2: Opportunities & Constraints on Renewable Energy Development



### 4.1 Principal Urban Areas (PUAs) and Areas of Special Need (ASNs)

PUAs offer considerable opportunity for renewable energy development.

As the largest producers of municipal and commercial/industrial waste, PUAs present significant opportunities for developing Energy from Waste plants (utilising advanced thermal treatment), although, there may also be opportunities for smaller scale EfW plants in less populous areas. EfW plants should be located close to good transport networks to facilitate the movement of waste to the plant. As with EfW, large scale biomass plants will also need to be located close to road networks. Locating EfW plants close to new industrial estates or housing developments, maybe possible within ASNs and PUAs to supply process heat or district heating.

On existing industrial estates or other brownfield sites, opportunities exist for the development of a range of different renewable energy schemes, from medium sized wind turbines in small clusters to the installation of building integrated systems. PUAs and ASNs are expected to be the focus for new development. New developments offer significant opportunities for identifying and utilising large heat loads to support biomass based community heating schemes and also provide extensive opportunities for the integration of renewable energy technologies into buildings.

There is also considerable potential for retrofitting renewable energy systems to existing buildings. There are many instances where this would fall within the planning system, for example, as part of major refurbishments taking place as part of urban regeneration.

## 4.2 Off gas areas

The parts of the region that do not have access to the gas network and therefore have to rely on higher cost fuels such as oil and liquefied petroleum gas to supply space heating and hot water, offer significant opportunities for implementing renewable heat technologies such as biomass boilers, solar water heating or ground source heat pumps.

## 4.3 Designated areas

Designated areas as highlighted within map 2 include, World Heritage Coasts, Areas of Outstanding Natural Beauty, National Parks and Nature Reserves, SSSIs, Ramsar sites, Special Protection Areas and Special Areas of Conservation. Whilst it is not expected that there will be the opportunity for the development of large scale renewable energy schemes within designated areas, there are significant opportunities for the development of smaller scale renewables which should be addressed in the management plans of these areas.

## 4.4 Non-designated rural areas

It is within the non-designated rural areas of the region where the larger scale development of renewable energy is expected to occur, subject to site specific constraints.

The highest wind energy resource exists within Devon and Cornwall. However there are increasing opportunities in the rest of the region, as minimum economic wind speeds<sup>52</sup> reduce over time. Lower economic wind speeds may result in reduced pressure on areas outside designated areas with higher quality landscapes and the highest wind speeds. The region's settlement dispersal and landscape character suggests that the majority of wind farm development in the South West is likely to be distributed in small and medium clusters<sup>53</sup> throughout the region rather than concentrated in any one area.

There are opportunities for biomass plant development in almost every county in the region. Plants should be located as close as possible to fuel sources to minimise carbon emissions from transport.

## 4.5 Offshore

The best locations for wave energy devices depend on the technology employed.

In general, the wave energy available increases with water depth. Although more energy is available further offshore, connection costs are increased due to the increased length of cable required. To support these costs, commercial wave farms will need to be large, eg 50-100MW, and there are a limited number of shoreline connection points that can accept this capacity, eg Hayle and Padstow. There are also several no-go areas (shipping lanes, MOD restricted areas, etc) that need to be avoided. Consequently, most of the development will be focused well off the north and west Cornish coasts and possibly off north Devon.

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<sup>52</sup> An economic wind speed represents the wind speed at which a developer may consider a particular site to be economically viable. Economic wind speeds may reduce over time in response to technology development and other economic factors

<sup>53</sup> For the purposes of the study that has supported the development of the targets, Land Use Consultants assumed that large clusters involved more than 10 turbines.

Unlike wave energy, the best locations for tidal stream devices are in shallower waters where there are strong currents. These include the Bristol Channel, the Isles of Scilly, several sites around the Cornwall and Devon coastline and Portland Bill. Again, shoreline connection points will be limited.

Although the offshore wind resource is very large, a major limitation to development is water depth. There are similar locational constraints as for wave and tidal resources and again connection costs can be considerable. The seabed shelves very quickly off most of the southwest peninsula so there are a limited number of sites where offshore wind development would be possible.

## 5 PROMOTING SUSTAINABLE ENERGY USE WITHIN NEW DEVELOPMENT & REGENERATION

PPS22 emphasises the importance of developing positively expressed policies on building integrated renewables. However, policies that encourage the on site generation of renewable energy must be placed within a wider context of the need for development, both new build and refurbishment, to incorporate the principles of sustainable energy design. This will involve reducing building energy demand through energy efficiency and low energy design, before meeting the resulting demand from first renewable energy and then fossil fuels or grid electricity. This approach has been characterised as the ‘Energy Hierarchy’ within the South West, and will ensure that energy efficiency opportunities are maximised before renewable energy is considered within proposals for new developments.

While the majority of actions required to achieve greater energy efficiency and the clean use of fuels fall outside the scope of the planning system, it is possible to influence the overall use of energy by the way in which development is located and served by sustainable transport, and by careful design.

There are several initiatives at both national and regional level that support the development of policy in this area. These include:

- the EU Energy Performance in Buildings Directive (EPBD) which is due to come into force in the UK in January 2006. This will require all buildings, domestic and non-domestic, both new and existing to have energy performance ratings;
- it is already mandatory, under current building regulations, for all new domestic dwellings to have a “SAP” rating, which is a measure of energy performance and CO2 emissions;
- the UK Government, in partnership with industry, is currently developing a Code for Sustainable Buildings (CSB). This will be a voluntary scheme to promote more sustainable building practices. The CSB will apply to all new building developments, with the initial focus on new build housing.
- for the SW, the Future Foundations initiative has an ongoing programme to promote sustainable construction within the South West;
- the draft regional housing strategy proposes that all new *social housing* (see action B.2. in RHS) should meet EcoHomes<sup>54</sup> “Very Good” accreditation, where there is access to the mains gas network, and “Good” accreditation in areas off the mains gas network;

<sup>54</sup> The Building Research Establishment’s Environmental Assessment Method (BREEAM) is a measure of best practice in environmental design and management of offices, industrial units and retail units. BREEAM assesses the performance of buildings, management, energy use, health and well-being, pollution, transport, land use, ecology, materials, and water. The EcoHomes Assessment is the version of BREEAM for new, converted or renovated homes, covering both houses and apartments. Both BREEAM and EcoHomes assessments are expressed on a scale of “pass” to “excellent”, carried out by independent assessors who are trained and licensed by the Building Research Establishment.

- the SW RDA has a policy that RDA funded new build projects should meet BREEAM “Very Good” rating.

Major development proposals must be accompanied by an “Energy Use Assessment” which describes how much energy is expected to be used within the proposal and goes on to consider ways by which the “Energy Hierarchy” can be put into effect. Existing methods that could be used to prepare such assessment are the BRE EcoHomes (for residential) and BREEAM (for non-residential) tools, that include an assessment of energy use and carbon emissions, and are already widely used by developers. Also, additional tools are in development to support the implementation of the EPBD.

This energy use assessment should provide a baseline for annual CO<sub>2</sub> emissions arising from fossil fuel energy use within the building (i.e. energy used for heating, cooling, lighting and appliances, and cooking, but not including industrial processes, transport or embodied energy).

This baseline for CO<sub>2</sub> emissions should be before the use of any on-site renewable energy generation, but after the application of measures to reduce energy use (including passive solar design), and improved energy efficiency.

#### **Policy E5 Sustainable Energy within Development Proposals**

**All developments will include a proportion of their energy from renewable sources. Major developments will be expected to provide, as a minimum, sufficient on-site renewable energy to reduce carbon dioxide emissions from energy use on site by 10%.**

**Proposals for major developments must be accompanied by an energy use assessment which sets the baseline for the calculation of the proportion of on site generation and describes the measures that are being taken to put the “Energy Hierarchy” into effect.**

Although there are capital costs associated with installing renewable energy systems, there are also benefits, financial and otherwise. These include the reduced energy costs arising from both reduced energy use and protection from rising energy costs. There is potential for improved comfort and health, improved capital value, reduced maintenance costs and environmental impacts. Business benefits can include enhanced corporate social responsibility, prestigious designs, exemption from climate change levy, renewable obligations certificates, local job creation and increased community spirit.

The feasibility of supplying a proportion of renewable energy may depend on technical or financial issues, and what is feasible is likely to change as energy prices vary, the costs of technologies change, as grants become available and legislation is adopted. Developers will be expected to demonstrate that they have explored all renewable energy options, and designed their developments to incorporate any renewable energy requirements. A detailed justification will be required from developers if they do not consider that it is feasible to provide the required proportion.

Compliance with the 10% target will be measured with reference to the Energy Use Assessment, which will give a baseline figure for CO<sub>2</sub> emissions for a development, before the use of any renewable energy. As well as enforcing compliance with this 10% target, Local Planning Authorities (LPAs) will need to check that built developments comply with the plans submitted as part of the Energy Use Assessment.<sup>55</sup>

<sup>55</sup> The Energy Use Assessment will therefore reflect actual practice and can be used to monitor the implementation of this policy by recording renewable energy capacity installed and CO<sub>2</sub> emissions saved.

Major development proposals include significant urban regeneration projects covering new build, refurbishment, conversion and change of use and are defined here, based on the ODPM PS2 definition used for reporting general developments, as:

- for dwellings, the development of 10 or more dwellings or sites of more than 0.5 ha, if the number is not given;
- for all other uses, where the floor space will be 1000 square metres or more, or the site is 1ha or more. Floor space is defined as the sum of floor area within the building measured externally to the external wall faces at each level. Basement car parks, rooftop plant rooms, caretaker's flats etc should be included in the floor space figure.

Individual Local Planning Authorities may use lower thresholds for what constitutes a major development and set higher percentages for on site generation, to suit their particular circumstances, within their Local Development Documents. However for reporting purposes, Local Planning Authorities will be required to monitor against the above definitions of "major developments".

Public authorities have a key role to play in providing examples of best practice in energy efficiency and the capture of renewable energy. Local authorities in particular should develop exemplar projects which are accessible to the public and properly explained.

Energy use on site is defined as that used for servicing buildings and includes energy used for:

- Space and water heating
- Cooking
- Lighting, appliances, and equipment, including computers, lifts, etc.
- Ventilation and cooling

It excludes energy used for:

- Industrial processes (as these can change depending on who occupies the building)
- Transport
- Embodied energy (e.g. energy used in building fabric)
- Energy used to provide water, food, and shared infrastructure

Eligible forms of renewable energy for meeting the target currently include: solar water heating, photovoltaics (rooftop or cladding), biomass heating, biomass CHP, wind generators, micro-hydroelectric, ground source heating and cooling, and air and water source heat pumps. It can also include heat from renewable CHP plants, such as: landfill gas, sewage gas, anaerobic digestion, biomass, and energy from waste.

Off-site renewable energy generation would be eligible where there is a physical connection to the site, via a heat main or private wire. However, buying in green electricity is not eligible, as such arrangements can be temporary in nature.