Progressing Renewable Energy in the SE of England

Project Reference: TV105

A Second Report to SEEDA: June 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

This report forms the second part of a two part study commissioned by SEEDA from TV Energy to set out a 'Road Map' for the SE Region to achieve its renewable energy targets as set out in the Regional Economic Strategy (RES) document.

In terms of targets, there is acceptance that by 2010 the region is likely to attain something of the order of 7% of electrical capacity being based on renewables. This falls short of the aspirational 10% that would be in line with national targets but there is insufficient time to change this outcome. Short term, the key is to make sure that all proposed large schemes actually come to fruition to avoid further attrition of the out turn. More important for the region is to focus on potential outcomes for 2020 where the region is likely to be asked by central government to reach 20% of regional electricity SUPPLY and 20% heat/ cooling SUPPLY coming from renewables. The expectation is that these figures are likely to increase over time, perhaps doubling for electricity generation, as the full force of international agreements get translated to the regions for delivery. Transport is something of a conundrum at present and the suggestion is to await further developments (but pencil in the currently required 10%). ***Meanwhile, a blanket '20% of primary energy supply' would seem an appropriate 2020 target for the region to achieve with renewables.***

Based on existing power stations and other facilities the region will need to achieve the following energy contribution from renewables:

TWh/yr	Total supply	20% RES
ELECTRICITY	63.8	12.8
HEATING	84.2	16.8
ROAD TRANSPORT	*78.6*	*15.7*

The main emphasis of the report focuses on the practical steps that need to be taken in the short and medium term to allow the region to attain such an outcome by 2020. The report details the number of projects needed by scale (very large through to small/ micro generation) and by technology.

Two differing scenarios have been set out to illustrate the scale and timing of bringing on the different renewables resources and technologies that will yield the required energy contribution. They are basically:

- Extrapolating from the mix that might be expected based on the last resource analysis carried out in 2000 ('Harnessing the Elements')
- Interpreting the mix based on the success or failure of technologies to deliver to date

In essence the first is a high biomass (wood) scenario, the second a high wind energy scenario coupled with extensive take up of anaerobic digestion (also a biomass technology***). At this scale of deployment there will be few towns and villages in the SE***

that by 2020 will not have a biomass energy scheme, a wind turbine or two close by coupled with extensive solar technology for housing and offices.

Each scenario has its many challenges (technical, non-technical and political) but to note that for the high wood fuel scenario, the ability of existing wood land resources in the region to supply is rapidly exhausted. To maintain a local/ regional supply will require extensive and urgent investment in energy crops (e.g. short rotation coppice or Miscanthus) and more generally in wood fuel supply infrastructure. The table below illustrates the extent of the call on land:

	Existing woodland* odt/ha/a	SRC requirement (balance) odt/ha/a	Hectares of land required for SRC	% of total agricultural land in SE
High biomass	552,000	6,587,000	659,000	55%
High wind	552,000	1,013,000	101,000	8.5%

Such deployment moves into the territory of the politics of land use for the production of sustainable food as well as energy. (Note that the call for land to produce crops for liquid biofuels production must also be taken into account.) In addition, is the extensive call on the region's land bank for domestic and commercial developments. ***SEEDA should consider devising a 'Land Use Strategy' that would seek to balance all stakeholder needs which would sit alongside the RES.***

Whichever scenario is assumed, large scale deployment of renewables will yield significantly high CO_2-equivalent savings. These are illustrated for electricity-generating components below:

1,000 t/CO2/a saved	Scenario 1	Scenario 2
Biomass	2,860	705
On-shore wind	776	1,043
Biogas	487	1,755
Solar (PV)	44	84
Hydro	9	15
Off-shore wind		
Wave & tidal		
Co-firing		
Landfill gas	1,587	3,025
TOTAL	**5,763**	**6,625**

The rate of deployment will be a very critical issue given the large number of projects that are needed. Assuming that financial resources are not a limiting step or planning permission, then the rate at which the industry can build and complete will become the

key determining step. ***Hence, SEEDA will need to invest in building the regional industry base to deliver the goods.***

Utilities can be relied upon to deliver the few but highly necessary, large projects and perhaps a proportion of the larger medium scale. No doubt that the vast number of small projects will be difficult to achieve and installer training for SMEs will be essential. However, a shortfall here is unlikely to make a significant difference to meeting targets overall. ***The key will be to ensure that medium to large scale developments can be kept on track and deliver.*** In particular, energy distribution schemes where Combined Heat and Power CHP) might be incorporated into new and regenerated towns and cities. Such schemes if deployed at a significant level with help to achieve both the electricity target but also the heat/ cooling target which otherwise will be extremely difficult to attain.

The report briefly covers the skills and training shortages which are already constraining the industry and will be a further impediment to wide scale adoption as time goes by. **SEEDA might seek to work with the industry, particularly the larger corporates and utilities, to train more engineers, fitters and key personnel to help satisfy these needs taking advantage of early project deployment.** The prospects for job and business creation are extensive for the SE region. Given European projections, in excess of 10,000 new jobs might be created by 2020.

The report goes on to consider how SEEDA might manage the programme required to attain the targets. Bringing significant resources to bear along with using influence will be critically important if the exceptional targets that are required are to be met. ***The reality is that SEEDA resources alone will not be anywhere near enough for the task ahead.*** Essentially, SEEDA must look to work in partnership with external bodies and use its funding to gear up the necessary resources.

The report sets out four coordination/ management models that SEEDA might consider, namely:

- 'Business as usual' working with a loose affiliation of a variety of agencies across the region
- Internal SEEDA coordination with use of 'seconded in' experts
- Establishment of an 'arms length' dedicated organisation to coordinate region wide activities and direct local agencies
- Partnering with a leading utility type organisation

The recommendation is that medium to long term one of the two latter options should be adopted to focus efforts and to act as a single portal for information. The table below illustrates the likely ability of each method for drawing down the necessary additional resources to achieve critical momentum/ funding.

Ability to draw in additional resources

Model\ Scale	Large	Medium	Small
BAU	Poor	Poor	Limited
In-house	Limited	Limited	Limited
Arms length	Good	Excellent	Excellent
Utility partner	Excellent*	Good*	Good

**Issue of independence would need addressing*

Finally, the report sets out a blow by blow listing of actions that should be undertaken to get the SE moving towards targets. Actions are subdivided by scale/ host or facilitator group. The main SEEDA investment should be targeted at the medium to large scale.

If SEEDA was looking to focus on three main themes then these should be:

- Establishing and actively managing relationships with the larger utilities and developers so facilitating the more rapid and wider scale introduction of 50MWe+ renewables schemes in the region (as compared to other regions)
- Investing in a series of exemplar medium to large scale energy distribution schemes with beacon/ diamond local authorities and developers as well as providing ongoing project management to maximise the benefit to the region
- Providing community scale technical support across the region to facilitate smaller scale projects, promote a positive view of renewables and to manage the 'hearts and minds' actions.

1.0 BACKGROUND

The phase 1 part of this study set out the evidence base for discussions on existing and projected renewable energy contributions for the SE region. The major findings of the study were reported back to a workshop organised by SEEDA on 29th February 2008 concerning the 'draft action plan for Target 11 Climate Change and Energy'. The feedback gained included:

- Endorsement of the approach to consider large, medium and small/ microgeneration facilities and opportunities
- Agreement that the greatest contribution towards targets would come from the largest 'utility type' players and it was of critical importance to achieve and early and sustained dialogue with senior figures
- Medium scale was seen as an area that SEEDA could influence substantially and seek close alliance with 'Diamonds' and others
- Agreed that the skills need was most critical for progressing the small scale
- But agreement that all scales were important and that all should be taken forward (including 'community' style actions)
- Endorsement of the close linkage between renewables and waste management particularly for biomass technologies
- Observation that the value of biomass was also in the net carbon sink (or sequestration) that was created for existing woodland but more importantly, with the extensive cultivation of energy crops such as coppice (SRC)
- Consensus on the need for greater coordination of efforts across the region for renewables implementation and facilitation perhaps involving an arms length body for SEEDA
- A 'look forward' to seeing how many projects and of what types might be necessary to reach the targets discussed (early scenario analysis)

In papers tabled, SEEDA outcomes during Corporate Plan period accepted that:

- 760MWe renewable energy installed by 2010, around 7% of regional electricity supply [pro rata target would be 1,170MW capacity to deliver 10% supply]

1.1 PROGRAMME OF WORK

The following programme was agreed between TV Energy and SEEDA:

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 II.

Additionally, given the feedback and discussions emerging from the workshop, the study will commence with some limited scenario analysis to make clear what will be needed for the region to meet its targets. More analysis would be useful but cannot be achieved within the limited nature of this first appraisal.

2.0 RENEWABLE ENERGY CONTRIBUTION & TARGETS

National targets for renewables remain fluid and relate to various international agreements and discussions. Arguably, the European commitments hold most sway and the UK has currently agreed to seek to attain a 15% primary energy contribution from renewables by 2020 (making an EC wide target of 20% by 2020). The logic being that thereafter targets will no longer be necessary as renewables will have become 'mainstream'.

In order to reach 15% of primary energy, BERR is indicating that the UK will need to attain of the order of:

- 20-25% of heat (and cooling)
- 40-45% of electricity production
- 10% transport fuels

The reason for the greater emphasis on power and heat is the intractability of getting major contributions for transport fuels. Current initiatives are steeped in technical, environmental and political differences where related at least to first generation fuels.

Nevertheless, SEEDA must draw from this the fact that even greater efforts will be required to move the region forward in a way that will be expected by central Government but also local stakeholders.

2.1 Review latest renewable energy targets

There is acceptance that by 2010 the region is likely to attain something of the order of 7% of electrical capacity being based on renewables is sensible. There is insufficient

time to change this outcome in a positive way given the length of time taken to get new (and particularly large) projects up and commissioned. Short term, the key is to make sure that all proposed large schemes actually come to fruition or even this modest figure could be unpicked.

We know in detail the likely make-up of the renewables contribution based on the SEE-STATS database entries. The region is highly reliant on wind, wood and waste.

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	145	66
On-shore wind (large)	111	11
Biomass co-firing	65	2 (Didcot, Kingsnorth)
Biomass (dedicated)	40	1 (Slough Heat & Power)
Others	9	>250
TOTAL	**762**	**>332**

The sub-regional split is as follows:

Sub-region	Contribution MWe
Thames Valley	185
Hants & IOW	25
Kent	139
Sussex	23
Not attributable	390

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.

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**

Slough Heat and Power will continue to dominate the regional picture in the short term both directly (its own production) and through initiatives with TV Energy to build up local supply infrastructure.

3.0 RENEWABLE REGIONAL SCENARIOS 2020

Given what has already been said, the minimum targets that the region is likely to be asked to reach by central government in order to 'do its bit' will be 20% of regional electricity SUPPLY and 20% heat/ cooling SUPPLY. The expectation is that even these figures are likely to increase over time, perhaps doubling for electricity generation, as the full force of international agreements get translated to the regions for delivery. Transport is harder to call and the suggestion would be to await further developments. Transport fuels will not be considered further here. ***Meanwhile, a blanket '20% of supply' would seem an appropriate positioning.***

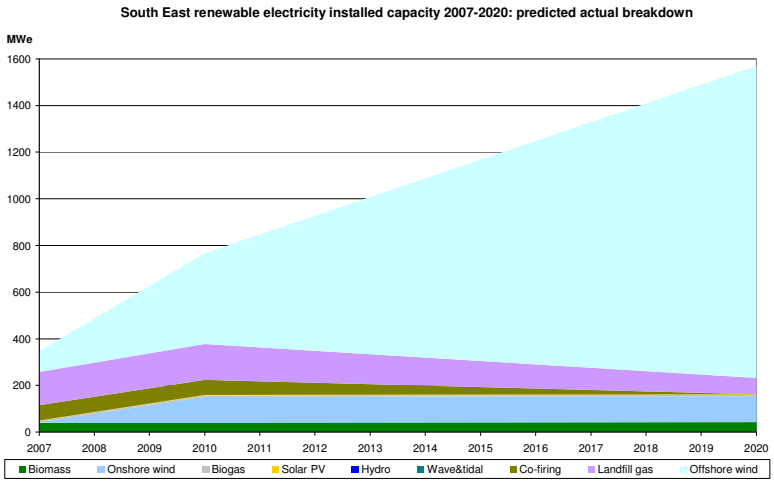
Based on existing power stations and other facilities the region will need to achieve:

TWh/yr	Supply	20%
ELECTRICITY*(1)*	63.8	12.8
HEATING*(2)*	84.2	16.8
ROAD TRANSPORT(3)	*78.6*	*15.7*

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.

3.1 Supplying 20% renewables electricity

Based on existing entries into SEE-STATS we can show the balance between contributing technologies/ sources to date. Phase 1 gives detailed analysis of the current mix and drivers, as illustrated below:



Not to underestimate the scale of the challenge, this will mean a very substantial increase over what we currently have to get to a minimum 20% supply by 2020.

To illustrate this challenge and to provide a further rationale for the proposed programme of activities and the emphasis given to differing elements, two diverging scenarios have been generated. Crudely, these approximate to:

- Extrapolating from the mix that might be expected based on the last resource analysis carried out in 2000 ('Harnessing the Elements')
- Interpreting the mix based on the success or failure of technologies to deliver to date

In essence, theoretically we would expect that biomass (wood mainly) coupled with wind (on and off shore) would be the major resources that would deliver targets. The appropriate technologies would be expected to each deliver a significant fraction, approximately 33% apiece. Other technologies might 'make up the numbers'.

The reality is that biomass has been much more intractable than was once believed (see phase 1 report) and is likely to only deliver a fraction of its potential over the next several years, even that will need to be hard won. On-shore and off-shore wind must do more and the 'others' must be made to work harder and faster. We believe there is a particular opportunity for Anaerobic Digestion (AD) to play a significant part in this and of all the technologies appears relatively modest in its deployment under scenario 1.

The table below sets out the resource contributions by way of installed capacity for the two scenarios. Note the difference in MWe installed is higher for scenario 2. This is because of the differing technology mix and greater emphasis in scenario 2 on wind energy that has a correspondingly lower 'capacity factor' (reflecting the reality that fewer units of energy are produced from a wind turbine than from a biomass facility of the same MW rating, for example).

Resource \ Scenario MWe	**Scenario 1**	**Scenario 2**
Biomass	**1,255**	**309**
On-shore wind	**1,085**	**1,457**
Biogas	147	529
Solar (PV)	129	249
Hydro	3.8	6
Off-shore wind	**1,539**	**2,939**
Wave & tidal	41	80
Co-firing	0	0
Landfill gas	70	70
TOTALS	**4,270**	**5,639**

So, what do these figures mean in reality? How stretching are these numbers? In the phase 1 report an indication of the proportion of electricity that might be derived from

differing scales of project was set out. This made the point that only by deploying larger schemes could the region hope to reach target. Taking an in-depth look at how such technology might be deployed allows the following picture to be drawn illustrating what the real challenge is for the region in order to make 20% renewables supply. We have split 'large scale' further into very large and large to aid analysis.

The following illustrations show the requirement for NEW facilities to reach targets.

BIOMASS RESOURCE: Our calculations show that a 'politically acceptable' limitation on biomass will be exceeded under scenario 1 in order to satisfy fuel needs from within the region. This matter will be explored in greater detail later.

Illustrations for scenario 2, switching emphasis away from biomass/ wood, are juxtaposed with scenario 1. The 'slack' from biomass is taken up by wind energy and larger or additional farms must be accommodated.

Very Large Scale (>50MWe)

	SCENARIO 1			SCENARIO 2		
Resource \ Scenario	**MWe/ project**	**Number needed**	**Total MWe**	**MWe/ project**	**Number needed**	**Total MWe**
Biomass	**50**	**9**	**450**	**50**	**1**	**50**
On-shore wind	**60**	**4**	**240**	**100**	**4**	**400**
Biogas	0	0	0	0	0	0
Solar (PV)	0	0	0	0	0	0
Hydro	0	0	0	0	0	0
Off-shore wind	**100**	**2**	**200**	**200**	**8**	**1,600**
Wave & tidal	0	0	0	0	0	0
Co-firing	0	0	0	0	0	0
Landfill gas	0	0	0	0	0	0
TOTALS		**15**	**890**		**13**	**2,050**

BIOMASS:	This will require a large biomass CHP facility per every town/ city with more than 100,000 population (see Annex 1 for list). Southampton the largest, Crawley the smallest.	Just one large facility preferably associated with a large town or city and preferably CHP.
ON-SHORE WIND:	One additional wind farm per sub-region (NUTS2 categorisation).	One additional (larger than for scenario 1) wind farm per sub-region (NUTS2 categorisation).
OFF-SHORE WIND:	Two additional off-shore wind farms.	Eight additional off-shore wind farms (double that of scenario 1).

Large Scale (5 – 49 MWe)

	SCENARIO 1			SCENARIO 2		
Resource \ Scenario	**MWe/ project**	**Number needed**	**Total MWe**	**MWe/ project**	**Number needed**	**Total MWe**
Biomass	**12**	**31**	**372**	**5**	**9**	**45**
On-shore wind	**18**	**14**	**252**	**36**	**14**	**504**
Biogas	0	0	0	0	0	0
Solar (PV)	0	0	0	0	0	0
Hydro	0	0	0	0	0	0
Off-shore wind	0	0	0	0	0	0
Wave & tidal	**5**	**8**	**41**	**5**	**16**	**80**
Co-firing	0	0	0	0	0	0
Landfill gas	0	0	0	0	0	0
TOTALS		**53**	**665**		**39**	**629**

BIOMASS:	This will require a medium scale biomass CHP facility per every town/ city with more than 50,000 population (see Annex 1 for list). Gillingham being the largest and Esher the smallest.	Considerable scaling back of expectations but this scenario will still require a medium scale biomass CHP facility per every town/ city with more than 100,000 population (see Annex 1 for list). Southampton the largest, Crawley the smallest.
ON-SHORE WIND:	One additional wind farm per county/unitary (NUTS3 categorisation).	Doubling the number of projects to two additional wind farms per County (NUTS3 categorisation).
WAVE & TIDAL:	One new wave or tidal station per 200km of coastline.	Doubling the number of projects or one new wave or tidal station per 100km of coastline.

Medium Scale (1 – 4.9 MWe)

	SCENARIO 1			SCENARIO 2		
Resource \ Scenario	**MWe/ project**	**Number needed**	**Total MWe**	**MWe/ project**	**Number needed**	**Total MWe**
Biomass	**3**	**112**	**336**	**1**	**143**	**143**
On-shore wind	**4.5**	**67**	**302**	**4.5**	**67**	**302**
Biogas	**2**	**40**	**80**	**2**	**152**	**304**
Solar (PV)	0	0	0	0	0	0
Hydro	0	0	0	0	0	0
Off-shore wind	0	0	0	0	0	0
Wave & tidal	0	0	0	0	0	0
Co-firing	0	0	0	0	0	0
Landfill gas	0	0	0	0	0	0
TOTALS		**219**	**718**		**362**	**749**

BIOMASS	This will require a medium scale biomass CHP facility per every town with more than 10,000 population and less than 50,000 (see Annex 1 for list). Horsham being the largest and Chertsey the smallest.	This will require a smaller scale biomass CHP facility per every town with more than 10,000 population and less than 100,000 (see Annex 1 for list). Gillingham being the largest and Chertsey the smallest.
ON-SHORE WIND	One additional wind farm per each Local Authority area.	One additional wind farm per Local Authority area
BIOGAS	One additional biogas facility for every town over 50,000 population and less than 100,000. Gillingham being the largest and Esher the smallest.	A much greater deployment of this technology/ resource. One additional biogas facility for every town over 10,000 population and less than 100,000. Gillingham being the largest and Chertsey the smallest.

Small scale (<1 MWe)

	SCENARIO 1			SCENARIO 2		
Resource \ Scenario	**MWe/ project**	**Number needed**	**Total MWe**	**MWe/ project**	**Number needed**	**Total MWe**
Biomass	**0.2**	**282**	**56**	**0.1**	**282**	**28**
On-shore wind	**0.5**	**282**	**141**	**0.5**	**282**	**141**
Biogas	**0.3**	**244**	**73**	**0.3**	**731**	**219**
Solar (PV)	**0.0015**	**82,200**	**123**	**0.0015**	**164,400**	**247**
Hydro	**0.05**	**73**	**3.7**	**0.05**	**125**	**6**
Off-shore wind	0	0	0	0	0	0
Wave & tidal	0	0	0	0	0	0
Co-firing	0	0	0	0	0	0
Landfill gas	0	0	0	0	0	0
TOTALS	**-**	**83,081**	**396.7**		**165,820**	**635**

BIOMASS	This will require a small scale biomass CHP facility per every town with more than 1,500 population. Shepperton being the largest and Steventon the smallest.	This will require a smaller scale biomass CHP facility per every town with more than 1,500 population (size halved from scenario 1). Shepperton being the largest and Steventon the smallest.
ON-SHORE WIND:	One additional wind turbine per village.	One additional wind turbine per village (as per scenario 1).
SOLAR PV:	1 additional PV array per every 40 households.	1 additional PV array per every 20 households.
BIOGAS:	One additional biogas facility for every 4,000 cattle or pigs farmed.	One additional biogas facility for every 1,000 cattle or pigs farmed (threshold reduced by x4). In addition, food and drink processing wastes will make a major contribution alone and in hybrid facilities with animal wastes.
HYDRO:	A new scheme for every 60km of river or stream.	A new scheme for every 35km of river or stream.

CARBON SAVINGS

The scenarios will generate the following CO_2-equivalent savings (electricity-generating components only):

1,000 t/CO2/a saved	Scenario 1	Scenario 2
Biomass	2,860	705
On-shore wind	776	1,043
Biogas	487	1,755
Solar (PV)	44	84
Hydro	9	15
Off-shore wind		
Wave & tidal		
Co-firing		
Landfill gas	1,587	3,025
TOTAL	**5,763**	**6,625**

Assumptions:

Table A - Technology factors	Emissions factor, tCO2/MWh
Biomass elec commercial	0.025
Onshore wind	0
Biogas elec commercial	0
Solar PV	0
Hydro	0
Offshore wind	0
Wave & tidal	0
Co-firing	0.025
Landfill gas	0
UK electricity grid	0.43
Natural gas	0.19

BIOMASS RESOURCE (WOOD)

A technical limitation for wood fuel (and for that matter any biomass) will be the size of the accessible or practicable resource. The SE has a very limited ability to supply the very large volumes of material that will be required under the various scenarios under consideration – even for just electricity! Of course, biomass could be imported to the region but with concomitant implications for local sustainability and carbon savings. This is a complex topic and will not be considered further here due to a lack of time.

The amounts of biomass required for the two scenarios along with the land take needed for energy crops are as follows:

	Existing woodland* odt/ha/a	SRC requirement (balance) odt/ha/a	Hectares of land required for SRC	% of total agricultural land in SE
Scenario 1	552,000	6,587,000	659,000	55%
Scenario 2	552,000	1,013,000	101,000	8.5%

* Estimated sustainable yield (Forestry Commission data) from SE Region.
** Based on 10 odt/ha/a yield (TV Bioenergy Coppice data).

Note that existing woodland can only supply a fraction of the resource required under either scenario, so the assumption must be that ALL available resource is mobilised early on and the necessary supply infrastructure established. Note also that this category includes arboricultural arisings and primary processing co-products. ***This point emphasises the need for:***

- ***the rapid establishment of a region wide and integrated wood fuel supply structure***
- ***significant and urgent action in the region for energy crop establishment. Not to be forgotten is that SRC has a four year lead time meaning that crop to feed projects to be up and running to meet the 2020 target deadline will need to be in the ground in 2016 – coincidentally the proposed year to be used to ensure that the RES strategy is 'on course'.***

Biomass supply is a complex topic and there is insufficient time to explore this matter further in Phase 2.

HYBRID BIOMASS PROJECTS

A 'purist' approach has been used in this analysis and energy from waste has not been included in any of the projections. In reality, hybrid facilities taking wastes as well as clean biomass will likely emerge (although the local politics are against currently). Such facilities could add significantly to both power and heat production. Such projects and the contribution will not be considered here.

Likewise the use of biomass with fossil fuels or 'co-firing' will not be considered. A few such facilities do exist currently in the UK (and the region). The short term prognosis is that such use and contribution will diminish unless Government incentivise the large power producers to use biomass. The analysis has prudently assumed that this will not happen and new co-firing facilities will not come on stream.

SUB REGIONAL ANALYSIS

Making sense of these scenarios can be in part (for biomass and solar) be accomplished by reference to where the centres of population arise. These are set out in aggregated form below. Further analysis is not possible under this phase.

Table 1 - Number of urban areas in SE, by 2001 population[1]

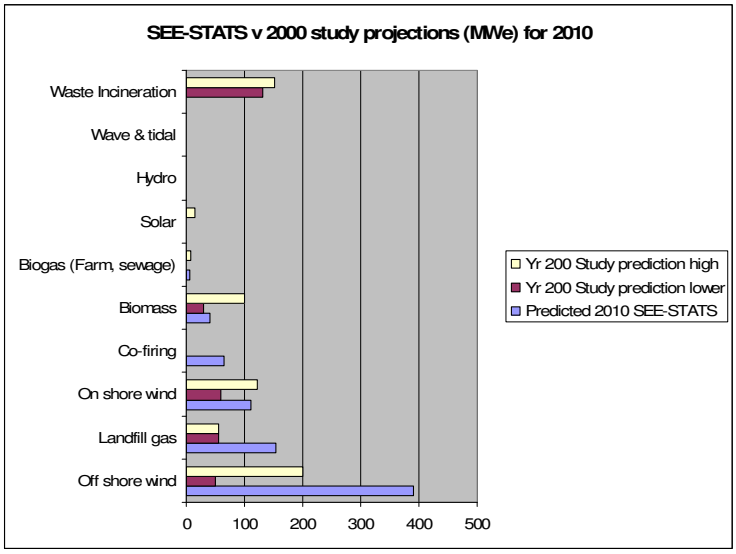
Sub-region	1,500 - 10,000	10,000 - 50,000	50,000 - 100,000	Over 100,000	All towns
Hampshire	53	23	7	2	85
Isle of Wight	68	24	8	0	100
Kent	38	20	5	3	66
East & West Sussex	123	45	11	4	183
Thames Vly. & Surrey					
Total SE	**282**	**112**	**31**	**9**	**434**

REALITY CHECK

It is worth bearing in mind that the 'art' of predicting actual technology contributions 12 years ahead is dubious. Second guessing Government policy, regulations and incentives is always fraught with difficulty and can massively influence outcomes. Coupled with this are advances in technology and changes in the market place.

In addition, the 20% supply figure is in reality a moving target as supply and consumption are both dynamic (Doubtless that projected growth in population and enterprises will put increasing pressure on the need for a commensurate greater energy supply.) However, given an aggressive energy efficiency programme any increased requirement could be managed and the expectation is that energy consumption per capita, should be reduced.

The predicted against the actual contribution for 2010 based on 2000 work is shown below. The actual outturn is acceptable but the mix is variable!



[1] Office for National Statistics (2004), 'KS01 Usual resident population: Census 2001, Key Statistics for urban areas', http://www.statistics.gov.uk/statbase/Product.asp?vlnk=12634&image.x=21&image.y=11

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.

3.2 Supplying 20% renewables heating/ cooling

There is insufficient time to carry out a detailed analysis of heat production across the region. However, SEE-STATS continues to track existing and proposed projects so further analysis can be carried out in the future. Electricity generation has been used as the major route to illustrating the scale of what needs to be achieved.

Nevertheless, heat production (and cooling provision) is also critical to the region's success in delivering on targets. Fewer technologies are appropriate than for electricity with biomass being the most important.

The scenario analysis used is based on the power generation scenarios above. This is essential since a major part of the heat that is needed will be generated by using CHP (Combined Heat and Power) for biomass/ wood fuel. ***The following analysis assumes that the heat from all biomass generation is made use of.*** This is a critical factor in the analysis. Should remote, power only facilities be constructed or projects where only a proportion of the heat is used then these figures will be an over estimate. The calculations are based on the following conversion factors. Note far more heat than power is generated using existing technologies at appropriate scales:

Heat:electricity output ratio for CHP	Heat: electric ratio	Waste	Electrical conversion efficiency	Heat conversion efficiency
CHP >5 MW	2	0.07	0.31	0.62
CHP 5-49 MW	3	0.20	0.20	0.60
CHP 1-4.9 MW	3	0.20	0.20	0.60
CHP <1 MW	4	0.25	0.15	0.60

The heat generated by the power projects will result in the following equivalent installed capacity (plus other sources by technology):

Resource \ Scenario MWth	Scenario 1	Scenario 2
Biomass	3,250	777
Biogas	533	1,789
Solar (thermal)	?*	?*
Ground/air source heat	?*	?*
TOTALS	**>3,782**	**>2,566**

*It is extremely difficult to estimate existing and future levels of uptake of solar, air and ground source heating, and has not been attempted here.

This will yield for the two most important resources (solid and gaseous biofuels) the following contributions per scenario:

TWth	Scenario 1	Scenario 2
Biomass/ wood	22.8	5.4
Biogas / AD	4.1	13.8
TOTAL	**26.9**	**19.2**

The 20% contribution needed for 2020 is 16.8 TWth of heat. ***Hence, it can be seen that even under the 'reduced biomass' scenario the amount of renewables heat is more than achieved.***

This might lead one to think that it is only important to deliver on power generation and that the heat target will automatically be delivered. This would be a mistake for several important reasons:

- Most biomass projects will only make partial use of the heat generated, particularly the largest of projects, so the figures above will represent an over estimate
- Most biogas projects require a high proportion of heat to maintain the process of bacterial activity (mesophilic at 35 degrees C, themophilic at 55 degrees C) so again the figures will be an over estimate of what is 'usable heat'
- Biomass and biogas 'early wins' at small and medium scale will mostly be heat only projects since these are the most economic and it is these that will open up the market at these scales and start to develop the supply infrastructure
- Other technologies such as solar thermal and even Ground Source Heat Pumps (although not strictly a renewables technology) will make important contributions in satisfying domestic and community energy needs

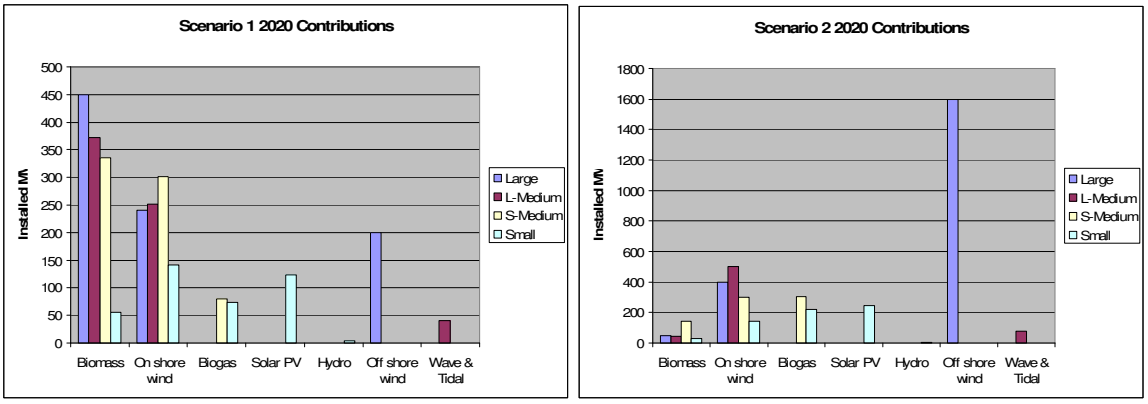
Not to be forgotten are the significant additional carbon savings achieved as set out below.

1,000 t/CO2/a saved	Scenario 1	Scenario 2
Biomass / wood	4,808	1,100
Biogas / AD	867	2,912
TOTAL	**5,675**	**4,012**

This does not take into account the important additional 'carbon sink' action of managing and planting new areas of energy crops, carbon being stored in the ground. ***This is a complex area that deserves greater study and application within the region.*** There is insufficient time to consider this further here.

3.3 Summary of scenario analysis

The scenarios used here provide two very different resource/ technology based outcomes to attain the required 20% supply target. This can clearly be seen from examining the charts below. In particular, observe the swing from biomass to off-shore wind as the leading provider from scenario 1 to 2.



The other point to understand is the degree of flexibility provided by different solutions. Biomass delivers across the spectrum of scale whereas off-shore technology is a big hitter – it has to be because of the scale of the investment needed. Not to be forgotten is that biomass also is a major contributor to renewables heat.

The number of projects to deliver the various targets is also very significant. From one extreme, that of solar PV where thousands of house scale projects are needed to provide a modest overall contribution, to off-shore wind where just a few very large projects are needed. The table below illustrates the point for the two scenarios considered.

Many other illustrations might be provided but these two scenarios make the point concerning the scale of need both in individual project size and the numbers involved.

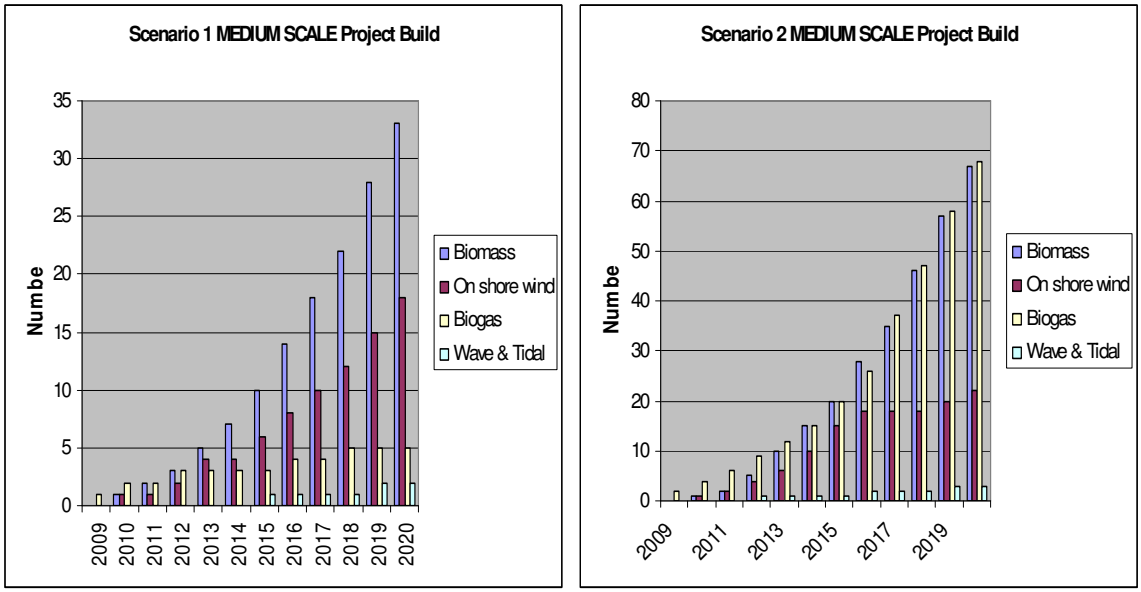
	Nos Very Large	Scenario 1 Large	Medium	Small	Nos Very Large	Scenario 2 Large	Medium	Small
Biomass	9	31	112	282	1	143	143	282
On shore wind	4	14	67	282	4	67	67	282
Biogas			40	244		152	152	731
Solar PV				82,187				164,374
Hydro				73				125
Off shore wind	2				8			
Wave & Tidal		8				16		
TOTALS	15	53	219	83,068	13	378	362	165,794

There should be few in the region by 2020 that do not have a local renewables facility of one kind or another. Hence, the importance of winning the 'hearts and minds' battle with local communities so that deployment is not held up by futile and time consuming local actions.

The rate of deployment will be a very critical issue given the large number of projects that are needed. If we assume that financial resources are not a limiting step or planning permission, then the rate at which the industry can build and complete will become the key determining step. Hence, SEEDA will need to invest in building the regional industry base to deliver the goods.
Utilities can be relied upon to deliver the few but highly necessary, large projects and perhaps a proportion of the larger medium scale. No doubt that the vast number of small projects will be difficult to achieve and installer training for SMEs will be essential. However, a shortfall here is unlikely to make a significant difference to meeting targets overall. ***The key will be to ensure that medium scale developments can be kept on track and deliver.***

The following diagrams chart the rate at which new medium scale projects need to come on stream if the 2020 target is to be met. Note that this charts the number of new projects needed per annum. The assumption is that the industry will scale up as time goes by. For this to happen, the industry must continue to get the signal from central Government that renewable energy targets are progressive. Failure here will mean that the industry will not invest sufficient resources and the industry will be incapable of delivering more and more projects.

The switch away from very large scale biomass (as set out in scenario 1) means even greater pressure on delivering smaller scale biomass projects (scenario 2) as well as anaerobic digestion facilities



SEEDA will need to use its resources to stimulate the first tranche of medium scale projects working with partners (LAs and the private sector). If this does not happen, the rate of build will be much slower and what is a most challenging target becomes an impossible target to achieve.

3.4 Skills and training needs

SEEDA should concentrate on the most important training requirements to stimulate project implementation and to sustain those projects once commissioned. Needs are divided into technical and non-technical.

TECHNICAL
Scale is again an important theme, as is technology. The large and very large projects will be built by utilities and large project developers who will be driven by regulation and 'bottom line' issues. They have the scale and stretch to be able to resource their needs from an international reservoir of existing talent. I see SEEDA's role here as supportive.

There is, however, a very important opportunity that SEEDA might wish to pursue when a dialogue with the large players is established. That is to draw in local skilled people who do not have the particular renewables exposure but are otherwise very competent in their particular trade. SEEDA might for example support a scheme to cover the costs of local people 'learning on the job' by working alongside experienced

operatives drawn in from overseas to install local projects. SEEDA might wish to go further and to sponsor engineers, graduates etc. to spend time overseas with companies that regularly manufacture and install. ***Such transfer of technology skills would be a major benefit to the regional economy medium to long term and could catalyse the establishment of local businesses.***

Any other investment by SEEDA should be targeted directly on the medium and small scale project requirements. This is where SEEDA can also expect to be able to invest in developing local talent that may well go on to establish sizable business enterprises within the region.

The following skills shortages are already apparent and will get worse as the rate of project installation increases:

QUALIFIED ENGINEERS (M&E) and ENVIRONMENTAL ADVISORS: To carry out pre and full feasibility assessments for sustainable energy projects drawing on a range of technology producing 'hybrid' energy solutions.
QUALIFIED ENGINEERS (M&E): To oversee project installation and commissioning.
QUALIFIED ENGINEERS (M&E): To maintain and repair existing systems.

At a very local level, in order to mainstream renewables and to achieve the many thousands of installations necessary, engineers will need to be supported by PLUMBERS, ELECTRICIANS, BOILER INSTALLERS, FITTERS that will carry out the actual work and will more than anything else PROMOTE the technologies. Until local artisans understand and are comfortable with renewables technology they will not push change from tried and tested gas, oil and coal systems.

The skills sets will vary with technology – installing a large wind turbine or a flat plate PV array or an anaerobic digester or a biomass boiler obviously varies considerably. Finding those that can understand the full range of technologies is even more demanding, but an essential prerequisite if we are to get the best systems installed at all scales.

Last but not least, biomass has special requirements in fuel preparation. Support will be needed from SEEDA to help provide training to a range of potential suppliers of wood fuel for example. Without assistance it is very unlikely that the necessary supply chains will establish in a timely fashion and be fit for purpose to deliver a quality and consistent fuel to supply projects on the timescales envisaged.

NON TECHNICAL
Training and site visits to address non technical barriers that are preventing project implementation remains a critical area. Although times are changing there is still a need to reach out to PLANNERS and to LOCAL ELECTED MEMBERS – those that bear the responsibility for approving or blocking project developments.

ARCHITECTS AND DEVELOPERS need to be encouraged to work with new technology and seek sustainable energy solutions. Facilitating interactions on a project basis (exemplars?) should be encouraged across the industry.

Raising awareness with the general public is also highly desirable but is probably best addressed centrally by government. Such matters should form part of any dialogue with BERR etc.

3.5 Business creation and employment generation

Business creation has been touched upon in the section above and elsewhere in the document. There is not doubt that the potential is very significant given the wide range of market opportunities that exist. Projections by the European Commission estimate that more than 2 million new jobs might be created by 2020 in the EU15 alone. All studies identify the biomass/ biofuels areas as offering the most scope for future employment and business creation. (This relates to the need for people to be deployed into the diverse areas of biomass fuel supply/ growing, preparation, transport, storage as well as end use – differentiating this technology.)

	2010 full-time jobs*	2020 full-time jobs*
Wind	184,000	318,000
Photovoltaic	30,000	245,000
Biomass	338,000	528,000
Biofuels	424,000	614,000
Small Hydro	15,000	28,000
Geothermal	6,000	10,000
Solar Thermal	70,000	280,000
TOTAL	**1,067,000**	**2,023,000**

NOTE: Jobs are direct and indirect, accounting for any job losses in the conventional energy sector.

Considerable additional jobs might also be created by supplying technology for export.

On the basis of these reports and the positioning of the SE, it is not inconceivable that in excess of 10,000 new jobs might be created and many thousands more secured. There is not time to delve into this matter further but national studies have been carried out by BERR and can be accessed through their website. SEEDA may wish to carry out further research within a future programme to help target future emphasis.

An illustration of other research for the UK is a study has been carried out for Scotland (http://www.ejscotland.info/skillsforrenewableenergyreport.pdf.pdf) This study identified 27 skill sets in the renewables sector. Most jobs would be at the experienced

craft, technician or graduate level and above. A few jobs would be for semi-skilled levels and there is the long term possibility of 'entry-level' job creation.

Currently 7,000 jobs are estimated for the sector with expectations of a double digit percentage growth to reach a value of £3.7 billion by 2010 and £7.5 billion by 2015 (15%/annum is used for forward forecasts).

New business creation is always exciting but SEEDA should also recognise the need for many existing energy related businesses to diversify into this field or even to change their business altogether. A local example might be a Coal Merchant who moves into the supply of wood fuel – initially as an 'add on' but in time perhaps the mainstay of the business. Likewise a timber grower who changes his business to enter the 'aggregator' or wood fuel supply area.

4.0 A REGIONAL ROUTE MAP FOR RENEWABLES

The SEEDA Corporate Plan period looks forward to 2011 and this report adopts a similar time frame considering activities through financial years 2008/9 to 2010/11.

Resources are considered later but critically, these are modest given the exceptional targets that are required to be met. ***The reality is that SEEDA resources alone will not be anywhere near enough for the task ahead.*** Essentially, SEEDA must look to work in partnership with external bodies and use its funding to gear up the necessary resources. This being so, it is essential that:

- In the first year (2008/9) where in-house resources are particularly stretched, low cost activities that help to prepare a platform for later work are given a higher profile (much of this work will be considered as 'generic')
- That resources are marshalled and a 'Task team' established that can effectively co-ordinate all relevant renewables activities so minimising the likelihood of duplication or squandering of resources unnecessarily. Such a body will also give continuity, will champion renewables inside as well as outside SEEDA making organisational links essential to delivery as well as providing technical/ policy support on related issues.
- That internal (SEEDA) resources are at least matched with external (partner) resources
- That the maximum gearing is obtained through external bodies (public and private sector) participating in terms of cash input as well as effort in kind

4.1 Management and coordination models

There are many ways in which SEEDA could expect to manage a regional renewables programme and more than one model might yield success. Indeed, it may well be prudent that one model might be used in a transitional sense whilst other options are developed. Different models might also be used at different scales.

The following discussion outlines four major choices and couples the likely consequences for resources.

- 'Business as usual' working with a loose affiliation of a variety of agencies across the region
- Internal SEEDA coordination with use of 'seconded in' experts
- Establishment of an 'arms length' dedicated organisation to coordinate region wide activities and direct local agencies
- Partnering with a leading utility type organisation

4.1.1 Business as usual

This represents the current ad hoc method of supporting activities on renewable energy across the region, notionally coordinated through SESEP.

Strengths	Weaknesses
Flexibility: SEEDA can decide year on year how much resource to allocate – no long term commitment of budget	Partners are not able to resource and cannot develop or retain the necessary expertise for strategic actions. Results in no long term commitment of partners.
Superficially 'politically correct' involving a maximum of partners	Most partners have limited understanding of renewables and need support themselves, so self defeating.
'Local' delivery in the sub-regions	Duplication of effort and lack of coordination. Some areas end up much better served than others based on local champions.
Competitive between providers and shows no favour	Inhibits sharing of knowledge and expertise essential in early market development stage

VIEW: Essentially, if the region carries on this way then SEEDA will not get best value for money and there will be poor progress made against targets. Partners are essential for delivery but they need a definite commitment from SEEDA over the corporate plan period in order to commit the necessary resources themselves.

Loose coordination will continue to lead to fragmented actions and a forum such as SESEP will remain dysfunctional since renewables will rarely appear as a priority given competition from better resourced and coordinated actions (e.g. energy efficiency).

The region will fail to develop a 'strategic renewables' capability and the future will be determined mostly by external regional forces and the working of the market. SEEDA's influence will be minimal in affecting delivery against targets.

4.1.2 Internal SEEDA coordination

This model would require the establishment of a team of individuals within the SEEDA management structure given the remit to focus on renewable energy. The team would be supplemented by external experts seconded in to the team for periods of time.

Strengths	Weaknesses
Keeps control within SEEDA, particularly useful in the early stages	Requires staff resources to be dedicated to this action over and above that planned for to date – resource implications
Enables SEEDA to supplement its team with external experts as and when	Cost and space requirements within SEEDA. Care not to weaken partners over the long term.
Gives time to learn	Care that this is not used to delay actions and decisions unnecessarily

VIEW: This is an attractive option that would help SEEDA through the next phase of developing a regional platform for renewables growth (say next 12 month period). It would allow exploration of internal links within SEEDA to maximise in-house use of resources and give time for the exploration of alternative regional models.

This model is unlikely to be sustainable longer term both for SEEDA and for partners and would not provide the maximum opportunity for gearing up. It is, however, preferable to the current status quo.

4.1.3 Arms length dedicated organisation

This is the 'REGENSW' type approach where the RDA facilitates and financially supports the establishment of a body that coordinates activity region wide. Go to http://www.regensw.co.uk/ for more information. The organisation does not carry out all of the programme work, merely the more strategic activities whilst directing activites more locally so making best use of sub-regional partners. This body would be independent but have close ties with SEEDA through the management board (SEEDA providing a chairman perhaps) and through secondment of staff into the entity for periods of time (e.g. specialist input for a major review or project).

Strengths	Weaknesses
Provides a dedicated unit to oversee regional renewables activites	May be seen as detracting from sub-regional coordination activities and introducing a 'new management layer'
Provides an independent voice region wide and a champion to push the renewables agenda forward	Perhaps not required?

Strengths	Weaknesses
Provides a central portal for all related information, marketing etc.	This is in part provided through national agencies so might be seen to be duplicating
Provides strategic and technical support to SEEDA and partners	Perhaps not required?
Gives partners an equal voice and representation through advisory groups	This would need to be carefully managed and chaired by an appropriate (SEEDA) officer
Gives major sponsors the opportunity for positions on the management board and resulting influence	Dilutes 'independence' (but can be managed by balanced membership as set out in articles etc.)
Provides a body able to bid for major European and National funding for strategic projects	Other bodies can already do this.

VIEW: There is much to be said in favour of this approach particularly relating to coordination of activity, one point of call etc. (as was seen as desirable by a majority at the SEEDA workshop) but most of all in its ability to draw down more resources and to gear up activity.

To give an order of magnitude, say the TV Energy sub-regional funding base was to be replicated region wide then the following gearing might be possible:

Annual basis	Sponsors	TVE sub-region	SE Region
Local Authorities	90% sign up	£90,000	£360,000
Private sector	4 companies	£35,000	£140,000
European funds	2 projects	£50,000	£200,000
TOTAL		**£175,000**	**£700,000**

This gearing comes at a price and the agenda needs to be true partnership working. For example, LA involvement might be obtained by offering each sub-region an effective 'community renewables programme' through establishment of a community renewables officer per sub-region, coordinated by the arms length body but based in each sub-region. To double the resource here (say £36k per sub-region) would require just 6 LAs to sign up (at £6k pa each) per sub-region, to treble then 12, quite achievable.

A region-wide body should expect to balance private sector involvement with public sector. The likely outcome in the SE would be less LA sign up at least initially but more private sector sponsorship than has been achieved by TV Energy (where this has not been pressed).

This model also gives greater ownership to those organisations that SEEDA needs to influence in order to get projects in place and thus to meet targets whilst preserving a balanced, objective approach.

Setting up such an organisation perhaps as a 'Not for Profit' body has been mooted several times before for the region but has not found favour. Inevitably, some organisations will feel that such a body will impinge on their activities, which in the main do not relate to renewables. Hence, moves have been stymied.

A bold step perhaps to go forward with this model either focusing on renewables alone or giving a wider remit across the sustainability agenda (as is happening in the SW) but one that might be contemplated over the next 12 months during a 'transitional stage'?

4.1.4 Partnering with a leading private sector company

The alternative longer term model is to hook up/ outsource with a leading utility type organisation that will push renewables as part of its own business plan. Such a body might be chosen through a tendering process.

Some of the strengths and weaknesses are the same as for the previous model. The differences will mostly relate to the degree of independence that will be retained and the ability to continue to motivate other regional partners. Nevertheless, to deliver big projects this model has its attractions.

Strengths	**Weaknesses**
Provides a dedicated unit to oversee regional renewables activites	May be seen as detracting from sub-regional coordination activities and introducing a 'new management layer'
Provides an authoritative voice region wide and a champion to push the renewables agenda forward	Lack of independence an issue and could be divisive with local partners. What will be their roles?
Provides significant in-house technical and financial resources	Gained at the cost of potential alienation of other major players
Provides a central portal for all related information, marketing etc.	Will inevitably be linked to company information and approaches
Provides strategic and technical support to SEEDA and partners	But not an independent, objective view – this will need to be separately resourced and overseen

VIEW: This model could work longer term but great care will be needed to choose the right partner. Utilities already based within the region would stand the best chance and likely give best value. Essentially, this is the way that central government is tending to move although it is not committing to just one organisation! Hence, there may be plays on this theme which could be explored further. However, best results are likely to be obtained from a simple approach.

Inevitably, local partners would be weakened by such a model but SEEDA would have the weight of a large, professional, international organisation promoting renewables region wide.

4.2 Resource implications by model adopted

A key reason for following a particular model must relate to the additional resources in terms of funding, access to market and expertise that might result thus enabling better value to be derived for SEEDA's own resources. Some models will fare better with some sponsors/ partners than others. Qualitatively, this might be represented as follows:

Ability to draw in additional resources

Model\ Scale	Large	Medium	Small
BAU	Poor	Poor	Limited
In-house	Limited	Limited	Limited
Arms length	Good	Excellent	Excellent
Utility partner	Excellent*	Good*	Good

**Issue of independence would need addressing*

The likely ability to draw in resources emphasises the need to move forward from 'Business as usual' to ultimately the 'Arms length' or 'Utility partner' model. Without such a progression, sufficient resources are most unlikely to be brought to bear and the resources that SEEDA has will not result in a significant change in what would happen without intervention. The 'in-house' model would prudently be adopted for a fixed period of 'transitional' time.

4.3 Costed programme

The assumption that will be made is that a transitional programme of either 'Business as usual' or 'In-house' will be adopted for the first 12 months. Thereafter, all four models will be considered against the activities that are seen as essential for the region to establish a platform that can ultimately lead to the attainment of its renewables targets.

4.3.1 SEEDA resources alone

A programme relevant to this scenario would relate to using models 'Business as usual' or 'In-house' taken over a protracted period. The assumption is that to a large extent, work carried out is resourced by SEEDA with perhaps modest financial inputs from partners along with some contributions in kind. It is recognised that this would be an extreme view and that for larger project investments, gearing might be expected at the very least on a matching basis from hosts or from other funding bodies. Such gearing would appear later rather than sooner in the programme life, given such an approach. ***Such 'project match funding' is excluded from all scenarios so that comparisons between models can be made on a like for like basis.***

Base line funding for renewables actions is drawn from that allocated in the SEEDA draft corporate plan (2008-11). The appropriate budget line is understood to be:

£k	2008/9	2009/10	2010/11
Renewable energy	300	1,690	2,200

4.3.2 Arms length body geared programme

The assumption under this programme is that additional resources are made available from participating partners and sponsors from the end of year 1 so gearing up activities. The assumption is made of an expanding support activity, as follows:

£k	2008/9	2009/10	2010/11
SEEDA	300	1,690	2,200
Gearing	50	300	500
TOTAL	**350**	**1,990**	**2,700**

An advantage here is that providing key project activities are supported (such as the community officer posts) and the body works closely with sponsors, the gearing should remain intact even if SEEDA has to reduce their budget allocation below that set out.

Private sector funding might be increased substantially if the high level strategy for engagement with the utilities is successful. A range of possible contributory initiatives might be contemplated that would be of benefit to the individual companies but also to the regional programme. All of this might be subject to negotiation.

4.3.3 Utility geared programme

At one extreme SEEDA might look for a matched funded programme through a tendered process. This could yield by far the greatest financial resource but have the restrictions as discussed previously.

£k	2008/9	2009/10	2010/11
SEEDA	300	1,690	2,200
Gearing	0	1,690	2,200
TOTAL	**300**	**3,380**	**4,400**

A further possibility would be to use a number of large utility/ developers where one might lead and seek a forum to provide steering. However, this might prove cumbersome and unworkable. The possibility could be examined if the work programme proposed in later sections is pursued.

The key with such an arrangement would be to carefully define the deliverables or outputs and if possible get penalty clauses included in any contractual set up. Emphasis should be on delivering the larger projects where the largest energy wins will be made.

The experience of the London Climate Change Agency working in partnership with EDF Energy clearly falls into this category. Information on their partnership can be found at:

http://www.london.gov.uk/mayor/environment/energy/climate-change/edf-energy.jsp

The London Climate Change Agency has selected EDF Energy as the preferred bidder to set up a joint venture company whose remit is to develop sustainable energy schemes for London. EDF Energy is one of the largest energy companies in the UK and the owner of London Energy and London's public electricity network

The company will tackle climate change by developing local sustainable energy solutions to London's power, heating and cooling needs. It will identify and develop sites across the capital where investment in sustainable energy technology would reduce carbon dioxide and other greenhouse gas emissions, which are contributing to global warming.

The arrangement has now been running for 2 years so it will be possible to get feedback on the efficacy of this method of moving forward. To be noted is that this covers all energy and sustainability matters, not just renewables. Here again, the danger would be that renewables would not be taken forward with the necessary vigour unless exacting targets were agreed as a part of the contractual arrangement.

4.4 List of activities

Priorities are set out as 1 – 3 with 1 being of the highest priority. Day rate is assumed as £500/ day for officer input equivalent and £750 / day for Director level input.

4.4.1 Generic activities (first 12 months)

Reference\ Business model	BAU	In-house	Arms length	Utility	Resource required
REVIEWS with regional focus					
G.1.1 All UK and EC policy relating plus target setting/ basis	1	1			5 days office based plus 2 days meetings £3,500
G.1.2 RDA best practice and success factors	1	1			10 days including 4 regional meetings £6,000
G.1.3 UK Agency opportunities (Carbon Trust/ EST etc)	1	1			3 days plus 2 days meetings £2,750
G.1.4 Business model approach for the region	1	1			10 days plus 5 days meetings £8,500
G.1.5 Regional research capabilities	2	2			10 days plus 4 days meetings initially £7,500 Programme to follow
G.1.6 Training needs/ coordination and initiatives	1	1			10 days office based and link to ongoing regional initiatives to gain best value £5,000
G.1.7 Employment generation	1	1			5 days office based and link to ongoing regional initiatives to gain best value £2,500

AUDITS					
G.2 Partner capabilities coupled with gap analysis	1	1			10 days plus 5 days of meetings £8,500
MONITORING					
G.3 SEE-STATS	1	1			£20,000 per annum using existing consortium of partners. Additional £5,000 to upgrade site and maps.
DIALOGUES					
G.4.1 Trade associations	2	2			4 days meetings £2,200
G.4.2 Supply industry	2	2			4 days meetings £2,200
GEARING					
G.5 International, European and UK funding sources	2	2			5 days office based, 2 days Brussels based meetings £4,000

4.4.2 Very large/ large scale renewables

Reference\ Business model	BAU	In-house	Arms length	Utility	Resources required
BUSINESS ENGAGEMENT					
L.1.1 Establish a list of target businesses and prioritise		1	1		3 days office based £1,500
L.1.2 Research companies, CSR agenda etc. before approach. Understand drivers.		1	1		10 days office based £5,000
L.1.3 Establish dialogue and form of communication		1	1		5 days senior effort £3,750

L.2 Develop champion/ guides with companies		1	1		10 days with companies £7,500
L.3.1 Establish forum and create secretariat		2	1		10 days, mixture of effort £6,000
L.3.2 Hold regular biennial meetings		2	1	1	4 days effort plus 2 days senior £4,000 (annual ongoing cost)

PROJECT IDENTIFICATION					
L.4.1 Use SEE-STATS to generate existing project involvement	1	1	1	1	Part of SEE-STATS project.
L.4.2 Generate proposed project preference list, based on drivers	1	1	1	2	5 days office based £2,500
PROJECT FACILITATION					
L.5.1 Identify opportunities for joint working, co-location		1	1	2	10 days plus 10 days site meetings £12,500
L.5.2 Develop incentives packages for primary regional targets		1	1	1	10 days mixed effort £6,000 ***Cost of incentives??????***
PROJECT TRACKING					
L.6.1 Use forum/ champion to aid energy tracking and recording	2	2	1	1	2 days additional effort £1,000
L.6.2 Input to SEE-STATS and feature companies/ market	2	1	1	1	Extension of SEE-STATS project

4.4.3 Medium scale renewables

Reference\ Business model	BAU	In-house	Arms length	Utility	Resources required
STUDIES					
M.1.1 Potential for CHP, co-location, market analysis (including AD)		1	1	1	30 days effort, desk based study with some mapping £15,000
M.1.2 Decentralised generation issues		1	1	3	5 days effort, desk based study/ consultations £2,500
M.1.3 Investigate ESCO opportunities and financing models		1	1	3	Link to EC project Bio-Sol-ESCO (3 yrs) and/ or additional consultation £20,000 (£20,000 EC effort matched pa)
M.1.4 Review all LA plans and strategies for renewables action		1	1	2	Partnership working with LAs plus event £10,000 effort (matched by LAs) £10,000 for workshop
M.1.5 Fuel supply, infrastructure needs		1	1	1	Desk based study with consultation £5,000
PARTNERING					
M.2.1 Identify lead group of LAs for potential host projects, diamonds, eco-towns etc. and initiate dialogue		1	1	2	Partnership working with LAs £5,000 (matched by LAs)
M.2.2 Identify leading private sector developers and establish dialogue, drivers		1	1	3	Partnership working with developers £10,000 (matched by developers)
LEAD PROJECT GENERATION					
M.3.1 Identify best 10 sites for key developments		1	1	3	Desk based with consultation £10,000

M.3.2 Facilitate action giving technical, commercial etc support		1	1	3	Protracted support required over years 1 AMY with costs £50,000
M.3.3 Commission 5 projects region wide (at least 1 in each sub-region) and provide financial incentives/ support		1	1	2	**£1 million per annum 'pot' and rising as budget permits** **£1 – 10 million per annum gearing anticipated**
REPLICATION					
M.4.1 Create case study material targeted on developers/ LAs		2	2	3	£10,000 effort and £10,000 printing etc.
M.4.2 Run a programme of sub-regional seminars for all LAs using case study material		2	2	3	£10,000 staff costs £20,000 event costs
INFRASTRUCTURE					
M.5.1 Support renewables infrastructure developments ongoing		1	1	1	Link to EC Forestry Commission project 'Woodheat Solutions' (30 months) £15,000 pa Link to RDPE infrastructure opportunities Staff effort £5,000
M.5.2 Support new renewables infrastructure developments		1	1	1	Staff effort and consultations £5,000 Capital fund £100,000 pa
M.5.3 Support energy crop actions and forward strategy. Hold workshop to discuss land use strategy		1	1	2	Link to Coppice/ SRC actions ongoing £20,000 initially pa Staff effort 10 days
M.5.4 Study limitations to biomass regional provision and impacts of imports		2	2	2	Partner with Forestry Commission and draw on IEA activities/ Task 40 £10,000

4.4.4 Small & micro scale renewables

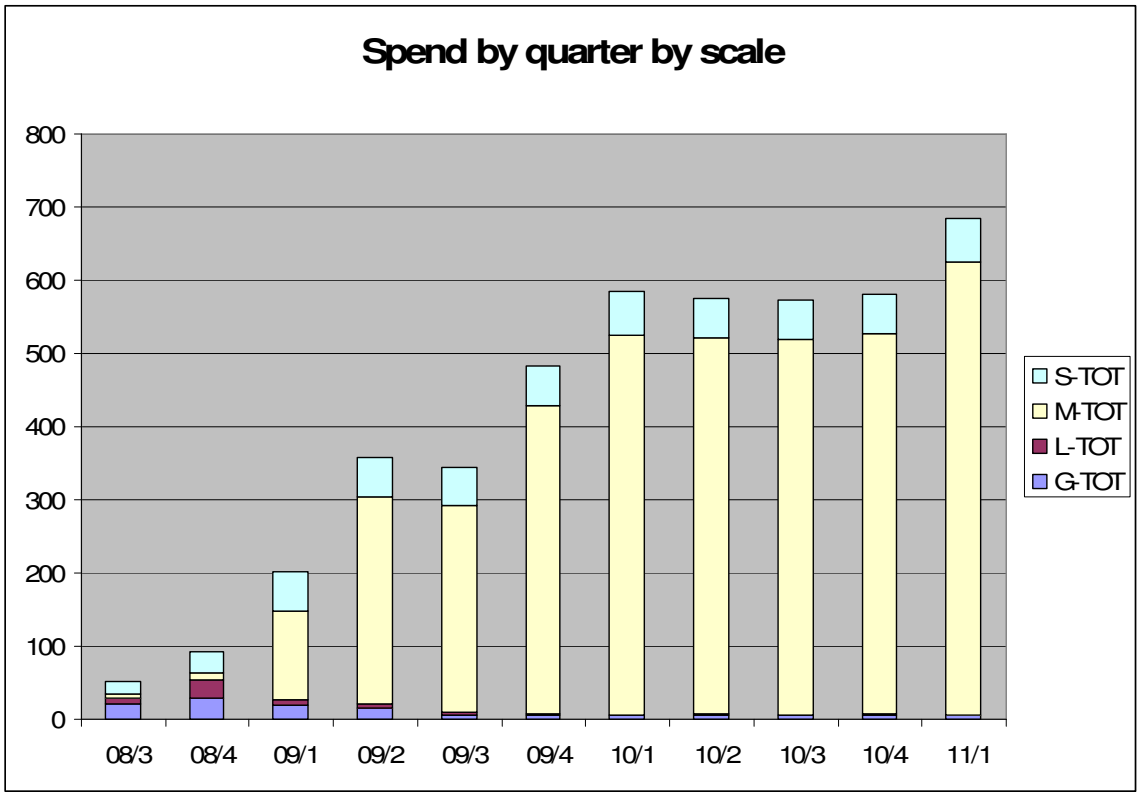
Reference\ Business model	BAU	In-house	Arms length	Utility	
PROJECT SUPPORT					
S.1.1 Establishment of community based renewables support, accessing grants etc	1	1	1	3	1AMY per sub-region eventually, start with 2 posts (one west, one east) £70,000. Later, one post per sub region (£140,000 pa)
S.1.2 Establishment of SME support	2	1	1	1	Additional resources to target SMEs but could be linked to community renewables 1AMY region wide £35,000 pa
S.1.3 Community actions capital fund	3	3	3	3	£50,000 pa to facilitate key, high profile actions as part of 'hearts and minds' campaign
S.1.4 Support for industry	3	3	3	3	Fund to champion local SME initiatives directed at innovative solutions £50,000 pa
LIAISON					
S.2 Training provision and actions for SMEs and individual providers	1	1	1	1	Link with ongoing actions, LEADER, Business Link etc. for necessary resources Watching and coordinating brief 10 days effort £5,000 pa
TRAINING					
S.3 Liaison with EST and other ongoing related programmes (incl. EEACs)	1	1	1	1	20 days office based £10,000 pa

4.5 Timeline for activities and deliverables

The following charts illustrate the recommended distribution of resources working with the budget available. Total costs including that of internal SEEDA effort is counted.

The vast majority of effort should be directed at the medium to large scale developments as discussed, this to include infrastructure/ supply side support. However, in the early part of the programme, SEEDA would benefit from examining all scales and establishing the necessary contacts and confirming the rationale, this is reflected in the allocations.

Variations in budget would primarily impact on funds available to mobilise medium scale projects and to project manage their outcomes (not separately reported). A range of spin off/ support actions might be envisaged and this should be given further consideration in the initial 12 month programme.



The Gantt chart below sets out in more detail the periods for delivery and the relevant costs that might be anticipated.

Ref	08-3	08-4	09-1	09-2	09-3	09-4	10-1	10-2	10-3	10-4	11-1	TOTALS
G.1	5.75	10	10	10								35.75
G.2	4.5	4										8.5
G.3	10	10	5	5	5	5	5	5	5	5	5	65
G.4	0.5	2	1.9									4.4
G.5		2	2									4
G-TOTAL	**20.75**	**28**	**18.9**	**15**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**117.65**
L1	4	3	3.25									10.25
L2	3	4	0.5									7.5
L3		10		2		2		2		2		18
L4	1	1	0.5									2.5
L5		6.5	4	4	4							18.5
L6		0.5	0.5									1
L-TOTAL	**8**	**25**	**8.75**	**6**	**4**	**2**		**2**		**2**		**57.75**
M1		2.5	5	7.5	7.5	5	5	5	5	5	5	52.5
M2			2.5	5	5	2.5						15
M3	5	5	110	260	260	400	400	500	500	500	500	3,440
M4				5	5	10	5	5	5	10	5	50
M5		2.5	2.5	5	5	5	110	5	5	5	110	255
M-TOTAL	**5**	**10**	**120**	**282.5**	**282.5**	**422.5**	**520**	**515**	**515**	**520**	**620**	**3,812.5**
S1	15	25	50	50	50	50	55	50	50	50	55	500
S2	1	1	2	1	1	1	2	1	1	1	2	14
S3	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	27.5
S-TOTAL	**18.5**	**28.5**	**54.5**	**53.5**	**53.5**	**53.5**	**59.5**	**53.5**	**53.5**	**53.5**	**59.5**	**541.5**
TOTAL	**52.25**	**91.5**	**202.15**	**357**	**345**	**483**	**584.5**	**575.5**	**573.5**	**580.5**	**684.5**	**4,529.4**
FY			**345.9**				**1,769.5**				**2,414**	
BUDGET			**300**				**1,690**				**2,200**	

4.6 Value for money considerations

The following table illustrates the relative costs of strategies focused on 'Very Large', through to small scale developments. Generating factors per MWe or carbon saved would not seem to be useful as we are not comparing 'apples with apples' as is described below.

	Generic	**Very Large**	**Large/ Medium**	**Small**
Cost/ £k	117.65	57.75	3,812.5	541.5
MWe installed Sc1 – Sc2	N/R	890 – 2,050	1,383 – 1,378	397 - 635
Value for money/ rationale	Necessary prerequisite for programme	Exceptional Based on influencing private sector	Main impact and requires major investment in early stages	Useful contribution and adds to 'hearts and minds' plus PR campaigns

If SEEDA was looking to focus on three main themes I would suggest:

- Establishing and actively managing relationships with the larger utilities and developers so facilitating the more rapid and wider scale introduction of 50MWe+ renewables schemes in the region (as compared to other regions)
- Investing in a series of exemplar medium to large scale energy distribution schemes with beacon/ diamond local authorities and developers
- Providing community scale technical support across the region to facilitate smaller scale projects, promote a positive view of renewables and to amange the 'hearts and minds' actions.

5.0 A FURTHER RECOMMENDATIONS FOR ACTION

There is a vast array of activities that might be pursued in such a complex area and many of these have been indicated in the text earlier (in blue) where there has been insufficient time to explain or to explore. Many of the remarks pertain to SEEDA gaining a fuller understanding of the consequences of following one or other of the possible future approaches.

Nevertheless, the programme that has been set out should allow SEEDA over the next 3 years to gain more control over future regional outcomes and to test out the approach. In particular, SEEDA will be able to predict with greater certainty how it will be placed against the 20% target and to monitor its progress.

Arguably, the most important matter for early action will be the decision as to which management plan to follow.

ANNEX 1: SE GEOGRAPHICAL DATA – LARGEST 59 TOWNS & CITIES

Urban area	2001 population	Sub-region
M66602 Southampton	234,224	HW
K56801 Reading	232,662	TV
M61703 Portsmouth	187,056	HW
J41400 Oxford	143,016	TV
M83708 Brighton	134,293	SU
K61001 Slough	126,276	TV
M91200 Eastbourne	106,562	SU
K60247 Woking/Byfleet	101,127	TV
L71402 Crawley	100,547	SU
K81704 Gillingham	98,403	KT
M83702 Worthing	96,964	SU
L55701 Basingstoke	90,171	HW
L80900 Maidstone	89,684	KT
M90902 Hastings	85,828	SU
K56902 High Wycombe	77,178	TV
K81703 Chatham	73,468	KT
M83707 Hove	72,335	SU
K56804 Bracknell	70,795	TV
L60900 Guildford	69,400	TV
M61702 Gosport	69,348	HW
J50900 Aylesbury	69,021	TV
K60251 Epsom and Ewell	64,493	TV
M61704 Waterlooville	63,558	HW
M71800 Bognor Regis	62,141	SU
I27901 Wolverton/Stony Stratford	60,359	TV
L82200 Royal Tunbridge Wells	60,095	KT
L90300 Ashford	58,936	KT
K51200 Maidenhead	58,848	TV
K90201 Margate	58,465	KT
L60406 Aldershot	58,170	HW
L60405 Farnborough	57,147	HW
K60240 Dartford	56,818	KT
M61701 Fareham/Portchester	56,160	HW
M83701 Littlehampton	55,716	SU
K60270 Gravesend	53,045	KT
M66601 Eastleigh	52,894	HW
K60246 Walton and Weybridge	52,890	TV
K60243 Staines	50,538	TV
L71405 Reigate/Redhill	50,436	TV
K60248 Esher/Molesey	50,344	TV
L72700 Horsham	47,804	SU
I27903 Bletchley	47,176	TV

L60401 Camberley/Frimley	47,123	TV
M61705 Havant	45,435	HW
K92602 Folkestone	45,273	KT
I11700 Banbury	43,867	TV
K90601 Canterbury	43,552	KT
K60252 Leatherhead	42,885	TV
L51100 Winchester	41,420	HW
K85201 Sittingbourne	39,974	KT
K56802 Wokingham	39,544	TV
M90901 Bexhill	39,451	SU
K60254 Banstead/Tadworth	38,664	TV
K90203 Ramsgate	37,967	KT
L50500 Andover	37,955	HW
M61401 Locks Heath	36,452	HW
L60407 Farnham	36,298	TV
J42000 Abingdon	36,010	TV

ANNEX 2: GRANTS

The major schemes running presently (2008) are set out below.

Name of Grant & Contact Details	Funding Focus	Target Groups & Eligibility Criteria	Submission Details & Deadline	Funding Available
BIG Lottery Fund (Main but not sole option is Community Sustainable Energy Programme run by BRE) Web: http://www.biglotteryfund.org.uk/ & www.communitysustainable.org.uk Tel: 08454 102030 & 0845 3671671	Distributor of half the good cause lottery money, to community projects. Funding both capital (incl. hydro) and project development for energy efficiency and renewable energy projects	Community based, not-for-profit organisations Competitive	Quarterly for capital and first-come-first-served for project development 16/05/08 15/08/08 07/11/08 Approx. 2 month turn around	Project development grants are max. of £5k or 75% of development costs, which ever is lowest. Capital is a max of £50k or 50% project costs, which ever is smaller.
DEFRA Bioenergy Capital Grant Scheme Information can be found at: http://www.defra.gov.uk/farm/crops/industrial/energy/capital-grants.htm	The Bio-energy Capital Grants Scheme promotes the efficient use of biomass for energy by stimulating the early deployment of biomass fuelled heat and biomass combined heat and power projects. It will do this by awarding capital grants towards the cost of equipment in complete installations.	Open to new projects submitted by industrial, commercial and community sectors (including LA's and schools). Heat only and CHP projects are eligible. Fuel sources can be any biomass excluding waste (WID) schemes. Preference will go to energy crops, forestry wood and agricultural residues.	Each round has a 10-week application window. Open till **20th May 2008:** Installers of small boilers can submit a single application on behalf of several end users, provided that each order is a confirmed order, has eligible costs below £100k and all of the benefit of the grant is passed on to the end users. **Scheme to be reopened in the Autumn of 2008 with 2 calls anticipated per annum.**	Based on Round 4: Grants available for 40% of eligible costs i.e. legitimate costs over & above the installed costs of equipment necessary to deliver the same output using natural gas or other fossil fuel. Eligible costs could include all purchased goods and services to build & commission the proposed project. They excluded buildings, planning & consents, operational costs after commissioning etc.
DEFRA Bioenergy Infrastructure Scheme Information can be found at: http://www.defra.gov.uk/news/latest/2008/climate-0609.htm	The Bio-energy Infrastructure Scheme will support the biomass industry in England, helping those supplying biomass fuel for use in heat and electricity generation.	All projects must be based in England and must supply the biomass to end users in Great B retain.	The deadline for applications is 5th August 2008 for producer groups Preference will go to energy crops, forestry wood and agricultural residues. To receive an application form contact the Bio-energy Infrastructure Scheme Helpline by telephone: 01355 595800 or email: help@beis.org.uk	Grants are available for up to a maximum of £200,000 per producer group or business.

BERR - Low Carbon Buildings Programme-	The scheme is designed to encourage small scale energy generation (micro-generation) from low carbon technologies.	Phase 1 (2006-2009): households only Phase 2 (2007->): Includes local housing authorities, housing associations, schools and other public sector buildings and charitable bodies. It is not open to private households or businesses.	Ongoing	Householders – fixed maximum amount per project dependent on the technology. Community, 'not-for-profit' orgs – 50% installed costs funding up to a maximum of £1mil
RDPE/ LEADER Information can be found at: **www.seeda.co.uk/rdpe**	Sustainable energy projects	Grants are available for farm based and forestry based businesses primarily. Cannot be used for residential properties.	Ongoing	RDPE can grant up to 50% of eligible costs. Requires an Expression of Interest (EoI) to be lodged through SEEDA (4 page form) LEADER max. £100k
Green Energy Fund **Nigel French** **EDF Energy** 329 Portland Road, Hove, East Sussex BN3 5SY Nigel.French@EDFEnergy.com Telephone. 01273 42864	Fund should support less established technologies where possible. The funding requested must be for the installation of renewable generation plant. Or for feasibility studies into the installation or renewable generation plant	The project must be located within either the SWEB, Seeboard or London Electricity supply areas. That the installations funded should benefit local communities in addition to the environment. Competitive	Ongoing	£30,000 max. (£5,000 for feasibility max.)
Scottish Power Green Energy Trust **Gordon McGregor** Tel: 0141 568 304 Email: Gordon.mcgregor@scottishpower.plc.uk or greenergytrust@scottishpower.com	Offers support to community based RE projects that: Aim to create new RE generation facilities in the UK, Aim to promote new RE generation through further development or education. Projects which will bring about a positive impact on the local community and surrounding habitats are encouraged.	Local community partnerships. Proposals should include the projects planned lifetime and kWh output, the expected positive impact on the local community and the status of planning approvals. Proposals for education projects should outline the objectives for advancement of knowledge, the target audience and means of communication to be used and specific RE sources to be supported. Competitive	Applications are assessed 3 times per year and should be submitted 7 weeks before meeting times in April, September and December. See http://freight.quix.co.uk/ for application form	50% funding up to £25,000. Most projects receive around £10,000.
E-On Source Community Relations E.ON UK Newstead Court Little oak Drive Sherwood Park Annesley Notts NG15 0DR http://www.eon-uk.com/about/source.aspx source@eon-uk.com	Support community energy projects which either result in the production of energy from a sustainable source or which reduce the amount of energy used by a community organisation.	Community Groups and 'Not-for-Profit' Organisations Competitive	Applications are reviewed three times a year with the deadline schedule for 2007 as follows: Friday 11 May 2008 Friday 24 August 2008 Friday 21 December 2008	**Up to £30k**