Progressing Renewable Energy in the SE of England

Project Reference: TV105

A First Report to SEEDA: January 2008

SEEDA SOUTH EAST ENGLAND DEVELOPMENT AGENCY
Working for England's World Class Region

TV Energy

This report has been prepared by TV Energy Ltd for SEEDA to facilitate development of renewable energy resources in the South East. Report reference TVR115.

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EXECUTIVE SUMMARY

Progress has been made with the deployment of renewable energy technology in the south east region. Targets drawn up in 2000 have largely been met although the actual make-up in terms of projects and technology mix has held some surprises. Largely, wind, waste and wood have delivered with other technologies and resources showing limited penetration.

Increasing the renewables supply and use in the region will clearly address the desire to move towards a low carbon economy for the region. Renewable energy generation, be it power, heat/ cooling or transport fuels, has a direct and highly measurable impact. The more of it you have, then generally the bigger the hit (exception can be liquid biofuels). Savings of an estimated 688,519 tonnes of CO_2 are currently being made through the generation of renewable electricity. Based on known projects this will rise to 1,085,568 tonnes by 2010 and to 1,618,208 tonnes by 2020.

The RES has set out very progressive targets that need to be honed and a method determined for delivery. The suggestion is that a future programme be determined that will address potential by consideration of scale of development as well as by host or facilitator organisation.

In the short to medium term the maximum benefits will be seen from:

- Large projects where electricity generation is the main driver and where individual large contributions are made to energy supply and carbon reductions
- Medium scale projects where heat as well as power are the main drivers and cumulatively make a significant contribution to energy supply and carbon reductions

A broader strategy and certainly a longer term strategy would also need to embrace the smaller down to domestic scale opportunities. Here significant contributions can be made but any significant impact will be over a much longer timescale. Fundamentally, this area addresses the 'hearts and minds' issues and the socio-economics are much more important. Getting the population more generally to reduce their energy consumption and potentially providing a part of their own energy needs is a critical part of a broader approach. Making them familiar with renewables will help address non-technical barriers too, for example likely reducing their opposition to larger, local wind, biomass etc. projects. Modest resources would be merited to help local groups continue to press on this front.

The region has the skills and the industry to become a major world class player in certain renewable energy technologies should it wish to grasp this. Biomass and possibly tidal stream are two obvious targets.

To be successful in the short to medium term, SEEDA needs to broadcast that the SE is open for business and 'renewables friendly'. That it is eager to increase the number and

range of projects. SEEDA must facilitate large scale projects using high level influencers/ champions giving strategic support whilst also devising incentives packages if possible, inject resources into targeted medium scale projects as exemplars for later replication working closely with developers and Local Authorities and win the 'hearts and minds' of the local population through support at community level.

Based on this analysis and evidence base, a themed and costed programme will be constructed in a phase 2 study.

1.0 BACKGROUND

Discussions and meetings between TV Energy and SEEDA have concluded that more thought needs to be given to a programme for delivery of renewable energy activities in the SE Region commensurate with the requirements of the RES (Regional Economic Strategy), SE Plan and other strategic documents and targets.

A programme of work has been agreed that will firstly review current knowledge and from this base set out a detailed plan for future activities.

1.1 PROGRAMME OF WORK

The following phased programme was agreed between TV Energy and SEEDA:

PHASE I

1.1.1 RENEWABLE ENERGY CONTRIBUTION & TARGETS

- Review current renewable energy contributions (in MWe, MWth and by carbon savings) by technology using data drawn from the SEE-STATS database
- Interpret these results and give predictions as to the likely out turns for 2010
- Make projections for possible out turn in 2020 given a range of scenarios drawing on a future programme of activities (SEE BELOW)
- Reference existing targets and comment on their likelihood of being achieved

1.1.2 CONSTRUCT A MATRIX (USING SCALE AND AREA AS DIFFRENTIATORS)

- Outline small, medium and large scale renewable energy projects
- Discuss appropriate technologies and the state of development
- Drivers
- Barriers (technical and non-technical)
- Priorities
- Research needs
- Opportunities, including spatially differentiated opportunities at sub-regional level, such as in each of the Diamonds and Coast, and Inner contour.
- Identify roles and responsibilities of stakeholders for collaborative action

PHASE II

1.1.3 DEVISE A 'ROUTE MAP' WITH THEMED TASKS

The work listed above will form the platform for the creation of a 'route map' for SEEDA to deliver a programme of work over an initial 3 year period to better mobilise regional renewable energy sources. This plan will include:

- A timeline for activities and deliverables
- A costed programme based on themes and related to scale

- An indication of the 'value for money' based on energy generation, carbon savings, jobs created, new business opportunities created and training opportunities emerging
- Further recommendations for action

This report sets out the findings from Phase I.

2.0 RENEWABLE ENERGY CONTRIBUTION & TARGETS

Renewable energy contributions in the region are presented in tabular form in Annex 1. This data is drawn directly from the regional SEE-STATS database and is up to date. The database enables us to have a clear view of where we currently are with projects both existing and proposed that will be on stream by 2010. Projections beyond to 2020 are possible based on this foundation but must be treated with caution.

2.1 Review current renewable energy contributions

The contribution that renewable sources of energy make to the regional energy mix remains modest (see Annex 1, Table 1 onwards). The contributions (electricity generation) relate to a few large facilities apart from landfill gas which has a potential based on many sites across the region. There is also a small additional contribution from onshore wind, biogas (sewage gas), solar PV and low head hydro – approximately 10 MWe in total.

The major contributors in terms of installed capacity (electricity generation) are:

Resource	Contribution MWe	Number of sites
Landfill gas	143	62
Off shore wind	90	1 (Kentish Flats)
Biomass co-firing	65	2 (Didcot, Kingsnorth)
Biomass (dedicated)	40	1 (Slough Heat & Power)
Others	10	>200
TOTAL	**348**	**>266**

The sub-regional split is as follows:

Sub-region	Contribution MWe
Thames Valley	72
Hants & IOW	1
Kent	41
Surrey & Sussex	1
Not attributable*	233

**Offshore wind, Landfill gas*

In terms of heat generation, this has not historically been a topic that central government required to be tracked in the same way as electrical capacity. Hence, less information is to hand. SEE-STATS does track the largest projects, however, as regionally we have seen this as an important element of our understanding. The following table sets out the renewables heat contribution as established by SEE-STATS for the SE region (see also Annex 1, Table 15).

Contribution MWth - 2007			
Sub-region	**Operational**	**Planned**	**Sum**
Thames Valley	23.30	1.67	24.98
Hants and IOW	1.14	0.02	1.16
Kent	1.38	0.07	1.45
Surrey & Sussex	3.19	0.01	3.19
South East	**29.01**	**1.77**	**30.78**

The vast majority of the recorded production is for biomass (wood) with minor contributions from solar thermal and GSHPs. Waste including landfill gas is not recorded (historically this was tracked by the LAMMCOS project which fed into RESTATS but was long ago discontinued through lack of funding by the then DoE and DTI).

2.2 Interpretation and projections to 2010

The 2010 milestone is rapidly approaching and we are able to determine with reasonable accuracy what the likely out turn will be (based on SEE-STATS data). The story concerns the growing importance of wind energy both on-shore and off-shore. Other resources remain rather stagnant by comparison. The expected contributions are as follows for electrical generation:

Resource	Contribution MWe	Number of sites
Off shore wind	390	2 (Kentish Flats, Thanet)
Landfill gas	153	66
On-shore wind (large)	110	11
Biomass co-firing	65	2 (Didcot, Kingsnorth)
Biomass (dedicated)	40	1 (Slough Heat & Power)
Others	9	>250
TOTAL	**767**	**>332**

The sub-regional split is as follows:

Sub-region	Contribution MWe
Thames Valley	102
Hants & IOW	9
Kent	111
Sussex	2
Not attributable	543

In terms of heat generation, the following table gives the combined sub-regional and broad technology breakdowns for known existing and prospective renewable heating projects. There are no known major projects of this type planned that will come on-stream in time to help meet targets.

Contribution MWth – 2010 anticipated			
Sub-region	**Biomass**	**Other**	**Sum 2010**
Thames Valley	24.91	0.43	25.34
Hants and IOW	1.14	0.38	1.52
Kent	1.38	0.31	1.69
Surrey & Sussex	3.19	0.15	3.23
South East	**30.62**	**1.26**	**31.77**

The expectation is of a modest increase in generation from renewable sources with the leading contender wood fuelled heat. Some further solar thermal is anticipated and perhaps biogas based on farm digesters (one or two). Slough Heat and Power will continue to dominate the regional picture both directly (its own production) and through initiatives with TV Energy to build up local supply infrastructure.

2.3 Projections to 2020

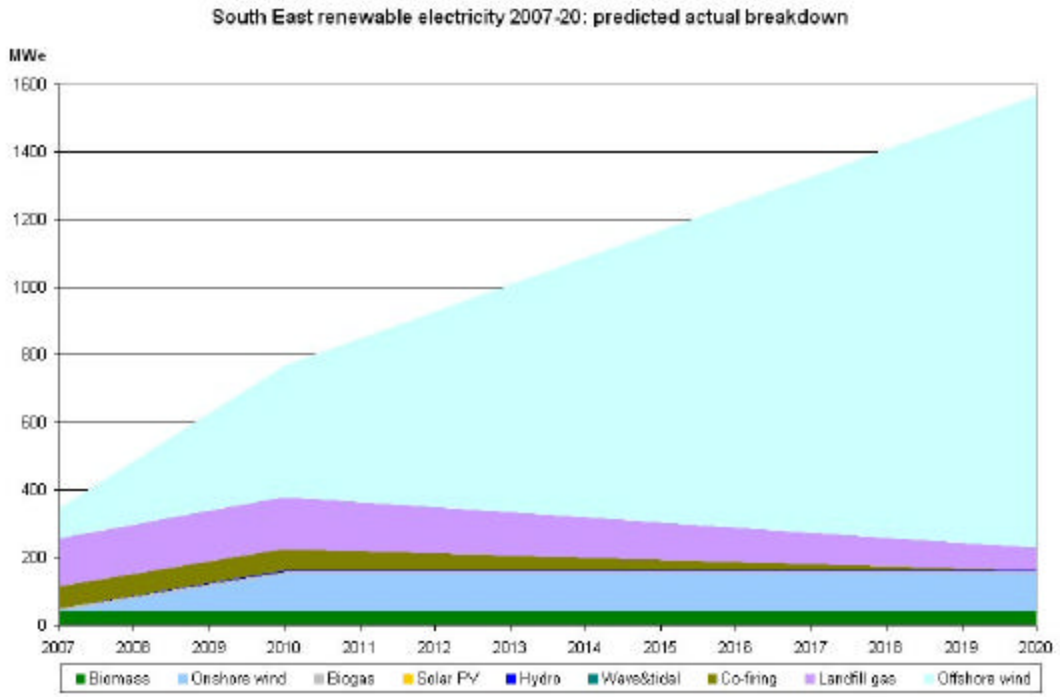
By comparison to 2010, 2020 is more open to speculation. Based on current knowledge and little change in policy, the expectation is of a major increase in off-shore wind energy making it by far the most important of all resources to the region. A modest further increase in on-shore wind energy might be anticipated, but has not been quantified here. A decline in landfill gas production to half its present level (as organic wastes to landfill decreases), a loss of co-firing (as the Didcot and Kingsnorth sites are closed/ modified) plus further unquantifiable modest growth in microgeneration. The assumption is that Slough Heat and Power continues.

Resource	Contribution MWe	Number of sites
Off shore wind	1,339	3 (Kentish Flats, Thanet, London Array)
On-shore wind	111	11
Landfill gas	70	30
Biomass (wood)	40	1 (Slough Heat & Power)
Others	9	>250
TOTAL	**1,567**	**>295**

The sub-regional split is as follows:

Sub-region	Contribution MWe
Thames Valley	77
Hants & IOW	9
Kent	71
Sussex	2
Not attributable	1,408

The chart below emphasises the likely dominant position of off-shore wind technology in providing green energy to the region in the short to medium term.



In terms of heat generation, it has not been attempted to predict the situation this far ahead owing to the unpredictability for these technologies. There are no known major renewable heating or CHP projects beyond the outline planning stage for the region.

2.4 Beyond 2020

Of the major technologies beyond 2020 the major prizes are expected to be:

- Solar PV: a theoretically very large potential which can be realised if equipment costs continue to reduce
- Wind (on and off shore): expected to have a significant resource still not captured
- Tidal: large remaining resource even by 2020 as technology still emerging

- Biomass/ energy crops: uptake is expected to accelerate but large uncertainties remain over resource size and ability to deliver, nevertheless seen as a major player longer term as a plethora of environmental benefits are possible

2.4 Targets

2.4.1 Evolution

Targets almost exclusively relate to electrical generation capacity as this was the focus of central government policy for many years. Regional targets for England (plus targets for Wales, Scotland and Northern Ireland) began their development around 2000 as part of a national initiative to better engage with regional governance bodies and to 'ground truth' whether the national numbers of a 10% renewables (electricity) contribution by 2010 coupled with an aspiration to reach 20% renewables by 2020 was feasible. Targets were supposed to be 'bottom-up' and based on an audit of regional resources. Targets were also to be scrutinised by stakeholders and through discussions, to be based on regional consensus.

Activity in the south east resulted in the following targets (capacity) being proposed as studies unfolded and then accepted and built into planning guidance:

Document	Date	Target (mimima) details
A strategy for Energy Efficiency and Renewable Energy – Draft for consideration of the Regional Planning Committee (SEERA)	July 2002	2010 – 450 MWe (4%) 2016 – 700 MWe (6%) 2026 – 1610 MWe (14%)
Harnessing the elements: A strategy for energy efficiency and renewable energy consultation draft (SEERA)	October 2002	2010 – 450 MWe (4%) 2016 – 700 MWe (6%) 2026 – 1610 MWe (14%)
Harnessing the elements: Energy efficiency and renewable energy (SEERA)	**March 2003**	**2010 – 620 MWe (5.5%)** **2016 – 895 MWe (8%)** **2026 – 1750 MWe (16%)**
Regional Planning Guidance for the south east (RPG9): Energy efficiency and renewable energy	**November 2004**	**2010 – 620 MWe (5.5%)** **2016 – 895 MWe (8%)** **2026 – 1750 MWe (16%)**

Interestingly, it was always noted that:

1. Landfill gas was not regarded as a 'true renewable' by many environmentalists in that it was a consequence of less than optimal waste management and as policies concerning waste reuse, recycle and minimisation came into play – that it would inevitably decrease. Initially landfill gas was excluded. Subsequent incorporation was seen by many as sending the 'wrong signals' concerning harnessing 'sustainable' sources of energy. Nevertheless, landfill gas is a substantial source of energy and pragmatically can be seen to boost the current numbers.

2. Anaerobic Digestion of the Organic Fraction of MSW by comparison was seen positively as this was potentially a growth area and helped facilitate a more energy and resource efficient method of dealing with waste. The potential, was however, seen as relatively insignificant in the short to medium term.
3. Co-firing. Was argued to have its own sub-section as once more this was seen by many as sending mixed messages – here wood being used in conjunction with fossil fuels (e.g. coal in large centralised facilities).
4. Off-shore wind. A critically important resource but seen as beyond the remit of regional planning and thus its ability to affect outcomes.
5. The basis of targets was always questioned by stakeholders. DTI had insisted on using 'installed capacity in MWe' as the baseline so facilitating the aggregation of all regional data. However, a better measure would be the proportion of total energy (primary energy) consumed in the region, be that electricity, heating/ cooling and transport. At the time of devising targets, regional consumption data was not available.

In conclusion, the renewables regional targets finally embraced: wind (on and off-shore), wood and organic residues, crops (including short rotation coppice and other energy crops such as Miscanthus/ grasses), slurries/ manures/ green fraction of MSW generating biogas (also sewage and landfill gases), low head hydro, solar (thermal and PV) and potentially wave, tidal stream and geothermal resources.

To date, the three leading resources/ technologies contributing the most to regional targets are Landfill Gas, Co-firing/ biomass and Off shore wind.

Finally, Energy Efficiency, Waste Management and Combined Heat and Power (CHP) targets have always been closely associated with renewable energy targets and will impinge on one another. How waste targets sit alongside the renewables targets is always a matter of debate since the resource may be seen as interchangeable (hence care also with double counting).

More recent targets have been established as follows:

Document	Date	Target (mimima) details
The South East Plan: (SEERA)	2005	**2010 – 620 MWe (5.5%)** **2016 – 895 MWe (8%)** **2020 – 1,130 MWe (10%)** **2026 – 1750 MWe (16%)**
Regional Economic Strategy or RES 2006 – 2016 (SEEDA)	2006	2010 – 10% of energy supply 2020 – 20% of energy supply

The South East Plan numbers relate back and are consistent with the 2000 study (plus extensions) and the installed capacity and supply at that time. By comparison, the RES numbers are more contemporary (and thus need to take into account the increased energy

use) and there is a worrying lack of an evidence base. The RES has the following target relating to climate change and energy (Annex 2 sets out the RES sustainable prosperity implementation plan as this appears on the SEEDA web site):

"To reduce CO_2 emissions attributable to the South East by 20% from the 2003 baseline by 2016 as a step towards the national target of achieving a 60% reduction on 1990 levels by 2050, and increase the contribution of renewable energy to at least 10% of energy supply in the South East by 2010 as a step towards achieving 20% by 2020."

In the main RES document (page 99 'actions to achieve targets') the wording of the target is slightly different, as follows:

Reduce CO^2 emissions attributable to the South East by 20% from the 2003 baseline by 2016 and increase the contribution of renewable energy to overall energy supply in the south east, to meet national targets of 10% of electricity demand by 2010 and aspire to achieve 20% by 2020.

The RES renewable energy target is thus ambiguous and needs to be clarified. Supply is not the same as demand/ consumption but many interpret this as the same. In addition, the implementation plan talks about 'energy' in the round whilst the main document talks of electricity only. The former is a much harder nut to crack, as follows:

If the target is measured by reference to consumption/ demand (and this would make the most sense) then the targets equate to:

MWh/yr	Consumption	10%	20%
ELECTRICITY*(1)*	41,673,138	4,167,314	8,334,628
HEATING*(2)*	84,206,424	8,420,642	16,841, 284
ROAD TRANSPORT*(3)*	78,578,249	7,857,825	15,715,650

Notes
(1) 2006 sales: 41,673,138 MWh electricity /yr
(2) 2006 (gas) & 2005 (other) sales: 78,789,804 MWh gas /yr + 409,109 toe domestic petroleum/yr + 42,301 toe domestic coal/yr + 14,335 toe domestic manuf. solid fuels/yr = 84,206,424 MWh/yr. (Source: BERR 2007. Includes some domestic non-heating usage; excludes commercial/industrial/agricultural heating fuels. Assumes 11.63 MWh/toe.)
(3) 2005 sales: 3,274,028 tonnes petrol/yr + 2,829,587 tonnes diesel/yr = 78,578,249 MWh/yr. (Source: BERR 2007. Assumes 13.06 MWh petrol/tonne & 12.66 MWh diesel/tonne.)

If done by supply then the figures would relate to the total that is currently supplied from within the region. So, based on existing power stations and other facilities:

MWh/yr	Supply	10%	20%
ELECTRICITY*(1)*	63,766,037	6,376,604	12,753,207
HEATING*(2)*	84,206,424	8,420,642	16,841, 284
ROAD TRANSPORT*(3)*	78,578,249	7,857,825	15,715,650

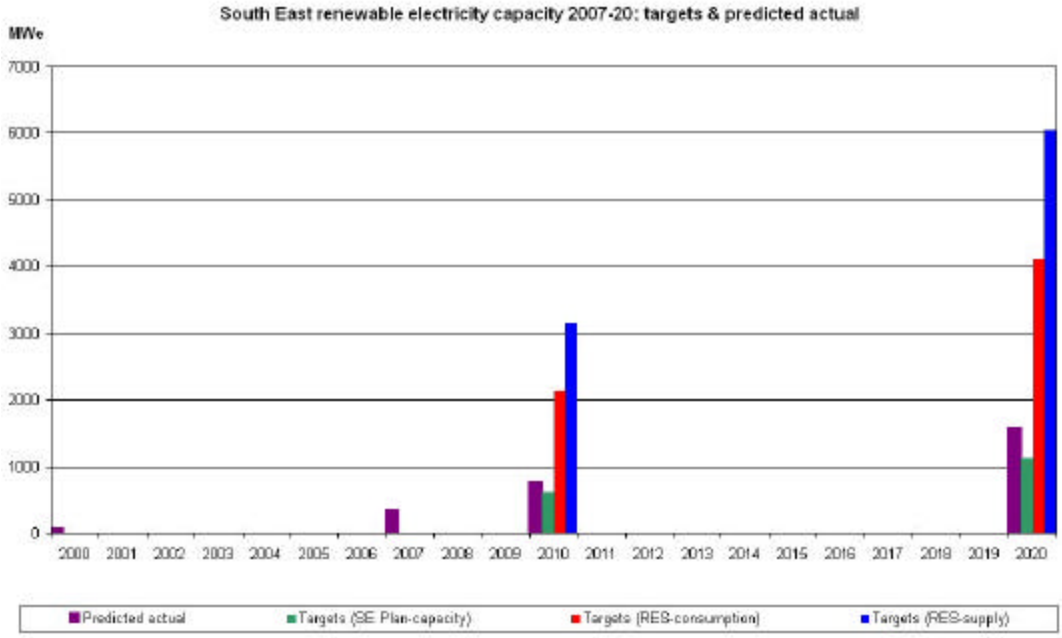
Notes

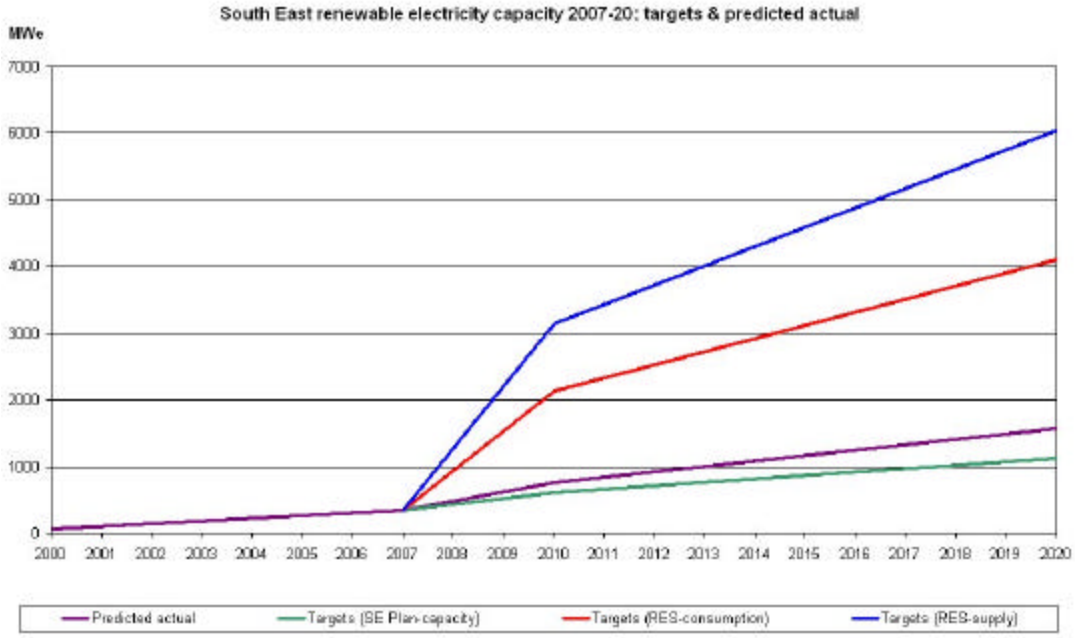
(1) 12,032 MW South East conventional large generating capacity × 0.59 South East mix-specific weighted-average capacity factor (from UK technology-specific capacity factors) × 8760 hours/yr = 62,160,757 MWh/yr. Source: DUKES (BERR 2007). Added to 1,605,280 MWh renewable energy/yr = 63,766,037. Source: SEE-STATS (TVE 2008). Excludes energy from small conventional generators and 352.1 MW large CHP (combined heat & power).
(2) Equals energy consumed: see note *(2)* above.
(3) Equals energy consumed: see note *(3)* above.

Interestingly, in a change from earlier perceived wisdom (year 2000 study when regional consumption was a matter of mere speculation), the numbers show that consumption of electricity in the region is rather less than that which is generated as much supply is routed to London. Hence, on the face of it, if a supply target for electricity is chosen rather perversely this would exceed that for consumption.

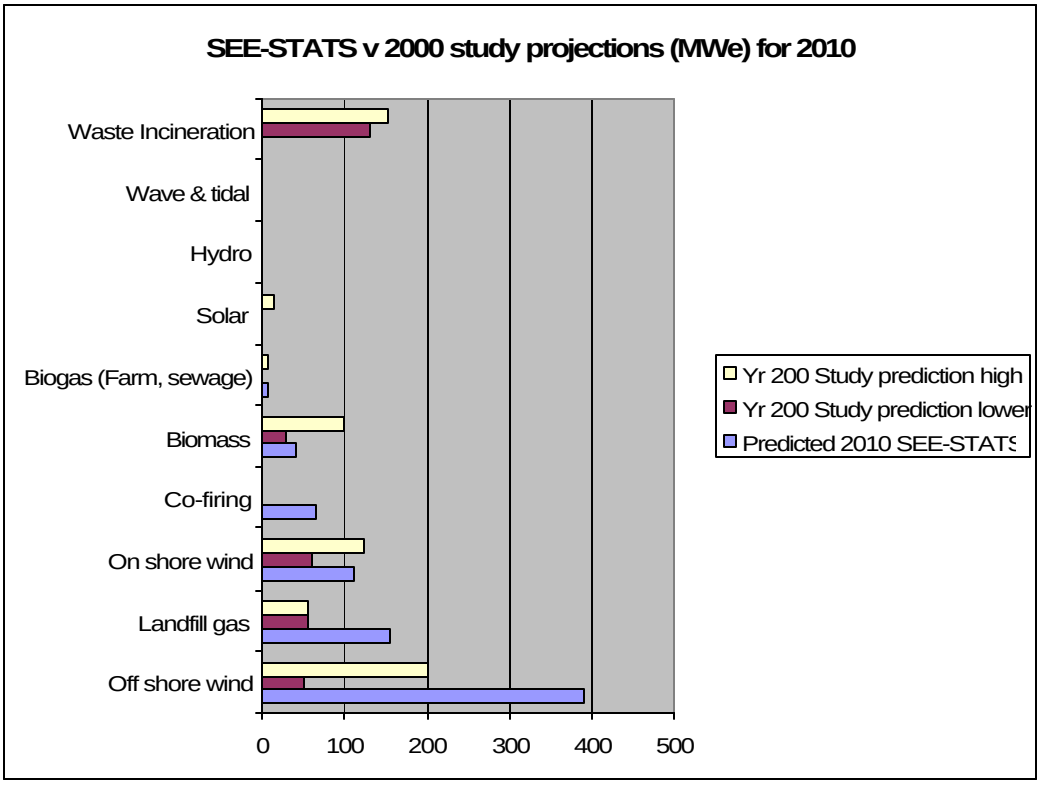
2.4.2 Progression against targets

Progress against the various targets (and in particular that for electricity supply or generation) has undoubtedly been made. The expectation is that the region will meet the targets as expressed in the SE Plan, however, the region will be well short of achieving the RES targets – whichever definition is chosen reasonably consistent with the wording used (see diagram below). Note that the RES targets are expressed as the equivalent capacity of the relevant renewable source for the purposes of generating the required electricity.





The graph below illustrates the differences between the predicted make-up of reaching the 5.5% of installed capacity and the actual as expected to be achieved (based on SEE-STATS figures). The major contributors were predicted correctly (wind, waste and wood) although the biomass figure might be considered as a little lucky and reached in a way not expected.



Note: Co-firing was not considered in 2000 separately. 17 projects were expected to make the biomass numbers (including many CHP plant), the contribution is made solely by Slough Heat & Power converting to wood fuel. Waste incineration is not included in SEE-STATS.

Progress for heat is if anything slower and there are no sensible bench mark targets to set this modest progress against.

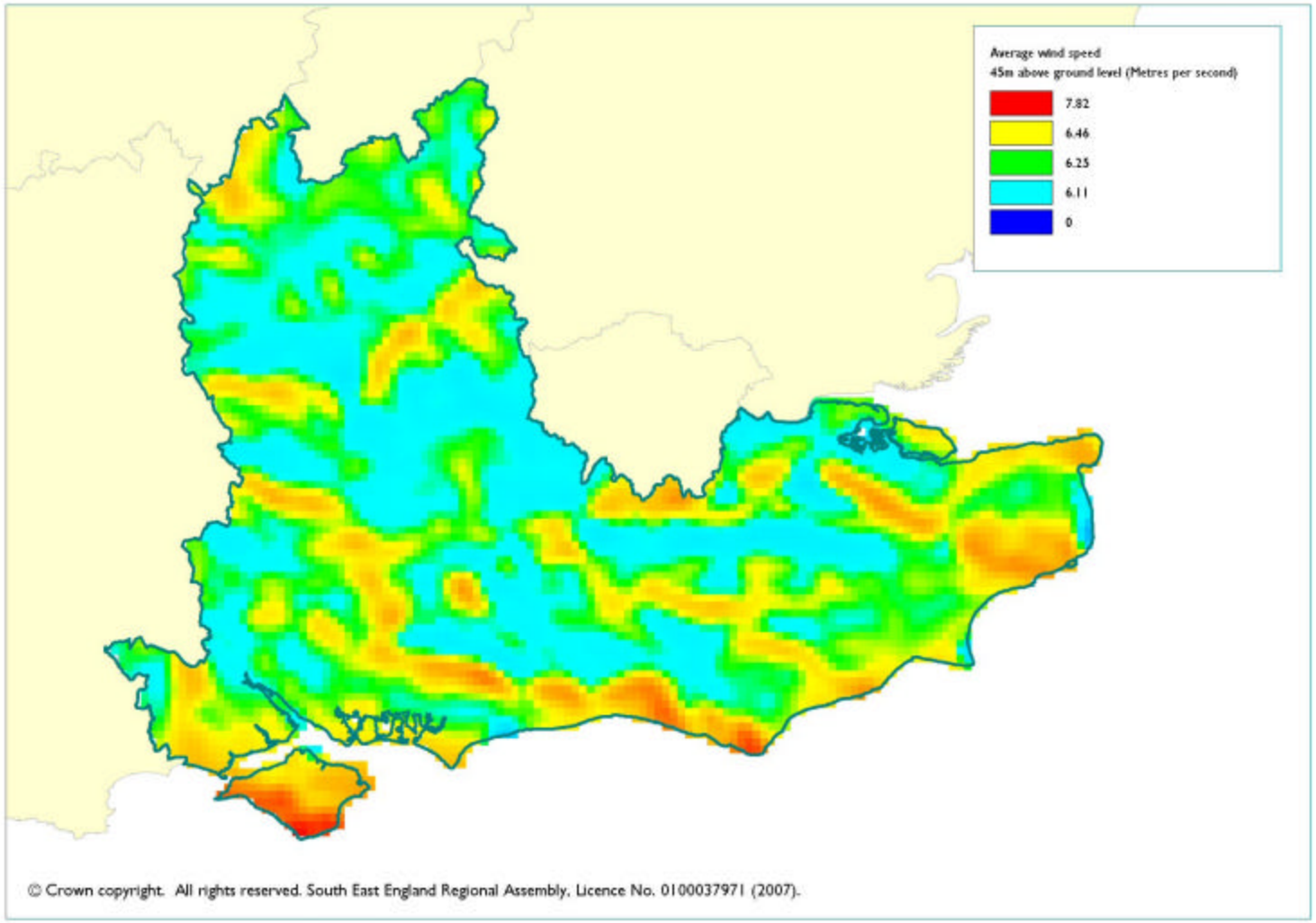
3.0 UNDERSTANDING SCALE AND SPATIAL NEEDS

3.1 Spatial dimension

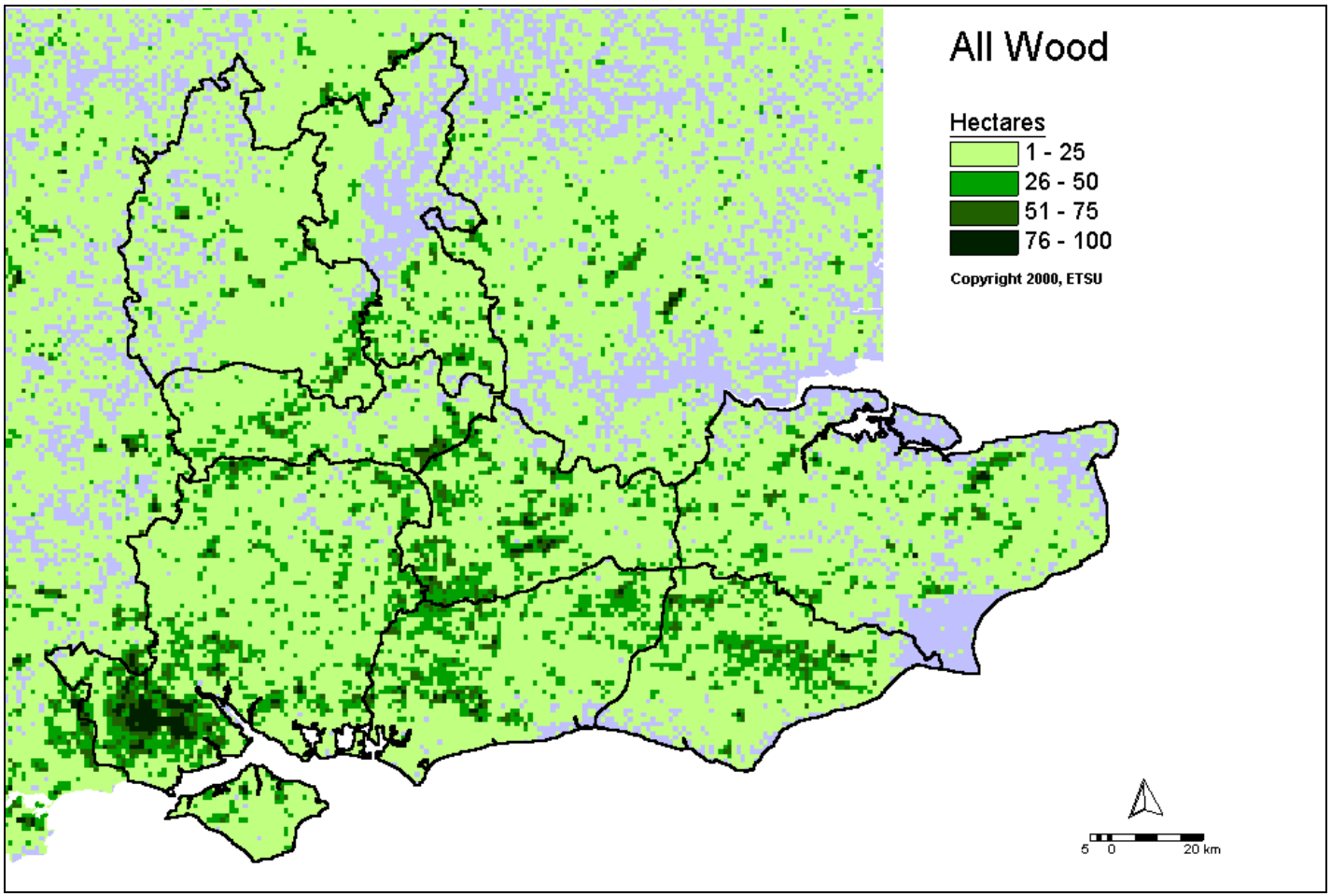
The south east of England is a diverse area and the opportunities for renewable energy production and use vary considerably. Most renewables by their very nature relate spatially in terms of their potential. This potential was examined in detail in the audits carried out in the year 2000 and those that are on-shore at least – will not have changed substantially. The bottom line is that significant resource does exist and could be exploited. To bear in mind is that some of the economic assumptions have most certainly changed and generally this has been to the benefit of renewables as mainstream energy prices have escalated substantially over the intervening period. ***Hence, the 'practicable' potential will in the main be higher than observed eight years ago.***

By way of illustration of the spatial relationship, three of the maps are reproduced from the year 2000 assessment - for wind, woodland and coppice potential – three of the most important of the resources available to the region. Note again that the focus of earlier studies was on resource relevant to electricity generation potential.

ON-SHORE WIND SPEED MAP

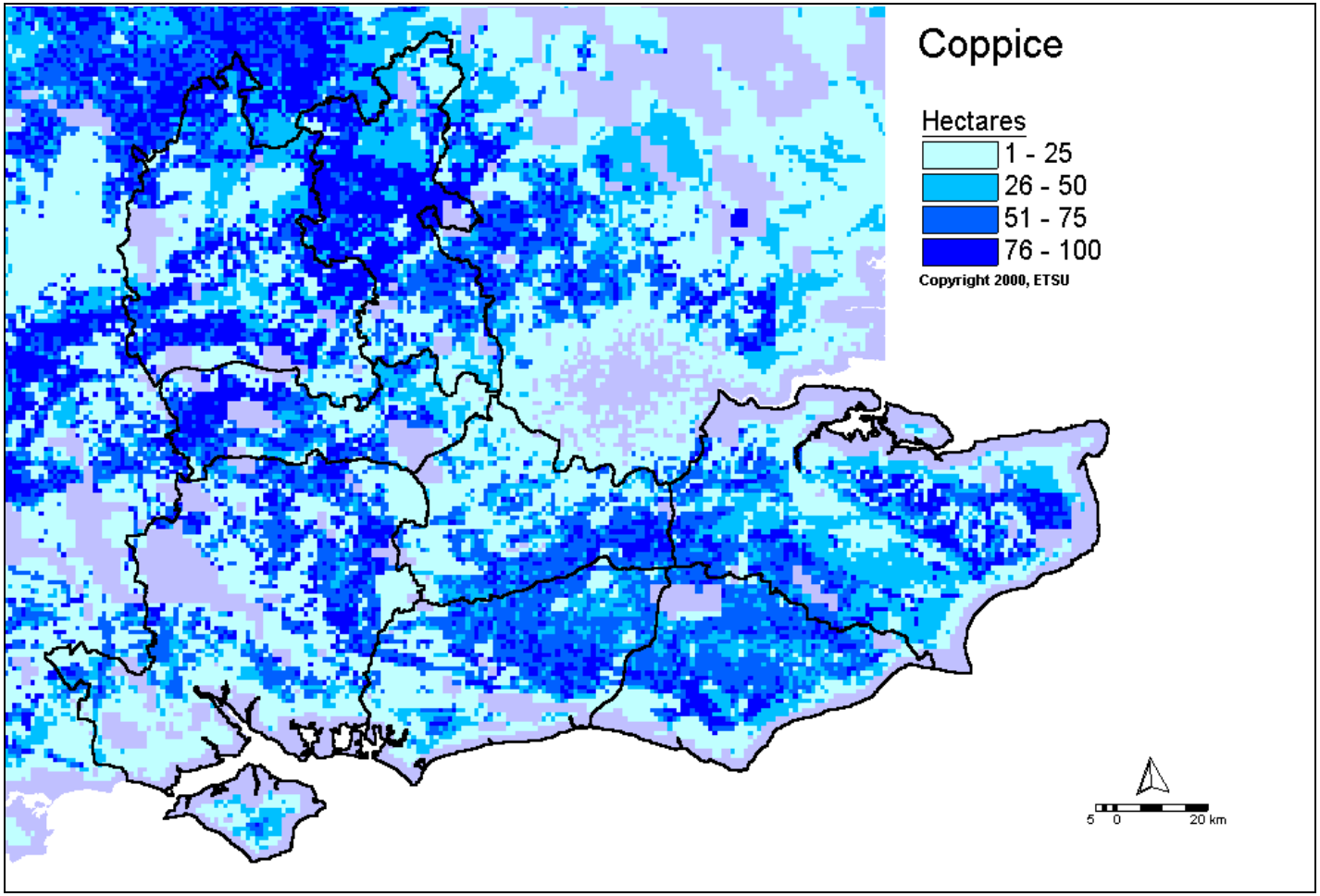


WOODLAND COVER



Map originated with the Institute of Terrestrial Ecology

SHORT ROTATION COPPICE POTENTIAL



3.1.1 Electricity generation potential

It is not the intention of this report to cover old ground in terms of explaining the limits to the renewable energy resource in the SE. This was comprehensively covered in 2000 in the report to GOSE with Technical, Accessible and Practicable resource discussed. ***What is undoubtedly true is that there is considerable unrealised potential from renewables and targeting the most practicable of each resource either singly or in combination (so called hybrid solutions) is the essential next step.***

However, it is perhaps worthwhile listing out the major resource or target split by sub-region under various scenarios as set out in the earlier study as this informs the priority that needs to be given within each of these areas to generate maximum benefit (in terms of renewables supplied/ used).

That said, some of the resource data and assumptions made could usefully be updated in due course, for example:

- The potential for wood arising from existing forestry has been updated by the Forestry Commission and the sustainable regional yield is seen as 550,000 odt/a drawn from unmanaged woodland. This is likely to be the upper limit – compared to the more pragmatic 'practicable resource' as determined in the 2000 study (191,000 odt/a – see below) although existing coppice may not have been included in the earlier study. Neither take into account the arisings from arboricultural or wood processing which is an important 'entry' fuel for wood fuel projects (as the resource is available at low or even negative cost).
- Co-firing was not seen as being of major importance and could be revisited. Co-firing to date has been in conjunction with fossil fuels but could also occur with MSW for example (there are many very good European examples).
- Off-shore wind developments have proceeded faster than anticipated and assumptions should be revisited
- The effects of recycling and green waste plans should be considered when looking at the potential for utilising the combustible fraction and organic fractions of MSW for energy production
- The economic potential as used by the industry for wind energy on-shore has dropped to approximately 6 m/s average wind speed (was assumed to be 7 m/s and above in 2000), giving rise to a much greater potential and thus higher numbers of projects/ MWe installed than might have otherwise been expected
- Solar (both thermal and photovoltaic/ PV) and Ground Source Heat Pump installations have their greatest potential when associated with new-build or regeneration projects. Examining the potential relative to this sector would be useful although such technologies will almost certainly contribute only a small part of the electricity and heat/ cooling for the region.

For the purposes of sub-regional prioritisation we will be assume that the resources identified in 2000 (consistent with proposed regional targets of that time) are consistent with, but likely underplay, the practicable potential in each area. MSW is also included as there is the technical potential for synergistic developments (politicians beware!).

Given these caveats, the shaded areas in the table below illustrate the most important resources for electricity generation for each sub-region:

Sub region	Actual wood Odt/a* MWe	Coppice/ SRC odt/a MWe	Off-shore wind (MWe)	On-shore wind (MWe)	MSW & (LFG) Combustion (MWe)
Thames Valley	**36,000 (148,000) 9 - 37**	**142,000 (346,000) 36 - 87**	0	**24 - 36**	**30 – 40 (27)**
Hamps & IOW	**61,000 (169,000) 15 - 42**	**49,000 (152,000) 12 - 38**	**0 - 50**	**33 - 48**	**42 (4)**
Surrey/ Sussex	**71,000 (163,000) 18 - 41**	**125,000 (199,000) 31 - 48**	**0 - 50**	**0 - 30**	**20 – 30 (14)**
Kent	**23,000 (77,000) 6 - 19**	**12,000 (125,000) 3 - 31**	**50 - 100**	**0 - 58**	**40 (12)**
TOTALS	**191,000**	**328,000**	**50 - 200**	**57 - 172**	**132 – 152 (57)**

* Figure in brackets shows wood that can be drawn in on a 40km collection basis. Conversion used: 4,000 odt/a to the MWe.
Note also that existing coppice is included in existing woodland figures (e.g. hazel and sweet chestnut).

Not included above as only modest regional contributions are expected in the short to medium term (up to 2020) are:

- Low head hydro
- Anaerobic digestion for slurries, crops, sewage
- Solar (PV) technologies
- Fuel cells (considered an 'energy transformation technology' not generation)
- Tidal stream
- Wave

Thames Valley
IN THEORY - By far the greatest potential for renewable energy in the TV area is from Bioenergy and more specifically from wood. The potential from existing woodland is significant and when combined with the potential from energy cropping (Short Rotation Coppice) is greatly enhanced. Waste technologies sit comfortably alongside Bioenergy in terms of their technical compatibility (the politics are something else). Wind energy also has significant potential using single turbines or small clusters of turbines.
IN PRACTICE – Slough Heat and Power converted to wood fuel and has more than matched what was anticipated from a number of small projects (electricity only and CHP). The Didcot site has undertaken a certain level of co-firing. However, this has remained static and no new small generators have come on-stream. Waste has failed to progress and wind energy has struggled to get even one significant project in place although there have been attempts that have failed at planning.

IN SUMMARY – the figures look okay due to a certain amount of serendipity with existing facilities 'greening' their production. New, dedicated generation capacity has been virtually zero and there is resistance and scepticism concerning new build opportunities. One or two significant wind energy projects are on the horizon. Nevertheless, new and dedicated facilities (e.g. Bioenergy/ waste) need significant resourcing and support or they will not happen in the short to medium term.

Hampshire & the Isle of Wight
IN THEORY: Has a greater potential for wood use from existing forestry but less from SRC than the TV area. Again, coupled with waste technologies there could be significant potential. Both on-shore and off-shore wind could equal or exceed Bioenergy and waste given the advances in economic potential for wind technology.
IN PRACTICE: Only small advances are seen for major projects, however, Hampshire is known to be pushing ahead with waste initiatives.
IN SUMMARY: This sub-region needs a major injection of activity if we are to see projects coming forward at the rate required.

Surrey and Sussex
IN THEORY: Again a spread of opportunities with the various Bioenergy streams (existing including sweet chestnut coppice, SRC and waste) giving rise to significant potential. On-shore wind opportunities are seen as the poorest in the region although there is considerable off-shore potential recognised.
IN PRACTICE: This sub-region is consistently the poorest performer in the SE.
IN SUMMARY: This sub-region needs a major injection of activity if we are to see projects coming forward at the rate required.

Kent
IN THEORY: Has by far the greatest potential for off-shore wind with significant on-shore opportunities too. Has good potential for waste and Bioenergy (including sweet chestnut coppice) more generally – although this is not the major strength on comparability terms, with other sub-regions.
IN PRACTICE: Very significant advances are being made with both off-shore and on-shore with projects coming to fruition ahead of what might have been anticipated in earlier studies.
IN SUMMARY: This sub-region needs a major injection of activity if we are to see projects coming forward apart from wind related.

3.1.2 Heat/ cooling potential

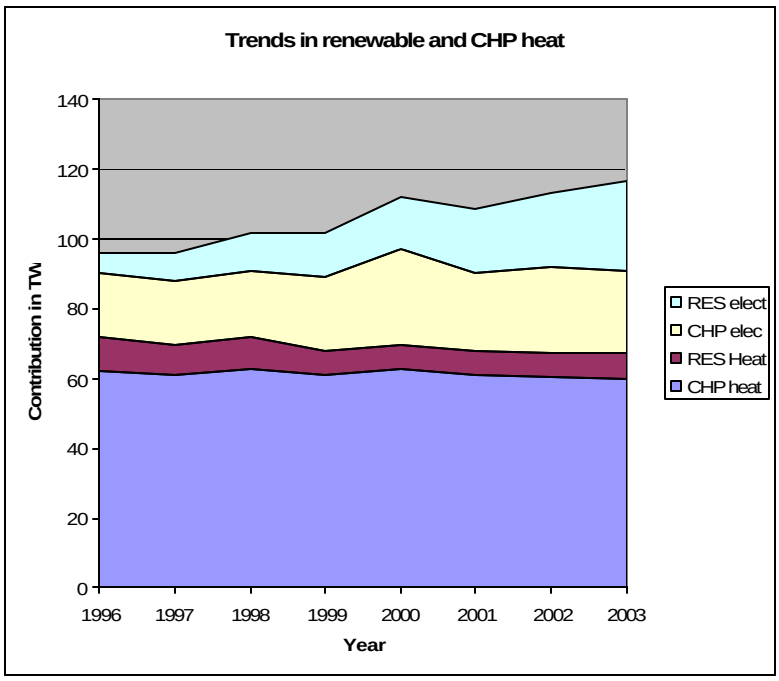
This topic was only poorly covered in earlier studies due to the brief provided by the then DTI and the interpretation given at the regional level. Nevertheless, renewables has a very significant role to play with heating and/ or cooling and thus in reducing the carbon footprint. The technologies and resources that are applicable in the region are:

- Combustion (wood/ energy crops/ residues and MSW being the most important 'dry' biomass resources)

- Anaerobic digestion (combusting biogases generated from various 'wet' biomass resources)
- Aerobic composting (biomass materials)
- Solar thermal
- Ground/ Air Source Heat Pumps (GSHP/ ASHP)
- Geothermal (aquifer)

Combustion and anaerobic digestion technologies can also be used in 'Combined Heat and Power' facilities (generating both electricity and heat) or 'Trigeneration' facilities (generating electricity, heating or cooling via absorption cooling for example).

Some 30% of the 1,186 TWh/a of total non-transport energy services consumed in the UK is in the form of heat for space or process heating. A recent national study carried out for DTI and DEFRA examining the prospects for renewable heat and CHP (reference 2) estimated that only around 1% of current heat demand (7.7 TWHth/a) nationally is satisfied by renewable heat or as heat from CHP. To make matters worse, this amount is actually in decline both as a proportion of the whole and as an absolute as some industrial wood fired systems have been decommissioned because of stricter emission regulations. CHP in total (including fossil fuelled CHP) is also in decline with the rate of new installations actually falling. The figure below (which could do with updating – but the trend continues) illustrates this trend.



Nevertheless, there is significant potential for renewables heat and CHP and regionally this is debatably the area of greatest failure to realise early potential. By far the greatest potential in the south east region is from the combustion of wood or dedicated energy crops such as SRC and the resource availability as set out for electricity generation

should dictate the initial emphasis that should be given across the region. However, for commercial and industrial applications where such technology could find widespread acceptance, large energy and process heat consumers should be targeted for maximum impact.

There is significant potential also for solar thermal and for GSHPs particularly when looking at new developments. Of note is that solar thermal is one technology that is relatively simple and cost effective to retrofit to existing housing stock – a sector that is hard to address for renewables.

The following table sets out the renewables heat contribution as established by SEE-STATS for the SE region (see also Annex 1, Table 15 for detail). As discussed earlier, the potential for significant growth is there but is currently not being realised and progress is painfully slow. Current usage is miniscule.

Thermal MWth			
Sub-region	**Operational**	**Planned**	**Sum**
Thames Valley	23.30	1.67	24.98
Surrey & Sussex	3.19	0.01	3.19
Kent	1.38	0.07	1.45
Hants and IOW	1.14	0.02	1.16
South East	**29.01**	**1.77**	**30.78**

3.2 The importance of scale for renewable energy projects

Renewable energy is often criticised by the established major utilities and players with a stake in maintaining the status quo (fossil and nuclear) that it is:

- A small player in the overall provision of energy
- Complex
- Expensive
- Not able to provide base load

All of these points can be addressed in time and scale is part of the solution.

3.2.1 Electricity generation potential

The current projected major contribution for the region is to come from large scale applications of wind energy (off-shore mainly). The London Array for example is more than 900 MWe. Such initiatives fit within existing practice of 'large, centralised generation' supplying into the existing supply infrastructure. They are as a result, largely embraced by the utilities and central government that sees such developments as creating further diversification within the supply base and contributing to security of supply (plus the low carbon nature naturally). Not to be forgotten is that such large scale deployment is worrying to certain environmental groups and NGOs who perceive this as something of

a threat to the sustainability and quality of life enjoyed by the population. In the main, developers can expect significant resistance to such schemes particularly when on-shore.

Without doubt, further large scale applications of wind energy in particular will be essential if the region is to reach the kind of targets being set within the RES. As technology develops, tidal and perhaps wave energy may also have a role to play but in the short to medium term, the hope must lay with wind energy. To note is that this technology is wide open to criticism concerning its 'intermittency' by other major supply players (notably nuclear and fossil oil/ gas/ coal) particularly at a regional level. This criticism can be countered by a broad energy strategy including renewables diversity – more later.

Of significant interest to the region is also the potential for more modest developments of perhaps 1 – 10 MWe using a wider range of renewables including wind, wood and/ or waste and for some special locations low head hydro connected to:

- new developments or major regeneration projects
- large individual energy consumers both private and public
- isolated single/ cluster developments

Arguably, this is where the region/ SEEDA can have maximum impact in bringing forward electricity generation initiatives. The scale here is of less interest to the major energy players who don't see the return but it is too costly and risky for those that could invest (housing developers, business park management companies, public sector bodies, hospitals, non-energy private sector companies).

Where wood and/ or waste is to be used then CHP or Trigeneration will be the sensible way forward, the generation of electricity alone is somewhat fraught at the small scale given existing technology (gasification technology is the best technical, but risky option if power is the only saleable product). For this to work consideration needs to be given to the 'heat sink' or market for saleable heat and/ or cooling as only a combination of electricity and heat receipts will generally make a viable project. Waste is a special case always where quite often some process heating is needed to fulfil the needs of the process itself (e.g. anaerobic digestion of manures or sewage where heating of digesters is typically to mesophillic temperatures around 35 degrees C).

Wood and waste also provide 'base load' power in the same way that nuclear or fossil fuels might.

Finally, there are those technologies that work well at the small or even domestic scale. The two main contenders here are; solar (photovoltaics) and wind. There have been major advances with technology and affordability in recent years – a trend that is set to continue.

3.2.1 Heat/ cooling potential

The heating market is different to the electricity supply market. In particular, the heat/ cooling market is dictated by the nature of the buildings/ facilities/ processes requiring heat/ cooling. This makes it at one and the same time very diverse and complex to understand and to target. Scale is critical to assessing the potential for:

- Housing/ domestic dwellings and developments
- Commercial and public buildings (hospitals, schools etc)
- Industrial applications (including waste treatment)

Starting with small, domestic scale (residential sector accounts for 61% of heating needs). There are a range of technologies/ resources that are currently being used – arguably the oldest is wood – on open fires through to sophisticated automatically fed stoves with back boilers. There is some existing regional industry here that could be expanded and developed. Other technologies include Ground Source Heat Pumps, solar thermal, other biomass (e.g. straw for larger houses). GSHPs work best with new developments (e.g. through underfloor heating) but other technologies are easily retrofitted and so can address heating needs in a wider proportion of current housing stock. Of course, for wood/ biomass combustion, a chimney is essential and not all houses have such these days. Care needs to be taken with emissions also for non-rural applications.

There is very significant potential for the region/ SEEDA to promote renewables heat to the middle range of applications both public and private. At the larger end , wood and/ or waste are the key resources to target through 'District Energy Schemes' where a centralised heat/ cooling provider might supply a plethora of connected users through a grid system of pipes.

Finally, the large, bespoke industrial process heat consumer. Here lies the opportunity to set in place a significant series of projects that might be promoted through various market segments influential to the region (e.g. food and drink). Such a strategy proved very successful for the 'EEDS' (Energy Efficiency Demonstration Scheme) programme in the 1980's using one or two companies to champion a sector and pull through the rest of the industry.

Exceptionally in the region is the potential to use heat recovered from the aquifer in the south Hampshire, West Sussex area. To date, the Southampton Geothermal Heating Scheme is the only example of tapping into this source (only project in the UK). Here the Civic Centre and a range of other consumers are linked by a 2 km hot water main. 2 MW of usable heat is fed into the main, however, the majority of the heat is generated from non-renewable sources but uses the same infrastrastructure. The project might be expanded (to include other sources of heat provided by biomass for example) although the economics of more geothermal are against it. The initial project received very considerable support in the early days of the UK's renewables programme (as far back as the 1970's and 1980's).

3.3 Technologies & state of development

Many of the renewables technologies are ready for deployment after many years of development both at home and abroad. Some remain expensive whilst others are perceived as risky (technical and commercial risk). A few still require considerable research and development prior to widespread adoption.

The official BERR position on proximity to market for power generation technologies is reflected in their 'Proposed Overview of Bands' for the Renewables Obligation (the RO). This equates higher levels of support through awarding numbers of 'ROCS' (Renewable Obligation Certificates) against MWh produced, as follows:

3.3.1 Well Established Technologies (0.25 ROCs/ MWh)

Sewage gas, landfill gas, co-firing of non-energy crop (regular) biomass. All are contributing in the SE.

3.3.2 Reference Technologies (1 ROCs/ MWh)

On-shore wind, hydro-electric, co-firing of energy crops, Energy from Waste with CHP. All are contributing in the SE.

3.3.3 Post Demonstration Technologies (1.5 ROCs/ MWh)

Off-shore wind, dedicated regular biomass. Both are becoming of extreme importance in the SE and offer considerable potential.

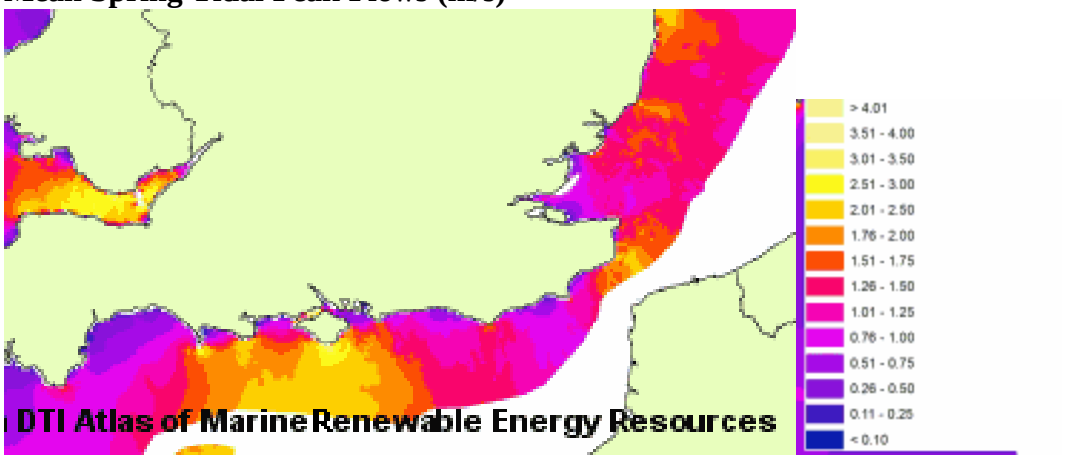
3.3.4 Emerging Technologies (2 ROCs/ MWh)

Wave, tidal stream, advanced conversion technologies, anaerobic digestion (other than for sewage and landfills), gasification, pyrolysis, dedicated biomass burning with energy crops (with or without CHP), dedicated regular biomass (with CHP), solar photovoltaics, geothermal (hot dry rock and aquifer). All have a place in the SE mix and there are particular niche market opportunities for anaerobic digestion and geothermal. Tidal and dedicated biomass are key technologies for the SE.

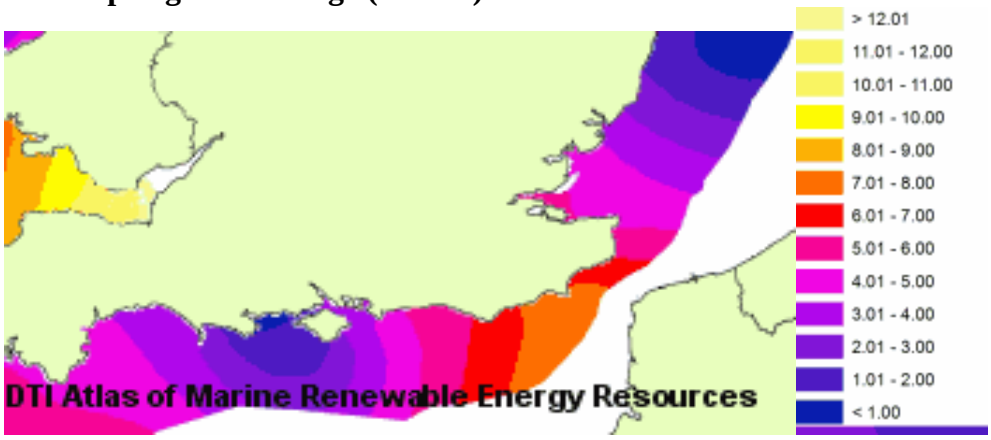
Additional commentary on the state of technologies can be found in the 'Renewables Innovation Review' available from the BERR website (carried out in conjunction with the Carbon Trust).

The maps below show the considerable potential for tidal stream, wave energy by comparison is less favoured and has many other issues associated with its development.

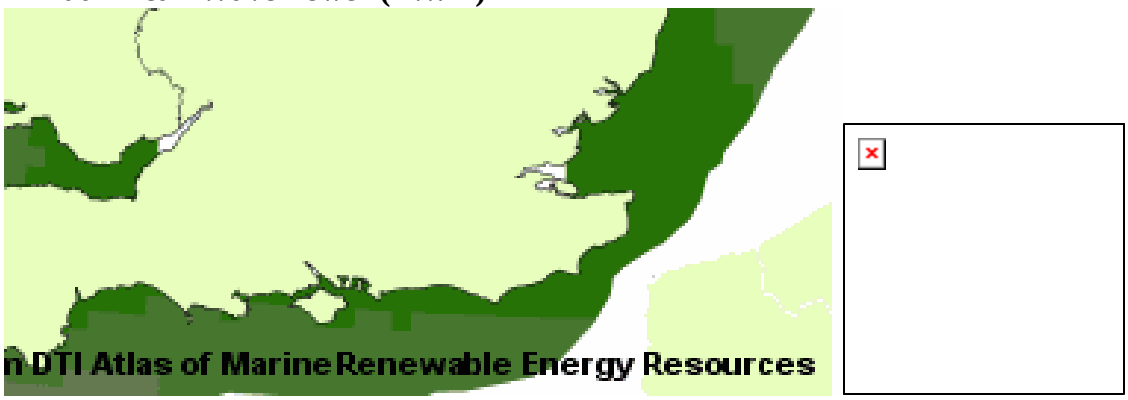
Mean Spring Tidal Peak Flows (m/s)



Mean Spring Tidal Range (metres)



Annual Mean Wave Power (kW/m)



3.3.5 Heat/ Cooling Technologies

As discussed, rather less profile has been associated with the heat producing technologies. Wood has historically been used for domestic heating and for some industrial sites where associated with wood preparation or use (e.g. the furniture industry). However, emerging in the market place are:

- Solar – water heating
- Ground/ Air Source Heat Pumps
- Wood fuelled boilers (pellets, chip and automated log)
- Biogas plants producing heat or CHP
- Geothermal – Heat (aquifer)

3.3.6 Transport Fuels

There has been considerable interest in '1st generation biofuels – Bioethanol, Biomethanol, Biodiesel etc. - those derived from starch, sugar or oil rich crops. However, considerable land is required to grow these crops, displacement of food crops is a concern and the generally poor environmental and energy balance. Using waste materials is of greater interest but the resource (e.g. gathering fats and oils from the food industry) is somewhat finite.

Of greater interest are '2nd generation biofuels' based on converting lignocellulosic material (wood) to liquid fuels. Much research is ongoing here at the international level.

Biofuels are also of limited interest in producing heat and power and there are a number of schemes under consideration. This may not, however, be the best use of such a valuable resource.

3.4 Drivers

Drivers vary from one set of hosts to another. The most straightforward way to understand this is to look at scale. Work by the IEA Socio-economics Task has recently looked in detail at Bioenergy/ wood and has concluded that the main drivers to choose renewables over other energy sources are:

Large Scale/ Private Firms: 'Bottom-line' profitability, security of supply, the RO for suppliers, portfolio risk management/ reduction, diversification and Corporate Social Responsibility.

Medium Scale/ Developers, Volume House Builders, Local Authorities: Target driven, fuel poverty, cost, niche market diversification.

Small/ domestic scale: utility, quality of life, cost.

Drivers will be further investigated and form a key input to the development of the proposed future programme. Interviews have commenced with:

- The Prudential
- RWE Npower-renewables
- Slough Heat and Power & Scottish and Southern Electricity

- Local Authorities (5)

3.5 Barriers

3.5.1 Technical barriers

There are few real show stoppers here anymore. For the sake of this report and short to medium term developments we will assume that the key technologies (wind, wave, Bioenergy) are fit for purpose.

3.5.2 Non-technical barriers

There are many non-technical barriers to the deployment of renewables in the region. The following list is not exhaustive but deals with those of major concern.

ECONOMIC VIABILITY, ELECTRICITY: For the emerging technologies poor economic viability remains a key impediment to rapid progress. Until the market matures and has sufficient critical mass/ economies of scale, support measures will be needed. For larger scale power generation the key instrument being used in the UK is the 'Renewables Obligation' or RO (a development on from the 'NFFO' or Non-Fossil Fuel Obligation). This has been discussed earlier and the latest twist on this is to 'band' technologies and offer differing levels of incentive based on perceived technical/ commercial risk. Higher risk technologies claim more 'ROCs' or Renewable Obligation Certificates that have a value.

What is the Renewables Obligation?
The Renewables Obligation requires licensed electricity suppliers to source a specific and annually increasing percentage of the electricity they supply from renewable sources. The current level is 7.9% for 2007/08 rising to 15.4% by 2015/16. It is expected that the Obligation, together with exemption from the Climate Change Levy for electricity from renewables will provide support to industry of up to £1bn per year by 2010.
Renewables Obligation Certificates (ROCs, one for each MWh produced) aka tradable green energy certificates are produced by every energy supplier to prove that they have sourced a set percentage of their electricity from renewable energy sources. ROCs show that a supplier has self generated or bought renewable electricity to the correct level (e.g. on the open market where others have a surplus). If this is not possible then there is a set 'buyout price' which must be paid. The funds received in this way are then 'recycled' back to suppliers in proportion to their holdings of ROCs.
The latest prices paid for ROCs can be found at the Non-Fossil Purchasing Agency Ltd website www.nfpa.co.uk. The latest auction (four are held a year) was held on 8th January 2008, 64,000 ROCs were purchased (including 3,052 co-fired) at an average price of £49.95. This was slightly above the price paid in autumn 2007.

For smaller scale and domestic level supplies more needs to be done as the number of ROCs produced is small and the administration involved is considerable. There has been discussion concerning 'grouping' small producers to try and get around this. A better proposition might well be a better 'feed in tariff'. Such a solution has proven popular and successful overseas. So called smart metering is an associated issue here.

RENEWABLE HEAT: this is the real problem area and discussions concerning a possible mechanism to stimulate and support the renewables heat industry has been a long running saga. In May 2007 the Energy White Paper stated the Government's intention to 'conduct further work into the policy options available to reduce the carbon impact of heat and its use in order to determine a strategy for heat'. Likewise the Biomass Strategy 2007 also strongly recommended that changes should be brought about to allow the development of a competitive and sustainable market and supply chain for biomass (heat).

Parts of the industry believe in a 'heat obligation' similar to the RO which would be best. This would make it mandatory for heat suppliers (e.g. British Gas and utilities) to provide a given percentage of their total energy supply from renewable sources. Others believe that this would be cumbersome and prefer other measures and incentives (e.g. capital grants programme). The Government commissioned Ernst & Young to investigate options. This report has just been published and is available from the BERR website.

LACK OF INDUSTRIAL CAPACITY
Whether wind turbines or biomass systems the wait is getting longer. This is linked to the economic barrier above. Companies are not investing if they don't believe that they can make money in the UK. Hence, the domestic market has to rely to a large extent on overseas manufacture and support.

PLANNING
This remains a major barrier for renewables projects of virtually all scales – but the larger the scheme – the bigger the problem!

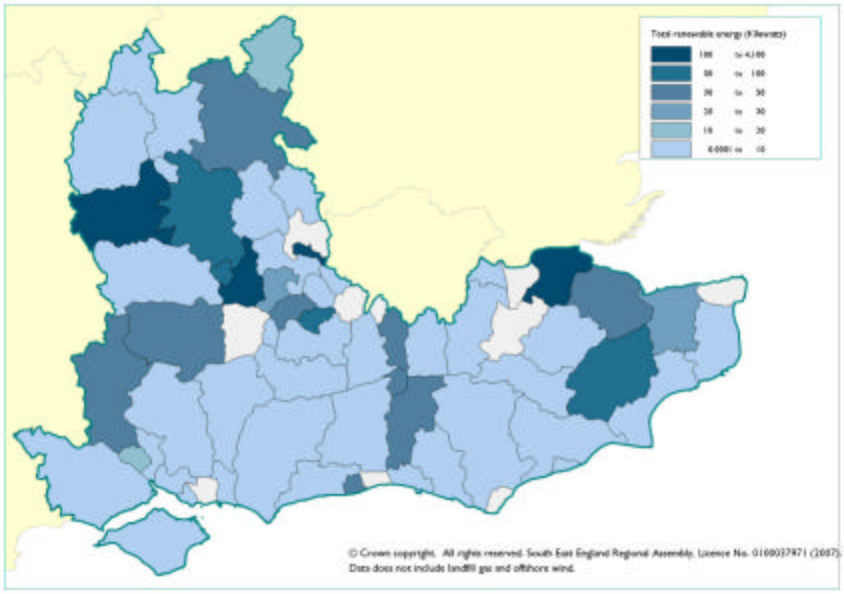
This report will not review all the developments that have been taking place Nationally and Regionally concerning a more positive view of renewables with regard to planning – such matters are clearly set out elsewhere (e.g. in Assembly documents, SE Plan etc., PPS22 on renewables). Enough said that the Climate Change Bill has given further emphasis to the urgent need to increase the renewables capacity in the UK and that a positive view needs to be taken of renewables developments at all levels.

This is a key area where the industry is looking for more policy and local support from regional bodies such as SEEDA and the Assembly. Too often Local Authorities are being parochial about reasonable schemes and are not giving enough weight to over reaching strategic needs and requirements. Unless this matter is addressed then the region will not be able to reach its targets.

RISK AVERSE PUBLIC SECTOR BODIES
This barrier is closely associated with that above.

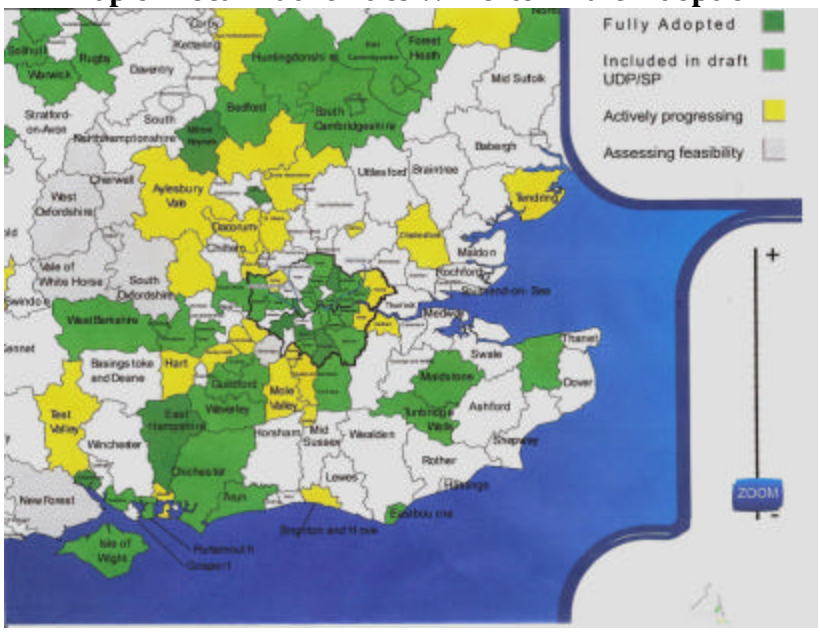
Local Authorities awareness/ capacity to implement: Local authorities are key to implementing both medium and small scale systems. Their influencing and planning control responsibilities are key. The awareness and activity levels of LAs across the

region is, however, highly variable. Most existing projects lie in the Thames Valley or Kent sub-regions. (Coincidentally, these are the areas where TVE and the Kent energy agencies operate.) The map below indicates where existing projects are to be found by LA boundary.



Another way of identifying where LAs are active or considering more action (at the small to medium scale) is to look at the adoption of the 'Merton Rule'. The map below shows a slightly different pattern including the Thames Valley but also Hampshire/ IOW and Surrey with lesser activity in Kent and definitely Sussex. Note that awareness measured this way is rather less than in London but probably no worse than most other English regions.

Map of Local Authorities v. Merton Rule Adoption



A closer link between regional and local policy (LDFs for example) is essential here and a dynamic link is required if we are to move matters along. The region should identify lead authorities and champions and use 'peer pressure' to increase momentum region wide.

Public procurement: There is rightly great concern that public procurement has not been working favourably (or even fairly) when confronted with the opportunity to facilitate renewables investment. The public sector needs to show a lead and consider 'lifetime costs and benefits' of developments and internalise externalities such as fuel poverty, environmental gains, quality of life gains, employment and so on.

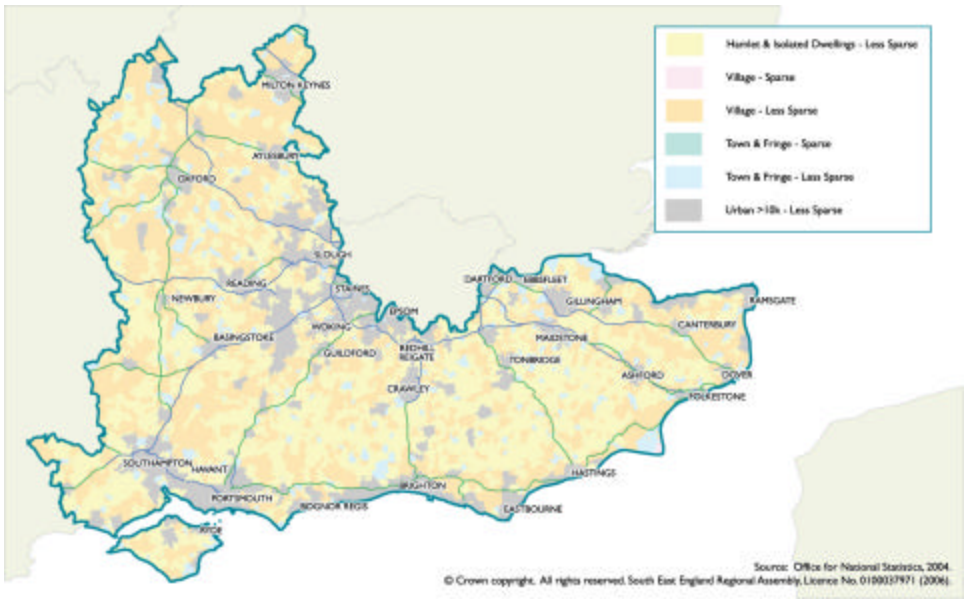
MOD, HOSPITALS/ TRUSTS, PRISONS, AGENCIES, GOVERNMENT OFFICES
There has been sporadic interest by such bodies on an individual site basis but a failure to manage any strategic deployment of technology which might show leadership and present exemplar facilities.

SE RURAL GENTRIFICATION
Renewables are a spatial resource and the greatest potential lies in rural areas. The development of the countryside in the SE continues to cause increasing problems as many people feel that renewables 'industrialises' the landscape. This is counter to many who have recently bought into the 'rural way of life' and do not understand the 'working' nature of the countryside and fear that developments will affect their property prices.

This is a theme that is partly developed in the SE Rural Strategy but does not focus on energy (which is seen as one of a number cross-cutting themes, for example climate change that are intended to underpin the strategy and proposed actions). Likewise the geographic and functional relationships between the region's rural and urban areas form a key part of the character of the South East and are important to realising the maximum benefit of renewables (e.g. biomass schemes sited in the hinterland between town and country – matching a supply of fuel in with energy provision out in terms of heat and power).

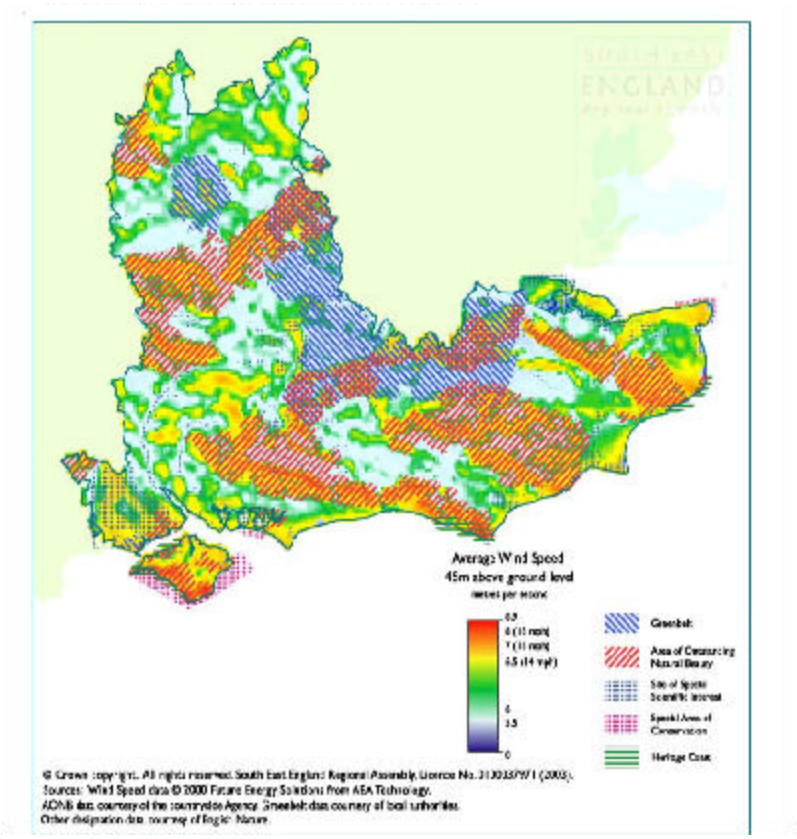
One way of tackling this barrier is to show the socio-economic benefits to disadvantaged rural groups in particular that often live cheek by jowl with relatively wealthy neighbours (those more prone to object). Renewables can create jobs and opportunities for training. Noted that there are approximately 800,000 people of working age who are economically inactive in the South East.

The map below shows the extent and type of rural areas in the region, as set out in the Government's Rural Strategy 2004. It highlights that over 82% of the land mass of the South East can be defined as rural or partially rural, and that this is very mixed in character and form – from sparsely populated open countryside, to market towns and villages. These areas have significant potential for renewables, particularly biomass.



AONBs AND DESIGNATED AREAS

The map below shows the very significant spread of sensitive areas in the region overlaying the best wind resource areas (areas with the highest wind speeds). The match is significant.



Wind Speed Map with Key Designations

Such areas are even more difficult to convince of the merits of renewables projects and although all of them state their 'renewable friendly nature' the reality is quite different. Even modest developments with a single turbine find it almost impossible to get a positive result through planning in large part due to their objection. A targeted programme of working with AONBs is required if we are to make much progress. To note is that the LEADER projects based with AONBs are allowing a dialogue to be established concerning smaller developments including biomass schemes. This is to be welcomed.

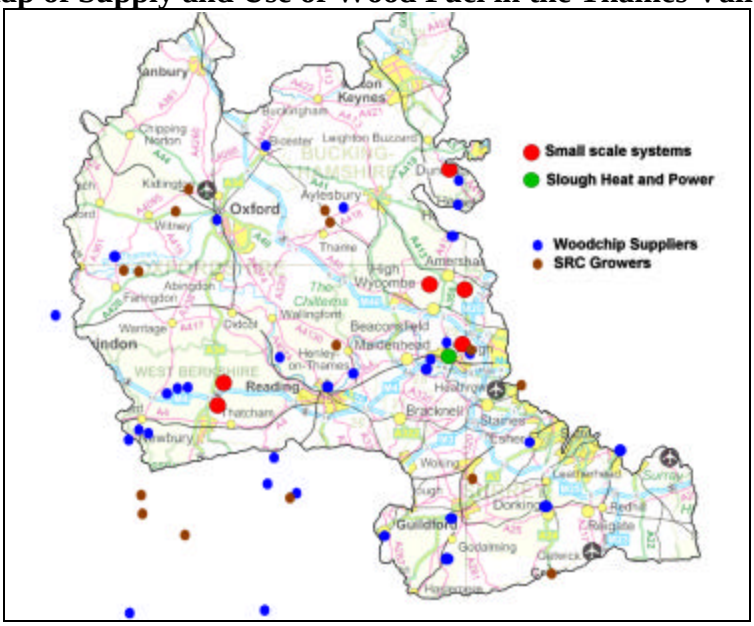
LACK OF SUPPLY INFRASTRUCTURE

This is a particular issue for biomass/ wood across the region. Supply of pellets and chip is highly variable and the lack of consistent and guaranteed supply is often quoted as an excuse by developers in particular for not pressing ahead with a biomass/ wood scheme.

Most existing suppliers are small players and the wood fuel represents a diversification opportunity. Although good in some ways it does mean that they tend not to concentrate on developing the business in a structured way – more likely they are opportunistic players. One exception is TV Bioenergy (trading) that is solely concerned with supply. This development has only been possible, however, due to the close working relationship with the region's largest existing CHP scheme based at Slough. After agreeing a 15 year supply contract this has enabled TVB to establish more 30+ active suppliers (with 20+ less active) across the Thames Valley, Hampshire and Surrey. The map below illustrates the spread.

Such a supply infrastructure has enabled TVE/ TVB to commence sales to smaller boilers/ projects although the margin here is paper thin and more often than not, TVE has cross-subsidised supply at least initially.

Map of Supply and Use of Wood Fuel in the Thames Valley



Building a wider secure supply infrastructure is an essential prerequisite to getting more projects in place. Repeating a 'Slough' is one way of introducing the necessary pull – however, getting these projects in place will not be easy.

Existing wood fuel supply is finite and will become exhausted even if 2010 targets were to be met. It is therefore essential to be investing in energy crops in order to supplement supplies. There are various possibilities here but SRC (short rotation coppice) or Miscanthus are the main runners.

Lack of investment in strategic supply (energy crops): Government has blown hot and cold on the matter of support to enable growers to get to grips with this potential diversification opportunity. Nationally, only 3 producer groups were established to spearhead the growing of SRC for example. One of these is in the SE and trades as TV Bioenergy Coppice Ltd. This producer group has established the majority of the 227 hectares of SRC in the region and has the Slough contract which underpins this exercise. Other crop has been speculatively grown (much for Didcot which will now not be using the material).

This very modest level of investment is itself now under threat as Government support has been further diluted with planting grants effectively halved. The expectation is that very little further crop will be planted unless a better deal can be negotiated. It will only make sense for estates/ farmers to grow the crop for own use.

Location	Hectares planted
Thames Valley	158.47
Hants & IOW	41.52
Surrey & Sussex	27.4
Kent	0
TOTALS	**227.39**

Other crops such as Miscanthus are even more modestly represented in the region.

LACK OF TRAINED INSTALLERS & MAINTENANCE ENGINEERS
As the number of projects begin to grow a pinch point is reached concerning the industry ability to service demand. There is no doubt that at the smaller scale/ microgeneration we already have a distinct lack of accredited suppliers and installers. This whole area needs addressing if we are to advance at a more rapid rate.

In summary, there are many non-technical barriers that are preventing progress. However, each of these can be seen as an opportunity for the SE. Successful remedies will yield a region which could benefit in great measure from renewables domestically and also from export of knowledge/ expertise and equipment.

3.6 Priorities

The temptation is always there to carry out more research and to go back over assumptions and to check out areas that appear to have been missed. However, to give such research priority would be to miss the point. Earlier studies have shown that there is significant potential and that technology exists to create a very significant contribution to renewable energy generation and use in the region. ***The priority must therefore be to seek to mobilise the most economic or practical potential as soon as possible. In order to achieve that end, to address the barriers that are preventing its uptake wherever and whenever possible and to facilitate more rapid deployment.***

Targeting of effort and resources is critical to maximising the benefits at a regional level. The brief analysis presented here clearly shows where the SE might seek to derive significant benefit in the short to medium term. This is set out in the next section.

Certainly the SEE-STATS initiative should continue to be maintained as a way of tracking progress and communicating this progress to the wider set of stakeholders. The grouping of agencies working to create the database has clear implications for wider co-operative working. There is advantage in exchanging best practice with other regions - in this case the SW – where a system based on SEE-STATS has been established. The statistics are used imaginatively with Local Authorities to show progress (or lack of it).

3.7 Research needs

There are areas of resource assessment that could be tightened up as set out earlier. There are also specific market studies required to better understand target organisations (both private and public sector), their particular drivers and capacity to deploy renewables.

Also as set out, there are a number of technologies that require further urgent research to increase efficiency, make for wider application and to reduce unit costs. Such research will greatly assist the need to 'mainstream' renewables. Choosing the right technology will also create the opportunity for regional business to develop its capability to supply the home market and create opportunities for export.

Strategically, the SE might choose to invest in an area that would yield considerable benefit internally in terms of energy savings/ carbon savings, employment generation, business development & diversification along with opportunities for export. Preferably, this would be an area that was not currently adequately addressed in other parts of the UK. Such an area would almost certainly be biomass/ bioenergy generation linked or tidal stream. Each has a very significant local potential and is still classed as 'emerging'.

A number of our local universities are working on biomass activities – none are world players but could become so particularly if linked to the correct industrial partners. The need would be to move rapidly through demonstration facilities to full scale applications.

The areas to consider would almost certainly be biomass gasification, pyrolysis and 2nd generation biofuels.

Closer to market would be the opportunity to create a wood supply industry with associated boilers and small scale CHP plant. The market is very significant and there is a dearth of local players.

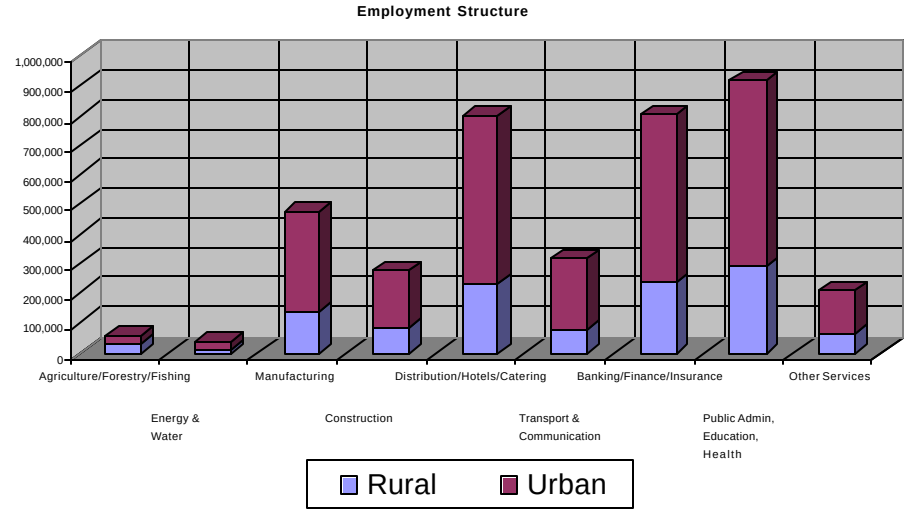
Off shore technologies also offer considerable potential, although this area is a key topic for the north east, south west and Scotland who have stolen the lead. Tidal stream technology might be a winner and perhaps more might be done here building on local university interest and activities (School of Ocean and Earth Science, University of Southampton).

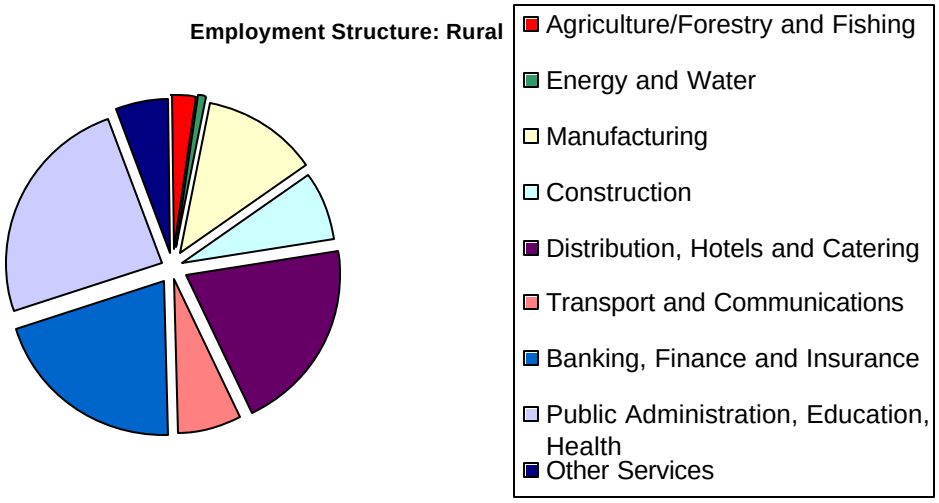
3.8 Opportunities

There are a number of opportunities that will be developed in the next section allied to particular leading exponents and practitioners within the region. A lead sector that might be targeted is the food& drink industry, the public sector would be a sensible place to focus exemplar projects in the mid-range.

Renewables are a classic way to help nurture existing business through diversification as well as to promote new economic activity. Business start-ups and social enterprises can also be encouraged. Renewables can stimulate new enterprise and promote home and community based business and sustainable rural tourism. Appropriate business support and advice needs to be made available to both land and non land based businesses including those in the eco-tourism sector (an emerging niche market).

The existing number of people involved with energy in the SE is minimal (see graph below) but could grow significantly – particularly in the rural areas.





ECO-TOURISM
The South East is the most wooded region. The attractive, mainly deciduous woodlands are essential components of our nationally designated quality landscapes, and being in a crowded region are easily accessible to large numbers of people, which encourage more healthy lifestyles as well as contributing to improved air quality. Various Forestry Commission studies on forestry have estimated that these public benefits from forestry in the south east are greater than in other regions. The total value is thought to be well over one Billion pounds and worth more than all those in Scotland and Wales put together

Use of wood as a fuel offers the prospect of better managed woodlands yielding a better quality of experience for the 'eco-tourist' as well as increased areas of planting and better access. Such strategies also increase the local biodiversity and can help to protect sensitive habitats.

3.9 Roles and responsibilities of stakeholders

LARGE SCALE GENERATION
This is an area where SEEDA should play a leading facilitator role and should engage directly with the larger utilities and suppliers. SEEDA needs to establish senior management level dialogue and promote the region, using strategic linkages and potential incentives to maximise the sustainability gain for the region. SEEDA can also facilitate the formation of necessary supply infrastructure and resources that will be needed to ensure projects are viable (for biomass encouraging strategic wood supply for example).

MEDIUM SCALE GENERATION
This is the realm of the larger housing and mixed community developer and as such these organisations are key stakeholders. Utilities and suppliers are also interested in this scale but the complexity for them is greater. Local Authorities in their role of planning body

and community leader will also be key and perhaps taking a more direct role through innovative ESCOs (Energy Service Companies). Regional bodies need to provide leadership and where necessary resources to assist public sector players and to tackle barriers to wider scale adoption. Estates and large rural enterprises may also come into this category and for them the possibility of self sufficiency in energy will be a key driver. One way of coordinating this would be to set up a group similar to 'RegenSW' that could provide the necessary dedicated technical support to SEEDA, organise and nurture project champions and liaise with stakeholders more widely.

SMALL SCALE/ MICRO GENERATION

The SE Sustainable Energy Partnership (SESEP) currently operates in this area and is comprised of various national & regional agencies including the EST, a primary funding source. Critical to win the 'hearts and minds' battle and to get community scale projects running is the availability of sub-regional 'community renewables specialists'. These people can advise, nurture, help draw in funds and generally guide smaller local projects. At this scale it is also important to ensure a joined up approach with energy efficiency initiatives hence linkage should be made with EEACs. Local Authorities need to be involved in their role as facilitators and community leaders. Housing Associations are an important primary target for small developments. Many SMEs are also active in this area and sustaining them and developing them will be crucial to moving the sector on.

4.0 FIRST THOUGHTS ON PHASE II

4.1 Preamble

The priority for action and the allocation of resources will be dependent on what SEEDA considers to be the most critical outcomes in the short, medium and long term. The headline targets in the RES relate to:

- Increasing the Gross Value Added per capita
- Increasing productivity per worker
- Reducing the rate of increase of the region's ecological footprint, then stabilising prior to seeking to reduce it by 2016

Energy is also seen as a 'critical enabler' of economic activity in the region and taken in its global context. Climate change worries are identified but the security of supply issue appears paramount with the foreseen 'energy gap' giving rise to concern since this could throw the entire economy off balance if not addressed regionally (as well as nationally and locally). Here renewables would be seen as an important part of the overall energy mix provision. The SE is recognised to have the potential skills base and business to grasp new opportunities and become a world leader in 'change energy'.

The SE is also recognised to be closely tied to London and adjacent regions. A point not to be missed when considering wider energy related issues.

4.2 Over-riding Strategic Intention

Increasing the renewables supply and use in the region will clearly address the desire to move towards a low carbon economy for the region. Renewable energy generation, be it power, heat/ cooling or transport fuels, has a direct and highly measurable impact. The more of it you have, then generally the bigger the hit (exception can be liquid biofuels).

Initiatives in countries and regions have tended to come at this matter in one of two ways:

- 'Big is beautiful' where the larger the project then the bigger the renewables hit and the benefits from economies of scale are realised
- Local provision of energy focusing on the needs of communities or individual industries

In the UK, the former strategy has predominated since large, centralised provision of electricity through an extensive and expensive infrastructure is part of our culture (often known as the 'CEGB mentality' within the industry). This is fine for the very large,

almost iconic projects (e.g. potential Severn Barrage, large off-shore wind arrays) but for the majority of on-shore renewables does not give the best fit. Here, decentralised power provision with CHP or District Heating Schemes in all major towns and cities would be the most sustainable option given a balanced renewables portfolio (i.e. not too much intermittent power). Many believe that maximising the benefit of renewables can only be realised by bringing about massive change which would be to the dis-benefit of traditional suppliers and industries (coal, oil, gas and nuclear power plants providing centralised base load power etc.). So far, government policies appear to continue to reinforce the 'big is beautiful' approach with the latest discussions on a new round of nuclear plant being the most obvious. Large centralised 'clean coal' facilities is another manifestation where lower levels of conversion of fuel to usable energy appear to be acceptable and the disposal of the CO2 being the main item of concern.

Given that we cannot hope to turn the tide on our own and bearing in mind the regional/ SEEDA stance on the provision of energy from a basket of sources to maximise the short to medium term security of supply (this to include a positive stance on nuclear for example), then the suggestion would be of a forward strategy that embraced elements of both approaches. This would cover:

- Large projects where electricity generation is the main driver and where individual large contributions are made to energy supply and carbon reductions
- Medium scale projects where heat as well as power are the main drivers and cumulatively make a significant contribution to energy supply and carbon reductions

A broader strategy and certainly a longer term strategy would also need to embrace the smaller down to domestic scale opportunities. Here significant contributions can be made but any significant impact will be over a much longer timescale. Fundamentally, this area addresses the 'hearts and minds' issues and the socio-economics are much more important. Getting the population more generally to reduce their energy consumption and potentially providing a part of their own energy needs is a critical part of a broader approach. Making them familiar with renewables will help address non-technical barriers too, for example likely reducing their opposition to larger, local wind, biomass etc. projects. Modest resources would be merited to help local groups continue to press on this front.

In summary, there needs to be a quantum shift to make renewables mainstream across the region. To do this SEEDA will need to:

- STRATEGIC: Draw on existing organisations and industries to work in common cause and use their expertise appropriately
- STRATEGIC: Provide the necessary leadership, support and access to cross SEEDA working
- RESOURCES: Provide sufficient resources to make change happen and be sustainable

- RESOURCES: Lever in funds (and expertise) from other public and private sector sources to bolster those resources that SEEDA will be able to bring to bear
- EXEMPLARS: Use targeted lead organisations and Local Authorities to act as the vanguard for change and mainstream renewables
- MONITOR AND TARGET: Constantly review progress being made and be prepared to alter course if necessary

4.3 Target topics

This should be addressed by looking at SCALE and HOSTS/ FACILITATORS to gain maximum benefit. Consideration will be given to short to medium term benefits. NOTE THIS WILL BE THEMED IN PHASE 2, COSTED, TIMETABLE ETC.

There are a number of critical activities that will be the main catalyst for change. The top six of these are listed below. Many other actions should also be carried out early on in any programme and these are listed thereafter, in particular those noted as 'generic' will bolster any efforts made.

4.3.1 Critical activities

LARGE SCALE RENEWABLES

Item 1	**Target Group**	**Outcomes**
Review and establish high level dialogue (at CEO level) and establish champions, hold regular meetings, possibly establish a 'forum/ panel for change'	Utilities, project developers, SEEDA industry groups, Crown Estates, existing providers	Better understanding of the potential for projects etc. and profile raising at the highest level, 'marriage brokering' possible enhancing regional stretch/ capability

Item 2	**Target Group**	**Outcomes**
Investigate potential for single fuel and co-firing, hybrid power stations	Utilities, project developers, waste contractors, SEEDA industry groups,	Better understand the potential for project development, scale, timing etc.

More than any other activity, following up on these two actions will deliver the highest renewable energy (electricity) reward at the 50MW plus level. These are the organisations that will deliver projects that will boost the renewables generation profile and give SEEDA the best chance of meeting 2020 targets and showing that it is 'on plan' by 2016. Conversely, without major success at this level SEEDA will be highly unlikely to meet such targets.

'Scouting' discussions are being held with RWE Npower-renewables, the Prudential and Slough Heat & Power/ Scottish & Southern Electricity, Waitrose/ John Lewis. There is a great appetite for closer working and this should be embraced.

LARGE SCALE - KEY FACTORS	
Estimated proportion of target delivered	70% electricity 25% heat/ cooling
Strategic input from SEEDA	Very high
Resources needed	Senior staff time plus specialist external support
Gearing achieved	Very high
Jobs created in the region	Significant on a local scale
Businesses created in the region	Small
Other socio-economic gains	Significant

MEDIUM SCALE RENEWABLES

Item 3	**Target Group**	**Outcomes**
Potential for CHP and Trigeneration, hybrid plant with fossil fuels	Utilities, project developers, Local Authorities	Determine where best to target effort and resources, then catalyse action

Item 4	**Target Group**	**Outcomes**
Fit with Eco-towns and related initiatives – link SAP, Code for Sustainable Homes etc	Utilities, project developers, leading Local Authorities (Diamonds for growth and others)	Takes advantage of 'new wave' of developments and increases the likelihood of renewables inclusion

This is the scale (a few MWs to 50MW) where SEEDA can enable change through the appropriate use of both financial and technical resources working in tandem. This is also the scale that allows for maximum sustainability with potential very high efficiency CHP/ Trigeneration schemes and hybrids achieving over 90% fuel utilisation. There is the opportunity to work with leading Local Authorities, other public sector (hospitals, prisons, schools in 'programmes for change' or portfolios of projects) and private sector organisations to achieve 'mainstreaming' of renewables in target areas of the region perhaps through a 'saturation' type policy. These areas could be 'diamonds for growth' plus others. The key renewables resources will be biomass (wood and waste plus a modicum of anaerobic digestion related technology) and there will need to be emphasis on supply infrastructure to feed such ambitions. Other technologies including wind and solar could be used to effect. Use of appropriate ESCOs will be key and the idea of a 'revolving fund' provided by SEEDA or by SEEDA and others (private sector) in partnership should be encouraged. Without doubt, success here with new developments and large regeneration schemes will catalyse much wider replication across the region and ultimately lead to retrofitting.

To get the maximum momentum, the region should provide central technical resources to facilitate the necessary activities. Models for this are available from other regions/ RDAs (e.g. RegenSW that continues to achieve impressive results).

MEDIUM SCALE - KEY FACTORS	
Estimated proportion of target delivered	25% electricity 55% heat/ cooling
Strategic input from SEEDA	High
Resources needed	Very significant capital funding/ revolving fund possibilities Technical support (e.g. RegenSW model)
Gearing achieved	High
Jobs created in the region	High potential
Businesses created in the region	High potential
Other socio-economic gains	High

SMALL SCALE RENEWABLES

Item 5	**Target Group**	**Outcomes**
Establish region wide community support building on CRI success	Community groups, Local Authorities, SMEs, individuals	More rapid take up of renewables

Item 6	**Target Group**	**Outcomes**
Training, installer, maintenance, supply side, skills deficit	SMEs, training councils, trade associations, LANTRA, etc.	Addresses shortage of skilled work force which will prevent rapid take-up

Although small and microscale developments do not yield very high gains against capacity targets for electricity, success here is important in the overall push towards sustainability and for the production of renewables heat. It is at this scale that the 'hearts and minds' battle is won or lost and this will have an impact on the wider acceptance of the community to the necessary changes that will come about. Many SMEs will benefit from a programme of support from SEEDA and this will also boost efforts on linked programmes (e.g. energy efficiency).

Some capital input for exemplar type projects is advisable, but the main gain will come from providing local community technical support (one full time post per sub-region) so allow mainstreaming of renewables. Such hand-holding is very much required and the local, objective and independent voice is invaluable. Such people have historically provided exceptional gearing for local projects through drawing down a variety of grants and resources from a plethora of sources.

The other key activity here is training for installers and maintenance engineers along with better accreditation and monitoring. Just a few 'cowboys' in the industry can cause many problems and delay mainstreaming by removing confidence.

SMALL SCALE - KEY FACTORS	
Estimated proportion of target delivered	5% electricity 20% heat/ cooling
Strategic input from SEEDA	Low
Resources needed	Some capital funding advisable
Gearing achieved	Significant
Jobs created in the region	High potential
Businesses created in the region	High potential
Other socio-economic gains	Very high

GENERIC ACTIVITIES

As discussed, it is important to consider a number of cross-cutting activities early on or the allocation of resources and priorities will not be fully guided and the most will not be made of SEEDA efforts (for example TV Energy are about to embark on a €1.3 million EC project on ESCOs that could help inform the region and could provide early gearing). The list is attached and the most important highlighted.

Item	Target Group	Outcomes
Review current and proposed Government policy	BERR, DEFRA etc	Better understanding of the potential for projects etc and support available for the region
Investigate regional best practice and success factors	***RDAs and regional bodies***	***Bench marks SE region and opens up possibilities for collaboration***
Upgrade dialogue with energy related agencies and become more proactive	EST and Carbon Trust	Co-ordinated actions that suit regional priorities and collaborate with ongoing programmes to the advantage of the region
European funding/ expertise/ regional twining	***European Commission, All groups***	***Gears up regional programme with funds and with expertise/ examples, increases profile***
RDPE/ LEADER	Rural activities, farmers, foresters	Co-ordinate activities to avoid unnecessary duplication and to maximise benefit across the region. Main impact at small scale.
Review regional research and university expertise	Research organisations and universities	Seek to support leading centres and develop in line with strategic needs
SEE-STATS	***All groups***	***Tracking and monitoring of renewables uptake. Modelling of future outcomes. Sub-regional agency partnership working.***
Establish dialogue with trade associations	REA, European equivalents	Better access to the industry, profile.

4.3.2 Key activities

LARGE SCALE

The technologies and resources that are applicable here are wind (on and off-shore) and biomass/ waste. Potentially in the longer term this might be expanded to tidal and wave.

Item	Target Group	Outcomes
Review and establish high level dialogue (at CEO level) and establish champions, regular meetings	***Utilities, project developers, SEEDA industry groups, Crown Estates, existing providers***	***Better understanding of the potential for projects etc. and profile raising at the highest level, 'marriage brokering' possible enhancing regional stretch/ capability***
Hold high level conference addressing large scale renewables developments in the region linked to other low carbon economic initiatives making maximum use of champions	Utilities, project developers, SEEDA industry groups, Crown Estates, existing providers	Greater likelihood of choosing the SE for major developments, profile raising, create 'renewables friendly' atmosphere
Provide incentives packages for major developments and regeneration activities	Utilities, project developers	Greater likelihood of choosing the SE for major developments
Determine highest energy users as potential hosts (c.f. Ford, Dagenham)	Large blue chip type private sector companies	Greater likelihood of bringing forward major projects
Investigate and target leading regional companies through analysis of CSR	Large blue chip type private sector companies	Greater likelihood of bringing forward major projects
Investigate potential for single fuel and co-firing, hybrid power stations	***Utilities, project developers, waste contractors, SEEDA industry groups,***	***Better understand the potential for project development***
Address transmission/ distribution requirements	Utilities, Distribution, transmission, BERR	Create better understanding of needs facilitating change/ access
Provide support for resource supply and infrastructure (biomass) for identified projects	Mostly biomass – rural players, farmers, growers	Increased likelihood of major projects as a key barrier addressed with support from landowners etc.
Stimulation of industrial build and supply capacity	Existing and potential industrial players	Creates a regional industry capable of meeting the shortfall in capacity at home and for export
Guidelines	Utilities, project developers	Facilitates faster growth of renewables
SEEDA policy support	Utilities, project developers	Facilitates faster growth of renewables
SEEDA local support	Utilities, project developers	Facilitates faster growth of renewables
Research – seek a lead technology area to develop into a world class enterprise	Universities and leading industrial players	Create 'centre of world class excellence' which will rachet up regional activity
Financial opportunities	Banks, investors,	Back-up large scale deployment opportunities leading to more rapid and sustained activity

MEDIUM SCALE

The technologies and resources that are applicable here are wind (on-shore), low head hydro, solar (thermal and PV), GSHPs and biomass/ waste.

Item	Target Group	Outcomes
Review and establish dialogue, establish champions	Utilities, project developers,	Better understanding of the potential for projects etc
Run conference on medium scale hybrid renewables making maximum use of champions	Utilities, project developers, Local Authorities	Increase the likelihood of projects coming forward, create 'renewables friendly' atmosphere
Potential for CHP and Trigeneration, hybrid plant with fossil fuels	***Utilities, project developers, Local Authorities***	***Determine where best to target effort and resources***
MSW and bioenergy	Utilities, project developers, Local Authorities	Determine the extent of synergistic project opportunities
Support for CHP/ Trigen exemplars	Local Authorities	Increases the (early) rate of project build
ESCOs	Developers, Local Authorities	Addresses economic and technical risk allowing more projects to come forward
Decentralised power generation infrastructure	Utilities, project developers, Local Authorities	Facilitates faster growth of renewables CHP in particular
Stimulation of industrial build and supply capacity	Existing and potential industrial players	Creates a regional industry capable of meeting the shortfall in capacity at home and for export
Fit with Eco-towns and related initiatives – link SAP, Code for Sustainable Homes etc	***Utilities, project developers, Local Authorities***	***Takes advantage of 'new wave' of developments and increases the likelihood of renewables inclusion***
Planning guidance/ case studies/ technical site visits	Local Authorities, developers, supply industry	Needed by potential hosts and will increase the likelihood of projects
Resource supply and infrastructure (biomass)	SMEs, hauliers, farmers, growers, existing solid fuel suppliers	A prerequisite for projects addresses non-technical barrier
AONBs and other designated areas	Local Authorities, AONBs, CPRE, FoE, CLA, NFU	Increases the scope for projects given large areas covered by designations
Guidelines	Utilities, project developers, Local Authorities	Facilitates faster growth of renewables
Provide region wide technical support	Utilities, project developers, Local Authorities	Facilitates faster growth of renewables
Training, skills deficit	SMEs, training councils, trade associations, LANTRA, etc.	Addresses shortage of skilled work force which will prevent rapid take-up
SEEDA policy support	Utilities, project developers, Local Authorities	Facilitates faster growth of renewables
SEEDA local support	Utilities, project developers, Local Authorities	Facilitates faster growth of renewables
Financial opportunities	Banks, investors, business angels	Facilitates faster growth of renewables

SMALL SCALE

The technologies and resources that are applicable here are at the microgen level and include small scale wind (on-shore), low head hydro (mills), solar (thermal and PV), GSHPs and biomass stoves and boilers.

Item	Target Group	Outcomes
Review and establish dialogue	SMEs (equipment suppliers, installers, facilitators)	Better understanding of the potential for projects etc
Establish region wide community support building on CRI success	***Community groups, Local Authorities, SMEs, individuals***	***More rapid take up of renewables***
Linkage with energy efficiency initiatives	Community groups, Local Authorities, SMEs, individuals, regional energy agencies	Will deliver a more joined up approach and will give greater value for money if treated holistically
Continue biennial regional renewables conferences	Community groups, Local Authorities, SMEs, individuals, regional energy agencies	Raises profile and will lead to more rapid technology uptake, profile
Stimulation of industrial build and supply capacity	Existing and potential industrial players	Creates a regional industry capable of meeting the shortfall in capacity at home and for export
Training, installer, maintenance, supply side, skills deficit	***SMEs, training councils, trade associations, LANTRA, etc.***	***Addresses shortage of skilled work force which will prevent rapid take-up***
Planning guidance/ case studies/ technical site visits	Local Authorities, SMEs	Facilitates faster growth of renewables
Resource supply and infrastructure (biomass)	Rural groups, forestry, SMEs, existing solid fuel suppliers	A prerequisite for projects addresses non-technical barrier
Fit with Eco-towns and related initiatives	SMEs, Local Authorities, individuals	Takes advantage of 'new wave' of developments and increases the likelihood of renewables inclusion
AONBs and other designated areas	Local Authorities, AONBs, CPRE, FoE, CLA, NFU	Increases the scope for projects given large areas covered by designations
Guidelines	SMEs, Local Authorities, individuals	Facilitates faster growth of renewables

5.0 REFERENCES

1. Development of a renewable energy assessment and targets for the south east. Final report to GOSE prepared by ETSU and Terence O'Rourke plc January 2001
2. Renewable Heat and Heat from Combined Heat and Power Plants – Study and Analysis. AEA Technology.
3. Reform of the Renewables Obligation Consultation' (BERR, May 2007) at http://www.berr.gov.uk/files/file39497.pdf.
4. Draft SEEDA Rural Strategy
5. Forestry Commission publications (various)
6. The Non-Fossil Fuel Purchasing Agency

ANNEX 1: REGIONAL RENEWABLE ENERGY CONTRIBUTION TABLES

The tables in the following three sections - Table 1, Table 3 and Table 5- reproduce the technology and sub-regional breakdown of installed renewable electricity capacity for the end of years 2007, 2010 and 2020, based on known data as drawn from South East Renewable Energy Statistics (SEE-STATS). This data is as definitive as we can currently get and contains all known significant activities. Table 2 is the technology and sub-regional breakdown of installed renewable heating capacity for the end of year 2007.

The estimates of annual renewable electrical energy generated ('Energy generated') and resultant CO_2 savings ('RE carbon savings') are based on recent UK and South East regional technology-specific capacity factors and emissions factors, relative to the target installed capacities. CO_2 consumption data for the baseline year 2003 ('2003 baseline') has been aggregated from local authority data for each sub-region. For reference, the annual CO_2 savings from the generation of renewable electricity corresponding to each target capacity is expressed in the last column ('RE savings/2003') as a percentage relative to the 2003 baseline.

Notes on data sources and methodological assumptions are given at the foot of each table.

CURRENT CAPACITY

Table 1 – Known RE capacity operational end 2007

Operational end 2007	Electrical MWe								*(2)*		MWhe/yr	tCO2/yr	tCO2/yr *(1)*	%/yr
Sub-region	Biomass	Onshore wi	Biogas	Solar PV	Hydro	Offshore win	Wave&tida	Co-firing	Landfill ga	TOTAL REle	Energy generated	RE carbon savings	2003 baseline CO2	RE savings/2003
TV	40.00	2.09	3.19	1.38	0.08	0.00	0.00	25.00	0.00	71.74	263,911	111,730	29,082,750	0.4%
HW	0.00	0.33	0.34	0.29	0.00	0.00	0.00	0.00	0.00	0.96	3,402	1,463	17,030,238	0.0%
KT	0.00	0.03	1.35	0.06	0.00	0.00	0.00	40.00	0.00	41.44	273,292	117,515	14,459,805	0.8%
SU	0.00	0.01	1.17	0.08	0.00	0.00	0.00	0.00	0.00	1.26	9,060	3,896	10,571,509	0.0%
Not attributable	0.00	0.00	0.00	0.00	0.00	90.00	0.00	0.00	142.80	232.80	1,055,615	453,914	n/a	n/a
South East	40.00	2.46	6.04	1.81	0.09	90.00	0.00	65.00	142.80	348.19	1,605,280	688,519	71,144,302	1.0%

Source: South East Renewable Energy Statistics (SEE-STATS) unless otherwise stated.

(1) Source: Emissions of carbon dioxide for local authority areas (Defra 2006)

(2) Source: Energy Trends September 2007 (BERR 2007), p.16, Table 2

(3) Source: Landfill Gas Generators' Response to the Reform of the Renewables Obligation (RO) (LFG Group 2007), p.6, Graph 2 'Golder Graph'. Assumes Accelerated Decay Curve applied to SE & capacity proportional to output

Significant (over 0.5 MW_e installed capacity) existing installations at the end of 2007 in the South East sub-regions are as follows:

TV Slough Heat & Power Biomass Station 40 MW_e
Didcot Biomass Co-firing Operation 25 MW_e

	GreenPark Wind Turbine 2.0 MW_e
	Reading Sewage Treatment Works Biogas Station 0.7 MW_e
	Sandford-on-Thames Sewage Treatment Works Biogas Station 0.7 MW_e
HW	-
KT	Ashford Sewage Treatment Works Biogas Station 0.7 MW_e
SU	-
Unallocated	Various Landfill Gas Stations 142.8 MW_e

Table 2 - Existing RE heating capacity end 2007

Operational end 2007	Thermal kWth			
Sub-region	Biomass t	Biogas	Other therr	TOTAL Rheat
TV	22.46	0.00	0.36	22.82
HW	1.14	0.00	0.36	1.50
KT	1.38	0.00	0.24	1.62
SU	3.19	0.00	0.04	3.22
Not attributable	n/a	n/a	n/a	n/a
South East	28.17	0.00	0.99	29.16

Table 3 – Projected RE capacity operational end 2010

Predicted end 2010	Electrical MWe								*(2,3)*		MWhe/yr	tCO2/yr	tCO2/yr *(1)*	%/yr
Sub-region	Biomass	Onshore wi	Biogas	Solar PV	Hydro	Offshore win	Wave&tida	Co-firing	Landfill ga:	TOTAL REIec	Energy generated	RE carbon savings	2003 baseline CO2	RE savings/2003
TV	40.00	31.51	3.19	1.76	0.12	0.00	0.00	25.00	0.00	101.57	313,364	132,994	29,082,750	0.5%
HW	0.00	8.29	0.34	0.37	0.01	0.00	0.00	0.00	0.00	9.01	16,761	7,207	17,030,238	0.0%
KT	0.00	69.89	1.35	0.08	0.04	0.00	0.00	40.00	0.00	111.35	389,771	167,602	14,459,805	1.2%
SU	0.00	0.86	1.17	0.13	0.00	0.00	0.00	0.00	0.00	2.16	10,514	4,521	10,571,509	0.0%
Not attributable	0.00	0.00	0.00	0.00	0.00	390.00	0.00	0.00	152.76	542.76	1,798,241	773,244	n/a	n/a
South East	40.00	110.54	6.04	2.34	0.17	390.00	0.00	65.00	152.76	766.85	2,528,651	1,085,568	71,144,302	1.5%

Source: South East Renewable Energy Statistics (SEE-STATS) unless otherwise stated.

(1) Source: Emissions of carbon dioxide for local authority areas (Defra 2006)

(2) Source: Energy Trends September 2007 (BERR 2007), p.16, Table 2

(3) Source: Landfill Gas Generators' Response to the Reform of the Renewables Obligation (RO) (LFG Group 2007), p.6, Graph 2 'Golder Graph'. Assumes Accelerated Decay Curve applied to SE & capacity proportional to output

Significant (over 0.5 MW_e installed capacity) new installations predicted by end of 2010 in the South East sub-regions are as follows:

TV	Milton Keynes Wind Farm 14 MW_e

	Westmill Wind Farm 6.5 MW_e
	Nun Wood Wind Farm 6.9 MW_e*
	Theale Wind Turbine 2.0 MW_e*
HW	West Wight Wind Farm 6.2 MW_e*
	Cheverton Down Wind Farm 1.8 MW_e
KT	Little Cheyne Court Wind Farm 59.8 MW_e
	North Dover Wind Farm 10.0 MW_e
SU	Glyndebourne Wind Turbine 0.85 MW_e
Unallocated	Thanet Offshore Wind Farm 300 MW_e
	Various Landfill Gas Stations (increased capacity) +10 MW_e

*Asterisked projects indicate the greatest uncertainty of installation by the target date.

Table 4 - Predicted RE heating capacity end 2010

Operational end 2010	Thermal kWth			
Sub-region	Biomass t	Biogas	Other therr	TOTAL Rheat
TV	24.91	0.00	0.43	25.34
HW	1.14	0.00	0.38	1.52
KT	1.38	0.00	0.31	1.69
SU	3.19	0.00	0.15	3.23
Not attributable	n/a	n/a	n/a	n/a
South East	30.62	0.00	1.26	31.77

Table 5 - Projected RE capacity operational end 2020

Predicted end 2020	Electrical MWe								*(2,3)*		MWhe/yr	tCO2/yr	tCO2/yr *(1)*	%/yr
Sub-region	Biomass	Onshore wi	Biogas	Solar PV	Hydro	Offshore win	Wave&tida	Co-firing	Landfill ga	TOTAL REle	Energy generated	RE carbon savings	2003 baseline CO2	RE savings/2003
TV	40.00	31.51	3.19	1.76	0.12	0.00	0.00	0.00	0.00	76.57	149,111	62,366	29,082,750	0.2%
HW	0.00	8.29	0.34	0.37	0.01	0.00	0.00	0.00	0.00	9.01	16,761	7,207	17,030,238	0.0%
KT	0.00	69.89	1.35	0.08	0.04	0.00	0.00	0.00	0.00	71.35	126,971	54,598	14,459,805	0.4%
SU	0.00	0.86	1.17	0.13	0.00	0.00	0.00	0.00	0.00	2.16	10,514	4,521	10,571,509	0.0%
Not attributable	0.00	0.00	0.00	0.00	0.00	1,338.50	0.00	0.00	69.74	1,408.24	3,463,992	1,489,517	n/a	n/a
South East	40.00	110.54	6.04	2.34	0.17	1,338.50	0.00	0.00	69.74	1,567.33	3,767,349	1,618,208	71,144,302	2.3%

Source: South East Renewable Energy Statistics (SEE-STATS) unless otherwise stated.

(1) Source: Emissions of carbon dioxide for local authority areas (Defra 2006)

(2) Source: Energy Trends September 2007 (BERR 2007), p.16, Table 2

(3) Source: Landfill Gas Generators' Response to the Reform of the Renewables Obligation (RO) (LFG Group 2007), p.6, Graph 2 'Golder Graph'. Assumes Accelerated Decay Curve applied to SE & capacity proportional to output

Significant (over 0.5 MW_e installed capacity) new installations predicted by end of 2020 in the South East sub-regions are as follows:

TV	Didcot Biomass Co-firing Operation (closure) -25 MW_e
HW	-
KT	-
SU	-
Unallocated	London Array Offshore Wind Farm 948.5 MW_e
	Various Landfill Gas Stations (reduced capacity/closures) -73 MW_e

The following four tables - Table 6, Table 7, Table 8 and Table 9 – reproduce the sub-regional and where possible the technology breakdown of the adopted South East Plan targets for 2010, 2016, 2020 and 2026 respectively as based on the SE Plan and its formative documents.

The estimates of annual renewable electrical energy generated ('Energy generated') and resultant CO_2 savings ('RE carbon savings') are based on recent UK and South East regional technology-specific capacity factors and emissions factors, relative to the target installed capacities. CO_2 consumption data for the baseline year 2003 ('2003 baseline') has been aggregated from local authority data for each sub-region. For reference, the annual CO_2 savings from the generation of renewable electricity corresponding to each target capacity is expressed in the last column ('RE savings/2003') as a percentage relative to the 2003 baseline. The technology breakdowns for 2020 and 2026 are calculated in proportion to the capacity breakdown for the 2016 targets (see Table 7).

Notes on the specific data sources and methodological assumptions are given at the end of Table 13. The capacity factors and CO_2-equivalent emission factors assumed for each technology are listed in Table 14.

Table 6 – South East Plan's RE capacity targets for 2010

Targets 2010 (SE PLAN)*(1)*	Electrical MWe										MWhe/yr	tCO2/yr	tCO2/yr	%
Sub-region	Biomass	Onshore wind	Biogas	Solar PV	Hydro	Offshore wind	Wave&tidal	Co-firing	Landfill gas	TOTAL RElec	Energy generated*(2)*	RE carbon savings*(3)*	2003 baseline CO2*(4)*	RE savings/2003
TV	85.0	39.0	9.0	6.8	0.5	0.0	0.0	0.0	0.0	140.0	291,200	121,493	29,082,750	0.4%
HW	60.0	49.0	2.5	3.1	0.0	0.0	0.0	0.0	0.0	115.0	208,392	86,980	17,030,238	0.5%
KT	30.0	75.0	2.5	3.2	0.3	0.0	0.0	0.0	0.0	111.0	200,762	85,014	14,459,805	0.6%
SU	40.0	11.0	2.5	3.2	0.0	0.0	0.0	0.0	0.0	57.0	110,183	45,627	10,571,509	0.4%
South East	**215.0**	**174.0**	**16.5**	**16.3**	**0.8**	**197.4**				**620.0**	**1,260,135**	**532,441**	**71,144,302**	**0.7%**

Table 7 - South East Plan's RE capacity targets for 2016

Targets 2016 (SE PLAN)*(1)*	Electrical MWe										MWhe/yr	tCO2/yr	tCO2/yr	%
Sub-region	Biomass	Onshore wind	Biogas	Solar PV	Hydro	Offshore wind	Wave&tidal	Co-firing	Landfill gas	TOTAL RElec	Energy generated*(2)*	RE carbon savings*(3)*	2003 baseline CO2*(4)*	RE savings/2003
TV	125.0	58.0	14.0	11.7	0.5	0.0	0.0	0.0	0.0	209.0	435,311	181,709	29,082,750	0.6%
HW	60.0	52.0	4.5	5.6	0.0	0.0	0.0	0.0	0.0	122.0	230,773	96,605	17,030,238	0.6%
KT	40.0	100.0	7.5	5.6	0.3	0.0	0.0	0.0	0.0	154.0	300,328	127,389	14,459,805	0.9%
SU	40.0	19.0	5.0	4.3	0.0	0.0	0.0	0.0	0.0	68.0	143,638	60,012	10,571,509	0.6%
South East	**265.0**	**229.0**	**31.0**	**27.2**	**0.8**	**342.0**				**895.0**	**1,888,989**	**800,658**	**71,144,302**	**1.1%**

Table 8 - South East Plan's RE capacity targets for 2020

Targets 2020 (SE PLAN)	Electrical MWe*(5)*									*(1)*	MWhe/yr	tCO2/yr	tCO2/yr	%
Sub-region	Biomass	Onshore wind	Biogas	Solar PV	Hydro	Offshore wind	Wave&tidal	Co-firing	Landfill gas	TOTAL RElec	Energy generated*(6)*	RE carbon savings*(3)*	2003 baseline CO2*(4)*	RE savings/2003
TV	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HW	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KT	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SU	-	-	-	-	-	-	-	-	-	-	-	-	-	-
South East	**334.6**	**289.1**	**39.1**	**34.3**	**1.0**	**431.8**				**1130.0**	**2,296,697**	**1,010,887**	**71,144,302**	**1.4%**

Table 9 - South East Plan's RE capacity targets for 2026

Targets 2026 (SE PLAN)	Electrical MWe*(5)*									*(1)*	MWhe/yr	tCO2/yr	tCO2/yr	%
Sub-region	Biomass	Onshore wind	Biogas	Solar PV	Hydro	Offshore wind	Wave&tidal	Co-firing	Landfill gas	TOTAL RElec	Energy generated*(6)*	RE carbon savings*(3)*	2003 baseline CO2*(4)*	RE savings/2003
TV	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HW	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KT	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SU	-	-	-	-	-	-	-	-	-	-	-	-	-	-
South East	**518.2**	**447.8**	**60.6**	**53.2**	**1.6**	**668.7**				**1,750.0**	**3,693,554**	**1,565,533**	**71,144,302**	**2.2%**

The following tables, Table 10 and Table 11, reproduce the regional proposed 10% and 20% renewable electricity targets for 2010 and 2020, as contained in the proposed Regional Economic Strategy for the South East and assuming these percentages apply to total electricity supply (generation) in the region (assumed here to be static at 2007 levels). No sub-regional breakdown is available for this.

The total and by-technology equivalent renewable installed electrical capacity ('Electrical MW_e') and the CO_2 savings ('RE carbon savings') are based on recent UK and South East regional technology-specific capacity factors and emissions factors. The technology breakdown is calculated relative to the target annual renewable electrical energy generated ('Energy generated') and in proportion to the capacity breakdown for the SE Plan's 2010 and 2016 targets respectively (see Table 6 and Table 7).

Table 10 - Regional Economic Strategy's RE supply targets for 2010

Targets 2010 (RES, supply)	Electrical MWe *(7)*									*(8)*	MWhe/yr	tCO2/yr	tCO2/yr	%
Sub-region	Biomass	Onshore wind	Biogas	Solar PV	Hydro	Offshore wind	Wave&tidal	Co-firing	Landfill gas	TOTAL RElec	Energy generated *(9)*	RE carbon savings *(3)*	2003 baseline CO2 *(4)*	RE savings/2003
TV	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HW	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KT	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SU	-	-	-	-	-	-	-	-	-	-	-	-	-	-
South East	**1,088.0**	**880.5**	**83.5**	**82.5**	**4.0**	**1,047.7**				**3,137.4**	**6,376,604**	**2,742,069**	**71,144,302**	**3.9%**

Table 11 - Regional Economic Strategy's RE supply targets for 2020

Targets 2020 (RES, supply)	Electrical MWe *(7)*									*(10)*	MWhe/yr	tCO2/yr	tCO2/yr	%
Sub-region	Biomass	Onshore wind	Biogas	Solar PV	Hydro	Offshore wind	Wave&tidal	Co-firing	Landfill gas	TOTAL RElec	Energy generated *(9)*	RE carbon savings *(3)*	2003 baseline CO2 *(4)*	RE savings/2003
TV	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HW	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KT	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SU	-	-	-	-	-	-	-	-	-	-	-	-	-	-
South East	**1,789.1**	**1,546.1**	**209.3**	**183.6**	**5.4**	**2,309.0**				**6,042.4**	**12,753,207**	**5,405,516**	**71,144,302**	**7.6%**

The following tables, Table 12 and Table 13, reproduce the regional proposed 10% and 20% renewable electricity targets for 2010 and 2020, as contained in the proposed Regional Economic Strategy for the South East and assuming these percentages apply to total electricity consumption (demand) in the region (**assumed here to be static at 2006 levels**). No sub-regional breakdown is available for this.

Table 12 - Regional Economic Strategy's RE consumption targets for 2010

Targets 2010 (RES, consum	Electrical MWe *(7)*									*(8)*	MWhe/yr	tCO2/yr	tCO2/yr	%
Sub-region	Biomass	Onshore wind	Biogas	Solar PV	Hydro	Offshore wind	Wave&tidal	Co-firing	Landfill gas	TOTAL RElec	Energy generated *(11)*	RE carbon savings *(3)*	2003 baseline CO2 *(4)*	RE savings/2003
TV	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HW	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KT	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SU	-	-	-	-	-	-	-	-	-	-	-	-	-	-
South East	**738.4**	**597.6**	**56.7**	**56.0**	**2.7**	**678.0**				**2,129.3**	**4,327,842**	**1,828,630**	**71,144,302**	**2.6%**

Table 13 - Regional Economic Strategy's RE consumption targets for 2020

Targets 2020 (RES, consum	Electrical MWe *(7)*									*(10)*	MWhe/yr	tCO2/yr	tCO2/yr	%
Sub-region	Biomass	Onshore wind	Biogas	Solar PV	Hydro	Offshore wind	Wave&tidal	Co-firing	Landfill gas	TOTAL RElec	Energy generated *(11)*	RE carbon savings *(3)*	2003 baseline CO2 *(4)*	RE savings/2003
TV	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HW	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KT	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SU	-	-	-	-	-	-	-	-	-	-	-	-	-	-
South East	**1,214.3**	**1,049.3**	**142.0**	**124.6**	**3.7**	**1,567.1**				**4,101.0**	**8,655,684**	**3,668,759**	**71,144,302**	**5.2%**

Notes

(1) Source: South East Plan (SEERA 2006) and Harnessing the Elements (SEERA 2004)
(2) Assumes tech-specific capacity factors as table A below. Source: BERR (2006), SEESTATS (2007)
(3) Assumes 0.43 kgCO2/kWh for UK grid, 0.025 kgCO2/kWh for biomass & co-firing, 0 for all other renewables. Source: Defra 2005, BRE 2000
(4) Source: Emissions of carbon dioxide for local authority areas (Defra 2006)
(5) Source: South East Plan (SEERA 2006) for total. Tech-specific targets are multiplied proport to % increase of total
(6) Uses year-specific overall weighted-average RE capacity factor from combination of (2) above
(7) Breakdown assumes tech-specific proportions from SE PLAN-driven targets above
(8) Assumes overall weighted-average RE capacity factor for 2010, and energy generated as given in following column
(9) % of total 2007 conventional generation. 2007 figure calculated from SE conventional generating capacity and SE mix-specific weighted-average capacity factor from UK tech-specific capacity factors. Source: DUKES (BERR 2007)
(10) Assumes overall weighted-average RE capacity factor for 2016, and energy generated as given in following column
(11) % of total 2006 consumption. 2006 figure calculated from SE conventional generating capacity and SE mix-specific weighted-average capacity factor from UK tech-specific capacity factors. Source: DUKES (BERR 2007)

Table 14 - Capacity and emissions factors

Table A - capacity factors	Capacity factor	Emissions factor, tCO2/MWh
Biomass elec commercial	0.20	0.025
Onshore wind	0.19	0
Biogas elec commercial	0.88	0
Solar PV	0.09	0
Hydro	0.60	0
Offshore wind	0.26	0
Wave & tidal	0	0
Co-firing	0.75	0.025
Landfill gas	0.68	0
UK electricity grid	-	0.43

Table 15 - Regional Thermal Projects

Thermal kWth			
Sub-region	**Operational**	**Planned**	**Sum 2010**
TV	23.30	1.67	24.98
HW	1.14	0.02	1.16
KT	1.38	0.07	1.45
SU	3.19	0.01	3.19
South East	**29.01**	**1.77**	**30.78**

Projects >100 kWth below - all biomass (chip) unless stated otherwise.

TV

100 kW Shoelands Farmyard, Hampton Estate, Surrey (under constr)
135 kW Grove Hill Farm, Thame, Oxon
220 kW Hill Fields Farm, Pangbourne, Berks
220 kW The Living Rainforest, Hampstead Norreys, Berks
? kW Hurleyford Farm, Hurley, Berks
? kW Ofquest Ltd, Chalgrove, Oxon
? kW Ercol Ltd, Princes Risborough, Bucks
? kW Waterperry Gdns, Waterperry, Oxon (priority prospect)
? kW Northmoor Trust, Ltl Wittenham, Oxon
300 kW Elvendon Priory, Goring, Oxon
300 kW Langley City Academy, Slough, Berks (priority prospect)
366 kW Farm nr Twyford, Berks
400 kW Chobham, Surrey (prospect)
540 kW Wexham Nursery, Slough, Berks
840 kW Belwey Homes, Redhill, Surrey
20,000 kW SH&P, Slough, Berks

KT

150 kW Torry Hill, Milstead
? kW Branscombe Estate, Chatham
? kW Kenward House, Yalding (under cons)
350 kW Amery Court Farm, Blean

1,000 kW Betteshanger Colliery, Sholden (under constr)

HW
120 kW Sustainability Centre, East Meon
150 kW Roundwood Estate, Micheldever
~150 kW Evergreens Housing, Whitehill **(= several solar thermal collectors)**
175 kW QECP, Horndean
~500 kW Rotherfield Park, East Tistead

SU
100 kW Ashdown Forest centre, Wych Cross, E Sussex
150 kW Westgate Joinery, Ringmer, E Sussex
210 kW Laughton Lodge, Laughton, E Sussex
? kW Community in Wadhurst, E Sussex
300 kW Hoathly Hill Community, West Hoathly, W Sussex
465 kW West Dean Estate II, West Dean, W Sussex
500 kW WIlton Park Conference Centre, Steyning, W Sussex (under constr)
770 kW West Dean Estate I, West Dean, W Sussex
1,000 kW Beacon Community College, Crowborough, E Sussex

Table 16 - Regional Short Rotation Coppice (SRC) Plantations

Total area in SE is approximately 228 ha, but there is no public register of SRC sites, so this is largely based on what TVE know exists and there may be some gaps. TVBC producer group sites unless otherwise noted.

Location	Hectares planted
Slough, Berkshire	5.45
Chearsley, Bucks	9.26
Faringdon, Oxfordshire	4.04
Burchetts Green, Berkshire	13.43
Faringdon, Oxfordshire	3.78
Faringdon, Oxfordshire	5.42
Haddenham, Buckinghamshire	40.6

Faringdon, Oxfordshire	3.96
Eynsham and Kiddlington, Oxfordshire	7.53
West Berks and SODC (ESD Planting)	55
Sutton Courtney, Oxon (CRL Planting)	10
Thames Valley	**158.47**
Leckford, Hampshire	9.61
Hook, Hampshire	18.25
Andover, Hampshire	7.07
Andover, Hampshire	6.59
Hants & IOW	**41.52**
Send, Surrey	19.1
East Grinstead, Sussex	8.3
Surrey & Sussex	**27.4**
Kent	**0**
TOTALS	**227.39**

ANNEX 2: REGIONAL ECONOMIC STRATEGY (EXTRACT)

Objective 3 – Sustainable Prosperity
Target 11 – Climate Change and Energy

Reduce CO_2 emissions attributable to the South East by 20% from the 2003 baseline by 2016 as a step towards the national target of achieving a 60% reduction on 1990 levels by 2050, and increase the contribution of renewable energy to at least 10% of energy supply in the South East by 2010 as a step towards achieving 20% by 2020

Action 11.1 – Promote the inclusion of climate risks and costs into public policy and business decision making, and plan for adaptation to the impacts of 'legacy' climate change.

Activities	**Contribution to the Target**	**Partner(s)** (lead partner(s) in bold)	**Timescales**			**Required Funding**	**Funding source(s)**
			07-08	08-11	12-16		
South East Climate Change Partnership Widen membership of South East Climate Change Partnership in order to develop significant adaptive capacity to "legacy" climate change in vulnerable economic sectors and business in general.	An additional 50 Businesses in vulnerable sectors are able to adapt in a timely manner as the impacts of climate change are felt, due to the greenhouse gas affect that will continue over the next 30 years as a "the climate change legacy".	**South East Climate Change Partnership**	●	●	●	£165,000 p.a. (but additional resources are required)	Membership fees, SEEDA
Planning for Climate Change Establish adaptive planning for climate change as a mainstream component in all policy, research and development of public and major corporate bodies, building on regulatory and pro-active activities of the Environment Agency.	The Environment Agency will put appropriate measures in place to address the unavoidable outcomes of climate change due to the greenhouse gas affect that will continue over the next 30 years as a "the climate change legacy".	**Environment Agency**	●	●	●	Costs absorbed as part of Environment Agency statutory function	Environment Agency

Cross Cutting Issues	
Europe	• Identify policy influence opportunities and facilitate the exploitation of the Green paper on post 2012 climate change, which will help identify areas where action is needed at Community level to support the EUs adaptation to climate change. • Identify policy influence opportunities and facilitate the exploitation of the implementation and enforcement of EC environmental law, which will analyse how EU member states have implemented EU law into their national laws.

Action 11.2 – (New Action). Promote and contribute to the delivery of local, regional and national infrastructure that is resilient to climate change.

Activities	**Contribution to the Target**	**Partner(s)** (lead partner(s) in bold)	**Timescales** 07-08	08-11	12-16	**Required Funding**	**Funding source(s)**
Engage Infrastructure Providers Engage key infrastructure providers to work with existing South East Climate Partnership membership e.g. water companies, Environment Agency, Local Authorities to improve the ability of regional infrastructure to adapt to climate change.	An additional 10 Infrastructure providers to have significantly improved regional infrastructure to adapt to the greenhouse gas affect that will continue over the next 30 years as a result of the "climate change legacy".	**South East Climate Change Partnership,** Environment Agency, Key Industry players	●	●	●	£5M	South East Climate Change Partnership members, SEEDA

Action 11.3 – Promote and support innovation for new markets, products and services that support adaptation to climate change.

Activities	Contribution to the Target	Partner(s) (lead partner(s) in bold)	Timescales 07-08	 08-11	 12-16	Required Funding	Funding source(s)
Opportunities for Innovation Identify key opportunities for innovation and undertaking a commercialisation programme. To include training of land-based programme facilitators to help develop initiatives using technology that helps landowners adapt to climate change.	An additional 50 land-based businesses can adapt to the greenhouse gas affect that will continue over the next 30 years as a result of the "climate change legacy".	**EnviroBusiness**, Manufacturing Advisory Service, SEEDA, South East Climate Change Partnership	●	●	●	£200,000 p.a.	SEEDA
Cross Cutting Issues: Rural • Land-base sector has an important role to play in the development new products and services that support adaptation of climate change. • Small Rural Town Partnership and Parish/Community Planning process to recognise and reduce their own environmental footprint. Europe • Identify policy influence opportunities and facilitate the exploitation of the Strategic Energy Technology Plan, which is designed t accelerate the development of promising energy technologies and to create conditions to bring technologies to the market.							

Action 11.4 – (New Action). Maximise opportunities for South East businesses arising from energy policy.

Activities	Contribution to the Target	Partner(s) (lead partner(s) in bold)	Timescales 07-08	 08-11	 12-16	Required Funding	Funding source(s)
Identifying Opportunities Identify, prioritise and support renewable energy technologies. Use the South East Renewable Energy Statistics (TV Energy) database to track progress against regional targets.	Give a clear steer to companies and potential investors in these regions and research and innovation organisations. To contribute an additional 5% in the amount of renewable energy produced in the South East by 2020.	**EnviroBusiness**, SEEDA	●	●	●	£100,000 for research	SEEDA, EnviroBusiness

The London Array Support, and where possible, facilitate the development of the London Array Offshore Windfarm.	London Array will ultimately deliver 1GW if renewable energy, with a significant proportion available by 2012.	**London Array Consortium**	●	●	●	N/A	N/A
Commercialisation of New Opportunities Facilitate development of emerging energy efficiency and renewable energy products, access to markets, commercialisation and support cross sector collaborations.	Contribute towards the CO2 reduction target and a greater % of renewable energy building on the Energi-SE Knowledge Transfer Network. To contribute a further 5% in the amount of renewable energy produced in the South East by 2020.	**EnviroBusiness**, South East Consortium for the Built Environment, Carbon Trust, Innovation Advisory Service	●	●	●	£200,000 p.a. (supplement to core activities)	SEEDA, EnviroBusiness
Business Links Promote the Business Information Diagnostic Brokerage model for businesses seeking support and advice on energy and resource efficiency by December 2007.	Will contribute measurable reductions in CO2 emissions each year. Targets to be set on the basis of the 2007/8 pilot. BREW metrics will be measured using the ENWORKS software.	**Business Link Providers,** Carbon Trust, EnviroWise,	●			N/A	N/A
Energy Skills Support development and retention of key energy skills, including those necessary to facilitate the move towards zero carbon development.	Skills development and retention will be essential if low carbon and energy technologies are to be realised and deployed. Without sufficient skills none of the above targets will be achieved.	**Sector Skills Councils**, Local Skills Partnerships, SEEDA	●	●	●	£100,000 to supplement core activities	Sector Skills Councils, Local Skills Partnerships, SEEDA
Public Sector Carbon Reduction Agree a common methodology for carbon calculation, and agree carbon reduction objectives across key organisations, and RES activities. To include the engagement of key regional partners with a significant property assets and land in the South East.	Key RES partners to contribute 5% towards the 2020 C02 reduction target.	**Sustainable Futures South East, South East Sustainable Energy Partnership**, NHS, SEEDA, Other Public Sector Bodies	●	●	●	£200,000 for studies £150,000 p.a. to establish and maintain ICT network	Partners within: Sustainable Futures South East and South East Sustainable Energy Partnership

Local Authority Carbon Management To work through sub-regional and local mechanisms spearhead reduction in the carbon footprint, particularly in relation to the built environment, local transport, energy efficiency and micro-generation. Demonstrate opportunities for enterprise and investment, as well as benefits in terms of local quality of life.	Draw together a raft of interventions and innovations in key areas of the South East where there is the opportunity to achieve maximum impact, and where there is a strong commitment from Local Authorities and Local Area Agreements to achieve their Carbon Management obligation. To contribute 5% towards the 2020 CO_2 reduction target.	**Local Authorities**, SEEDA, South East Sustainable Energy Partnership, South East based Climate Change Experts	●	●	●	£100,000 for feasibility studies, which will inform what level of investment is required for future years	SEEDA, South East Sustainable Energy Partnership
Behavioural Change Work with Forums and partners that have a wide membership base in order to close the attitude behaviour gap, particularly through recreation and tourism channels.	Reduce Carbon consumption and production through behavioural change. South East Forum for Sustainability organisations collective membership base alone has a population reach of about one million i.e. one eighth of the regions population.	**South East Forum for Sustainability**, National Trust	●	●	●	N/A	South East Forum for Sustainability

Action 11.5 – (New Action). Support initiatives that integrate local demand and supply of energy, with energy efficiency, building on exemplar projects in the region.

Activities	Contribution to the Target	Partner(s) (lead partner(s) in bold)	Timescales 07-08	 08-11	 12-16	Required Funding	Funding source(s)
South East Energy Service Companies Network To develop a network of Energy Service Companies (ESCOS) in the South East, building on the success of Woking Borough Council.	To contribute an additional 5% in the amount of renewable energy produced in the South East by 2020.	**SEEDA**, Government Office South East, The Regional Assembly, South East Sustainable Energy Partnership, Woking Borough Council	●			£50,000 (feasibility study)	SEEDA

Cross Cutting Issues	
Rural	• Need to encourage collaboration among key partners and businesses to increase energy supply from wood-fuel, energy crops, liquid bio-fuels and anaerobic digestion. • Establish collaborative networks of woodland businesses and necessary supply chains to deliver wood for local products, including for sustainable local construction.

Action 11.6 – New Developmental Action to reflect the policy shift from climate change adaptation to mitigation

Activities	**Contribution to the Target**	**Partner(s)** (lead partner(s) in bold)	**Timescales** 07-08	08-11	12-16	**Required Funding**	**Funding source(s)**
Climate Change Mitigation Develop a co-ordinated approach to climate change mitigation and climate change by: Agreeing a common methodology for carbon calculation Reviewing carbon reduction objectives across key organisations. Undertaking a Carbon impact study across all RES activities and agreeing targets for climate change mitigation. Undertaking an audit to identify leading expertise in the region and establishing an ICT network for collaborative working.	A regional Carbon Action Plan that supports the RES, and makes significant contribution to the Climate Change Implementation Plan supporting the South East Plan. Preparatory work to establish responsibilities and targets for all RES partners. Partners working on Global Competitiveness, Smart Growth , Transformational and Sub-Regional activities and partners to agree to work to carbon reduction targets.	**Sustainable Futures South East, South East Sustainable Energy Partnership**, SEEDA	●	●		£100,000	Partners within: Sustainable Futures South East, South East Sustainable Energy Partnership SEEDA

Influencing Policy Influence policy development at European and National levels.	Maximise the South East influence on climate change mitigation and adaptation policy and regulation.	**South East Office in Brussels,** South East based Climate Change Experts	●	●	●	N/A	South East based Climate Change Experts South East Office in Brussels

ANNEX 3: DATA FROM RESOURCES REPORT (2000)

INDICATIVE RENEWABLE ENERGY ELECTRICITY SUB-REGIONAL BREAKDOWN BY 2010 FOR THE SOUTH EAST (assuming a regional target of ca. 750MW)

Indicative Renewable Energy Generation Type/Size	Thames Valley (Oxon / Bucks / Berks)		Hampshire / Isle of Wight		Kent		Surrey / East & West Sussex		TOTAl	
	Schemes	Capacity(MW)	Schemes	Capacity(MW)	Schemes	Capacity(MW)	Schemes	Capacity(MW)	Schemes	Cap
Large CHP or Electricity Plants Fuelled by the Combustion of Energy Crops and/or Agricultural & Forestry Wastes (AfW) (15 MW)	1 Straw or Ch. Litter 1 Wood	15 15	2 Wood	30	0	0	1 Wood	15	5	
Small CHP Plants Fuelled by the Combustion of Energy Crops and/or AfW (5 MW)	3 Wood	15	4 Wood	20	2 Wood	10	3 Wood	15	12	
Anaerobic Digestion Plants Fuelled by Farm Biogas (0.5 MW)	3	1.5	3	1.5	2	1	2	1	10	
Anaerobic Digestion Plants Fuelled by Sewage Gas (0.5 MW)	2	1	1	0.5	1	0.5	2	1	6	
Offshore Wind Farms (50 MW; 20-30 Turbines)	0	0	1	50	2	100	1	50	4	
Small Wind Clusters (6 MW; 4-10 Turbines)	5	30	7	42	3	18	1	6	16	
Single Large Wind Turbines (1.5 MW)	4	6	4	6	4	6	4	6	16	
Single Small Wind Turbines/Chargers (0.03 MW)	15	0.45	10	0.3	15	0.45	10	0.3	50	
CHP or Electricity Plants Fuelled by Municipal or Industrial Solid Wastes [1]	2	40	4	41.5	1	40	3	30	10	
CHP or Electricity Plants Fuelled by Landfill Gas[2]	11	27	4	4	4	12	8	14	27	
Small-Scale Hydro Power (0.1 MW)[3]	5	0.5	0	0	3	0.3	0	0	8	

[1] Based upon existing and prospective Waste Authority plans across the South East
[2] Based upon prospective NFFO schemes

Domestic PV Installations (1.5-3kW$_p$)	810	2.1	700	1.85	640	1.7	1050	2.75	3200	
Commercial PV Installations (50kW$_p$)	25	1.25	8	0.4	12	0.6	15	0.75	60	
Motorway PV Installations (160kW$_p$/km)		0.6		0.25		0.3		0.45	10km	
TOTAL	**52 + PV**	**155**	**40 + PV**	**198**	**37 + PV**	**191**	**35 + PV**	**142**	**164 + PV**	

[3] Actual capacities may vary from the figures given but the numbers of schemes reflect the likely sub-regional balance of uptake
[4] In addition to which there are 42 schemes with an installed capacity of 74MW already in place within the South East

ANNEX 4: SE REGIONAL DEVELOPMENT MATRIX

	1kWe	Small Scale	500kWe		Medium Scale	10MWe		Large Scale	1GWe
Organisations	Domestic/ Community SMEs			Farm business units Small estates SMEs	Local Authority Public sector/NFP/ Developers/ Volume house builders		Utilities Private sector business		
Drivers	Utility Quality of Life Cost			Diversification Cost	Targets Fuel poverty Quality of life Cost		Profitability (bottom line) Security of supply CSR Diversification		
Other Agency Remit Focus	EST (mostly energy efficiency) Historically CRI			RDPE FC	LA DEFRA Carbon Trust European Commission		BERR Carbon Trust European Commission		
Project Type	Microgeneration Microheat	Microgrids (power and heat)		Stand alone	District Energy (DE)	Cooling	Combined Heat and Power (CHP) Trigeneration		Power Stations/ Farms
Technology / resources available	**GSHP Solar (thermal) Solar (PV) Wind (microgen) Heat: Wood (logs and pellets)** Low head hydro/ mills			GSHP Solar (thermal) Solar (PV) **Wind (single, cluster) Heat/ wood CHP& Trigen Energy crops AD** Low head hydro/ mills			**Wind (farms) Wind (off-shore) Wood (chips, particle, pellets) gasification** Biofuels (1st generation) **Energy crops**		
Waste (MSW)		Anaerobic digestion (AD)			Anaerobic digestion (AD) Landfill Gas (LFG) Incineration			Landfill Gas (LFG) Incineration	
Technical barriers		Supply infrastructure			Windspeed Supply Infrastructure			Windspeed Supply Infrastructure	

	1kWe	Small Scale	500kWe		Medium Scale	10MWe		Large Scale	1GWe
Non-technical barriers		Lack of installers/ service engineers Lack of information Lack of credibility Expensive			Planning Lack of information Supply constrained Lack of market (wood) Infrastructure cost, revenue risk (DE) Risk averse public sector lead Lack of champions			Planning Acceptable sites/ opportunities Lack of champions Cost over conventional fuel plant Infrastructure cost, revenue risk (DE) Risk averse public sector lead	
Priorities		Trained (local installers) Trained maintenance Credible equipment Installation/ capital grants and/ or feed in tariff Marketing/ awareness raising			Targeted information Exemplars (regional) Installation/ capital grants and/ or feed in tariff Commercial solutions (e.g. ESCOs)			Targeted discussions lead players Incentives packages Strategic linkages	
Technology/ R&D needed		Wind (microgen) Biomass CHP Hybrid solutions Fuel cells			Hybrid solutions Gasification and pyrolysis Tidal Wave Fuel cells			Biofuels (2nd generation) Gasification and pyrolysis Tidal Wave	

Current renewables generation	96.4 MWe and 0.9% 6.9 MWth		142.1 MWe and 1.3% 2.3 MWth	105 MWe and 0.9% 20 MWth	343.5 MWe and 3% 29.2 MWth	
Target 2010 10% electricity					620 MWe and 5.5% 1127.3 MWe and 10%	
Expected 2010	97.1 MWe and 0.9%		167.6 MWe and 1.5%	488.8 MWe and 4.3%	753.5 MWe and 6.7%	710.5 MWe and 6.3%
Target 2020 20% electricity					2254 MWe and 20%	