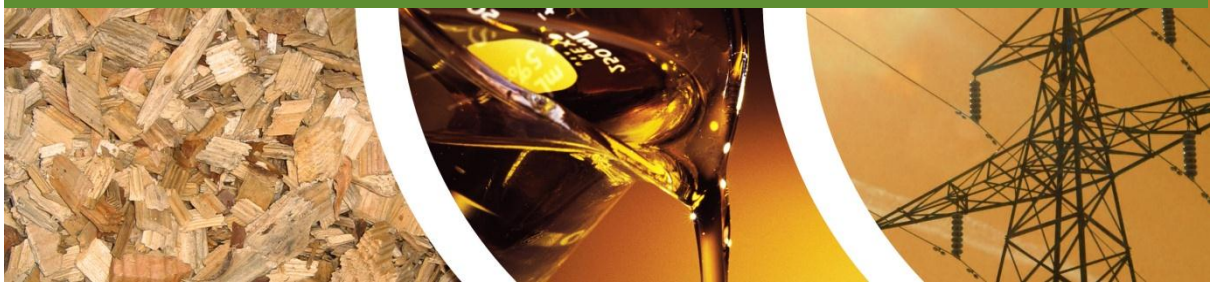
Review of approaches adopted in regional renewable energy capacity assessments when following the Regional Renewable and Low Carbon Energy Capacity Methodology

June 2012 update

A Report for the Department of Energy and Climate Change



NNFCC Project 11-030

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The NNFCC

The UK's National Centre for Biorenewable Energy, Fuels and Materials

The NNFCC is committed to the sustainable development of markets for biorenewable products. We promote the benefits of biorenewable energy, fuels and materials for enhancement of the bioeconomy, environment and society.

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Summary

1. In 2009, SQW Energy and Land Use Consultants were commissioned by the Department of Energy and Climate Change (DECC) and the Department for Communities and Local Government to develop the "Renewable and Low-Carbon Energy Capacity Methodology" (RLCECM) as a common approach to assess the potential accessible renewable energy resource (biomass, wind, solar and thermal (via heat pumps)) and potential for renewable and low-carbon energy (primarily heat) deployment (combined heat and power and district heating systems) in the English regions. In 2010 DECC provided further financial support to the regions to implement the application of the methodology to underpin the development of regional low carbon energy strategies and to help establish ambitious regional targets for renewable and low-carbon energy generation. The latter were required to drive delivery against the challenges identified in scenarios developed for the government's 2009 Renewable Energy Strategy (RES) which examined options to deliver 15% of the UK's energy demand from renewable sources by 2020.

2. In 2011, DECC commissioned the NNFCC to review the outputs from the reports for each of the nine English regions, which included assessment of;

    - the consistency of regional approaches in applying the RLCECM
    - any differences in approach adopted and
    - whether these differences in approach were likely to affect the integrity of the results presented, particularly when comparing between regions.

3. Review of assumptions and approaches in the original RLCECM were outside the remit of the NNFCC work.

4. The RLCECM is designed to broadly assess the potential regional renewable energy resource that could be accessed and the electricity or heat plant capacity that this could support. In addition advice is given on how the potential for low carbon energy deployment could be assessed in each region. In both cases, the assessment takes account of available natural resources and the following constraints;

    - technical
    - physical, geographical and environmental
    - planning and regulatory.

5. The final outputs delivered by the methodology represent the maximum potential deployment potential. **Actual levels of future renewable and low carbon energy deployment will be significantly lower**, as this will be affected by additional economic, local planning and supply chain constraints.

6. The individual regional studies highlighted the potentially very significant contribution that onshore renewable and low carbon energy technologies could theoretically make towards renewable and low-carbon energy technology deployment, particularly through harnessing wind energy (at a large scale). Though small by comparison to the wind resource, the potential contributions to renewable energy generation from exploitation of biomass and micro-generation technologies (solar PV and Heat pumps) are still very significant in all regions.

7. Differences in the regional approaches to adoption of the RLCECM methodology and the coarse nature of the assessment means little value would be gained from

comparing data between regions. The coarse regional nature of the output means that further work would be required to take account of the additional local constraints affecting deployment to enable better targeting and priority setting.

8. An overview of the regional and technology related patterns of deviations from the RLCECM methodology can be seen in **Table 1**.

9. Dealing with biomass resource assessments was responsible for the majority of deviations from the RLCECM methodology, where revised approaches or assumptions had a significant impact on the results. In part this reflects problems encountered in dealing with the more complicated nature of the wide range of resources that constitute 'biomass' (The RLCECM covers managed woodlands, dedicated energy crops, wood waste and agricultural arisings (straw & manures), municipal solid waste and biogas (landfill and sewerage)) and the wide range of possible technologies for exploitation. The main deviations were associated with disagreement over heat plant availability figures (the amount of time that biomass-fuelled plants are generating heat). Regions adopted a range of different plant availability figures to reflect what they saw as their own specific circumstances.

10. There were also uncertainties around the proportion available biomass from managed and unmanaged woodland resources that could be accessed. Gaining access to regional data on dedicated energy crops also proved to be a problem in some cases.

11. There was common consent that the RLCECM approach was not robust enough in taking account of the many local constraints on exploiting wind potential and the implications of concentrations of wind-farm developments. As a result the potential for wind turbine deployment is seen to be the extreme upper limit. Problems were also experienced in securing information from the Ministry of Defence (MoD) in terms of where wind turbines could potentially be situated without affecting radar systems.

12. The potential for exploitation of micro-generation resources (solar, ground and air source heat pumps) was also assessed as being too optimistic by all regional contractors.

13. It was always going to be difficult to create a methodology that could be applied universally by different regions using very different consultants without any problems arising. However, the flexibility and robustness at the core of the RLCECM approach allowed it to be used as intended in the most part and adapted where better regional information or data was available to refine the outputs.

14. The RLCECM has attempted to harmonise a process that was already happening in some regions though on a piecemeal basis. On this basis alone and in focussing thoughts in this area it has achieved much in developing a starting point for further work and analysis.

15. The RLCECM approach to date has been more successful in supporting assessment of opportunities for developing renewable energy capacity than opportunities for deployment of CHP or district heating systems. However, it has stimulated many regions to produce some of the first regional heat density maps (of varying sophistication) which will be important tools for targeting future actions.

16. The outputs of the RLCECM reports furnish Local Authorities and other interested parties with a broad overview of the regional renewable energy potential. This should enable the first steps to be taken in developing or refining local energy planning strategies and policies to encourage exploitation of this potential.

Table 1: Summary of potential regional renewable heat and power plant capacity that could be supported by renewable energy resources in each of the nine English regions in 2020 (2030 for West Midlands and 2031 for London), highlighting where there were specific issues raised by contractors following the RLCECM approach.

Category	Sub-category level 1	Sub-category level 2	North West			North East			Yorkshire & Humber			West Midlands			East Midlands			East of England			London			South West			South East		
			Electricity (MWe)	Heat (MWth)	Total Energy (MW) by group	Electricity (MWe)	Heat (MWth)	Total Energy (MW) by group	Electricity (MWe)	Heat (MWth)	Total Energy (MW) by group	Electricity (MWe)	Heat (MWth)	Total Energy (MW) by group	Electricity (MWe)	Heat (MWth)	Total Energy (MW) by group	Electricity (MWe)	Heat (MWth)	Total Energy (MW) by group	Electricity (MWe)	Heat (MWth)	Total Energy (MW) by group	Electricity (MWe)	Heat (MWth)	Total Energy (MW) by group	Electricity (MWe)	Heat (MWth)	Total Energy (MW) by group
Wind	Wind – commercial scale	Wind – commercial	23,587			11,000			46,533			36,727			24,366			69,218			*746*			47,765			19,832		
	Wind – small scale	Wind – small scale	669			2,700			1,132			1,634			1,430			48						2,207			1,801		
					24,256			**13,700**			**47,665**			**38,361**			**25,796**			**69,266**			*746*			**49,972**			**21,633**
Biomass	Plant biomass	Managed woodland	20			4			0			31			108			27			*0.6*						81		
		Managed woodland (heat)		122			9			50			36			29			259									1,325	
		Energy crops	11			15			168			229			608			1									64		
		Energy crops (heat)		60			93			335			1,321			170			2			*2*						828	
		Waste wood	39			47	111		17	33		37	32		27	23		23	47		*67.5*						30	459	
		Agricultural arisings (straw)	11			22			263	371		51			166			43			*0.5*						421		
	Animal biomass	Wet Organic Waste	206			40			42	34		165			119			13	11		*0.1*			68	1,497		4,167		
		Poultry Litter	9			3			49	70		18			20			76			*0.01*						11		
	Municipal Solid Waste		211			141			108	57		209			148			152	76		*70*						2,429		
	Commercial & Industrial Waste		135			108			53	105		145			127			235	118		*56*						4,974		
	Biogas (EfW)	Landfill gas	68			41			153			11			51			169			-	-					72		
		Sewage gas	28			5			16			34			18			27			-	-					56		
	Co-firing of biomass		198			12						106			609												810		
					1,118			**650**			**1,924**			**2,425**			**2,225**			**1,279**			*196*			**1,565**			**15,728**
Hydro	Small scale hydropower	Small scale hydropower	77			**55**			185			72			19			1.5			*3*			74			41		
					77			**55**			**185**			**72**			**19**			**1.5**			*3*			**74**			**41**
Microgeneration	Solar	Solar Photovoltaics	1,158			788			1,522			1,378			1,379			1,936			*3,688*						2,538		
		Solar Water Heating		1,158			776			1,516			1,153			1,502			1,496			*1,872*			2,594				2,182	
													2,215																	
	Heat pumps	Ground Source Heat Pump		2,471			4			5,775			8,859			8,372			857			*11,624*			9,595			13,685	
		Air Source Heat Pump		9,884																		*26,564*								
					14,671			**1,568**			**8,813**			**13,605**			**11,254**			**4,289**			*43,748*			**12,189**			**18,405**
Totals			**26,427**	**13,695**	**40,122**	**14,979**	**993**	**15,972**	**50,241**	**8,346**	**58,587**	**40,847**	**13,616**	**54,463**	**29,197**	**10,097**	**39,293**	**71,970**	**2,866**	**74,836**			*44,693*			**63,800**	**37,327**	**18,479**	**55,807**
Percentages			66	34	100%	94	6	100%	86	14	100%	75	25	100%	74	26	100%	96	4	100%			*100%*			100%	67	33	100%

Key:

Indicates where deviations from the methodology affect the results
Indicates where issues have been raised by contractors attempting to following the methodology
Indicates draft findings from draft report

Introduction

17. The EU Renewable Energy Directive (RED) specifies that 20% of energy consumption across Europe should be derived from renewable energy sources by 2020, though targets vary between Member States dependent on existing levels of renewable energy deployment. As its contribution, the UK is expected to ensure that 15% of final energy consumption is derived from renewable sources by 2020.

18. In response, the previous Government published the Renewable Energy Strategy (RES) in July 2009, which set out the strategic aims and objectives for delivery of upwards of 30% of electricity; 12% of heat; and 10% of transport fuel energy from renewables. These targets are challenging and require joint action from both central and local government. In the past much of the focus on delivery has been through targets and actions set out in Regional Spatial Strategies.

19. A key step in developing strategies and initiatives to promote development of renewable and low-carbon energy generation is gaining an understanding of both the potentially exploitable renewable energy resource and opportunities for low carbon technology deployment (combined heat and power plants or district heating systems). This can be achieved through mapping of parameters such as biomass resources, wind potential and heat demand, at a resolution that is useful and meaningful to regional developers and strategic planners, while also taking account of physical, environmental, planning and regulatory constraints.

20. Research undertaken in 2008 by Arup[1] for the Department for Communities and Local Government (DCLG) found that there were considerable inconsistencies in the way renewable energy capacity had been defined, assessed and fed through to the setting of targets in Regional Spatial Strategies. To improve consistency between regional assessments, in the RES the Government committed to support regions in reviewing their potential for renewable energy generation. In support of this, in September 2009, Two project partners SQW Energy and Land Use Consultants were commissioned by the Department of Energy and Climate Change (DECC) and DCLG to develop a methodology (the "Renewable and Low-carbon Energy Capacity Methodology" (RLCECM) to assess the opportunities and constraints affecting the potential for renewable and low-carbon energy deployment in the English regions.

21. The RLCECM was published by DECC on 5th March 2010. The key objectives of the RLCECM were;

- to help regions assess the potential for renewable and low carbon energy in their area in a consistent way;
- for each regional assessment to underpin the evidence base for setting ambitious targets for renewable energy and a clear strategy to support their delivery in (now former) Regional Spatial Strategies;
- to help regions plan for substantial new development in locations and ways which provide for energy, in particular heat, to be gained where there are clear opportunities for new or extended decentralised energy systems;
- to support Government policy and targets.

22. The methodology included guidelines designed to assess the potential renewable energy resource that could be accessed or low-carbon energy technologies that could be deployed, taking account of

[1] Renewable Energy Capacity in Regional Spatial Strategies: Final Report (2008) Arup.

- Naturally available resources;
- Technically accessible resources (what can be captured and converted to useful energy);
- Physical environmental constraints (e.g. areas where renewable schemes cannot be deployed or low carbon energy technologies cannot be established);
- Planning and regulatory constraints.

23. It should be noted that the outputs of such assessments represent the maximum renewable energy capacity that could potentially be deployed[2]. What will actually be accessed for renewable and low-carbon heat or power generation will be significantly lower.

24. For example; economic and supply chain constraints will affect potential deployment, but accounting for such factors is beyond the scope of the methodology. The guidelines are therefore designed to enable assessment of maximum potential exploitable renewable and low carbon energy capacity, taking key constraints into account.

25. In 2010/11, DECC provided financial support to each of the English regions (through Regional Development Agencies, other regional bodies and local authorities) to commission regional assessments of the future potential for renewable and low-carbon energy deployment, based on the RLCECM. The reports for each of the nine English regions were expected to provide a forward assessment of potentially accessible renewable energy resources in 2020, though this extended up to 2030 for the West Midlands report. The results are presented by renewable category (see next section for the range of technologies covered).

26. In early 2011, DECC commissioned the NNFCC to review the outputs from the regional reports as they became available to assess. The key objectives were to;

    - assess the consistency of approaches used, both within and between regions (i.e. deviations from the proposed methodology);
    - highlight any differences in approach and;
    - identify whether any deviations from the methodology were likely to affect the integrity of any of the results presented, particularly when comparing between regions.

27. Review of assumptions and approaches adopted within the original RLCECM were not within the remit of this assessment. The key remit of this study was to assess compliance with and deviations from use of RLCECM methodology and to assess where any deviations from the methodology are likely to have a significant impact on the results presented.

28. The outcomes of this assessment are presented in this report which has been compiled through;

    - consultation with the original authors of the RLCECM approach
    - review of the individual regional reports
    - face-to-face interviews with representatives of the consultants who conducted the studies in each region
    - examination of the data sets sourced and collated by the consultants;

[2] Based on RLCECM or the individual contractors assumptions about the efficiency of energy conversion for different routes of exploitation of renewable energy resources.

- Interviews with some of the local authority and Regional Development Agency clients for the regional studies.

29. This report does not attempt to evaluate or comment on the individual findings of the reports but provides a summary of the comparable findings across the nine English regions, highlighting deviations from the methodology and identifying whether these deviations are likely to affect comparisons between regions.

30. The NNFCC is not responsible for the individual data presented in this report which is derived from the individual regional reports.

Approaches

Technologies covered

Renewable Energy

31. The resource and technological scope for the RLCECM includes land-based renewable energy categories but not offshore sources (offshore wind and wave/tidal). This includes both large-scale commercial renewables as well as micro-generation, including on-site and building-integrated renewables.

32. **Table 2** lists the renewable energy categories and sub-categories covered by the methodology. These are broadly consistent with the general categories used previously in renewable energy assessments. Several technology categories were excluded because either their potential in the UK is currently deemed to be negligible (e.g. deep geothermal energy and surface-water source heat pumps) or cannot be quantified in terms of installed capacity (such as solar passive design).

Low carbon energy (primarily for heating)

33. The RLCEC methodology also refers to technologies that offer potential to reduce the carbon footprint of energy delivery - *even if the primary fuel feed is fossil-based*. Low carbon energy technologies discussed in the RLCECM include combined heat and power (CHP) tri-generation (to include cooling) and district heating schemes. Whilst not directly fulfilling commitments under the RES or RED, such energy-efficient low carbon sources of energy supply are an important part of the mix of technologies that regions can employ to reduce carbon emissions.

34. However, the assessment of deployment opportunities for such low-carbon technologies relies on economic benchmarks rather than technical ones. A low-carbon scheme is deemed viable if it meets certain minimum economic criteria, such as the heat demand density thresholds (*it is not only the heat demand but the concentration of heat demand that is important as it is uneconomical to transport heat over long distances*). Consultation and work undertaken during development of the RLCECM identified that currently there are no agreed benchmarks or assumptions to enable accurate assessment of potential uptake for such low-carbon technologies and the RLCECM therefore provides no specific approach to assess potential, other than to suggest assessing heat density. As a result, deployment of the above low-carbon energy technologies are only briefly mentioned at a generic level in the RLCECM report and only in a small sample of regional reports (discussed below).

Table 2: Renewable energy resource categories covered by RLCECM

Category	Sub-category level 1	Sub-category level 2
Wind (onshore)	Wind – commercial scale Wind – small scale	
Biomass	Plant biomass	Managed woodland Energy crops Waste wood Agricultural arisings (straw)
	Animal biomass (EfW)	Wet organic waste Poultry litter
	Municipal Solid Waste (MSW) Commercial & Industrial Waste (C&IW)	
	Biogas (EfW)	Landfill gas Sewage gas
	Co-firing of biomass (with a fossil fuel)	
Hydropower	Small scale hydropower	
Microgeneration	Solar	Solar Photovoltaics (PV) Solar Water Heating (SWH)
	Heat pumps	Ground source heat (GSHP)[3] Air source heat (ASHP)[4]

Source: SQW Energy

Interviews and data checking

35. For each of the renewable technologies, a check list was developed (using MS Excel) to compare the approach, procedure and sources of data used compared to those suggested by methodologies outlined in the RLCECM. The check sheet was also used to capture information and comment on any deviations.

36. NNFCC initially scrutinised regional reports as they became available to identify whether RLCECM `methodologies had been followed, whether specific difficulties had been encountered and whether any deviations in calculations or assumptions had been made. Records of compliance and anomalies were captured in the check sheets for each region

37. In addition, to address any information gaps and check on underlying data usage, face-to-face interviews were undertaken with the consultants involved in undertaking the regional assessments.

38. The collated comments for each region (in terms of both assumptions used and evidence presented) were reviewed and analysed in terms of whether returns represented;

[3] This category covers horizontal trench and vertical borehole systems across the closed loop and open loop types (open loop GSHP uses ground water from an aquifer)
[4] Only those systems that achieve a coefficient of performance in line with the Renewables Directive 2009

- deviations from the methodology likely to affect the delivered results (highlighted in yellow in individual regional and overall summary tables)
- issues raised by contractors in following the methodology (highlighted in orange in summary tables only. In this case these indicate where issues or approaches did not significantly affect the outcomes)
- draft findings only (indicated in red).

39. Summary results tables for all regions provide a visual indication of where there were common issues affecting the methodology across regions.

Scope of work reviewed in regional assessment reports

40. As it was left up to the individual regions to commission the work, the remit of some of the reports extended beyond that detailed earlier. Some studies attempted to assess how further economic and planning constraints along with development of scenarios and assumptions regarding deployment rates were likely to affect actual rates of future renewable energy deployment. Some regional reports addressed this more comprehensively (North West and North East) than others (South East). In other cases a more general figure was presented but without clear explanation of how figures were derived (East of England). In the remaining cases no attempt was made to go beyond the assessment of 'potentially accessible resource' (i.e. not beyond assessment of impacts of planning and regulatory constraints).

41. In addition, while seven regional reports presented data for 2020, as proposed in the methodology, the West Midlands report deviated by presenting data to 2030 as this was seen as being "in better alignment with local planning horizons and time scales for technical development". The draft London report available at the time of writing also only presented data for 2031, but the final report plans to include results for 2020.

42. As the RLCECM does not clearly specify how low carbon technology potential should be addressed, where it was addressed it was addressed in different ways. Five reports presented additional heat mapping work to help identify regions of high heat demand density that could support combined heat and power (CHP) or district heating systems but only in 3 cases was this extended to provide an estimate of potential future low-carbon heat capacity.

43. As a result of such limitations, this review primarily limits itself to examining the common data sets within each report that relate to assessment of potential renewable energy deployment up to 2020 (or 2030 & 2031 as nearest alternatives - given that some energy resources will not change over time (e.g. wind or water resource) this is seen as a reasonable compromise).

44. Given the low level of detailed coverage within individual reports, reference to low carbon energy technologies is limited to comment on the common issues affecting deployment.

45. Reference is given in following sections to any additional estimates of estimated potential for actual renewable energy deployment to help put the presented data into context.

Reports by Region

46. In the following sections the high-level summary data findings from each regional report are presented by technology category, amalgamated at the regional level.

Deviations from the RLCECM, which were sometimes necessary due to the complex nature of the study, are reported for each region. As detailed above, the figures represent the **potential renewable energy resources that could be accessed, expressed as the potential generating capacity that would be supported by each renewable energy resource**. As a result they represent an extreme upper limit on potential. As a comparison it should be borne mind that the current UK electricity demand is delivered from 85GW of installed capacity (from all sources). The highest estimate of accessible renewable energy potential for electricity production in an individual region was 72GW (in the East of England) which represents 84% of this total.

47. In the concluding section, a single table provides an overview of trends across regions to demonstrate compliance with the RLCECM approaches. In addition an amalgamated table (**Table 1**) is provided in the summary as an overview.

North West

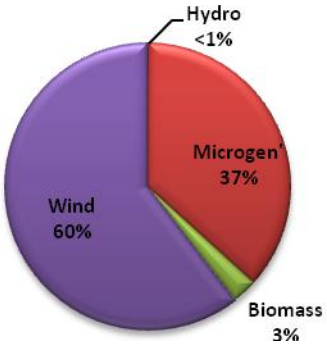

Figure 1: Potential renewable energy plant capacity by technology (MW) that could be supported in 2020 in the North West

48. The North West renewable and low carbon energy capacity and deployment project report is available from the DECC website: http://www.decc.gov.uk/en/content/cms/meeting_energy/renewable_ener/ored_news/ored_news/method_assess/method_assess.aspx

49. The North West report concludes that there is potential for up to 40GW of renewable energy plant capacity in 2020, dominated by the potential for wind-derived electricity.

- Wind 24GW[5]
- Biomass 1GW
- Small scale hydro power 77MW
- Microgeneration 15GW

50. The North West analysis undertakes further assessment of economic and planning constraints and concludes that around 15-17% of regional electricity demand could potentially be generated from renewable and low carbon technologies by 2020.

[5] Figures have been rounded.

Table 3: Summary of potential renewable energy plant capacity in the North West that could be supported by regional renewable energy sources in 2020

Figures are highlighted where deviations from the methodology affect the results

Category	Sub-category level 1	Sub-category level 2	North West		
			Electricity (MWe)	Heat (MWth)	Total Energy (MW) by group
Wind	**Wind – commercial scale**	Wind – commercial	23,587		
	Wind – small scale	Wind – small scale	669		
					24,256
Biomass	**Plant biomass**	Managed woodland	20		
		Managed woodland (heat)		122	
		Energy crops	11		
		Energy crops (heat)		60	
		Waste wood	39		
		Agricultural arisings (straw)	11		
	Animal biomass	Wet Organic Waste	206		
		Poultry Litter	9		
	Municipal Solid Waste		211		
	Commercial & Industrial Waste		135		
	Biogas (aka EfW)	Landfill gas	68		
		Sewage gas	28		
	Co-firing of biomass		198		
					1,118
Hydro	**Small scale hydropower**	Small scale hydropower	77		
					77
Microgeneration	**Solar**	Solar Photovoltaics	1,158		
		Solar Water Heating		1,158	
	Heat pumps	Ground Source Heat Pump		2,471	
		Air Source Heat Pump		9,884	
					14,671
Totals			**26,427**	**13,695**	**40,122**
Percentages			66	34	100%

North West Deviations from RLCECM

51. The North West assessment applies the RLCECM methodology with little deviation. Deviations that affect the results are highlighted in **Table 3**, and include:

Plant Biomass: Managed Woodland and Energy Crops

52. The RLCECM methodology advises that for managed woodland and energy crop resource, a heat plant availability figure of 80% should be used to calculate supported heat capacity. However, after the contractors consulted the regional Forestry Commission Woodland Officer, 45% was adopted as more realistic figure for heat plant availability.

- *It is accepted that a figure of 80% for heat plant availability is too high for most situations other than where process heat is being supplied and this is an oversight in the original methodology (Also recognised by SQW Energy (the authors of the RLCECM) who also led some of the regional assessments (West & East Midlands and North West)). However, 45% is potentially still too high for many seasonally variable heat requirements and as a result this could lead to an underestimate of the potential installed capacity for heat generation that could be supported by the available managed woodland resource. (i.e. the same biomass energy resource would support a larger number of boiler plants running at a lower heat plant availability – though the total amount of heat delivered would remain the same).*
- *This was a common issue amongst all the regional assessments and many deferred to reference figures provided by the Carbon Trust Biomass Heating Guide[6], which provides examples of typical heating plant availability factors for three different categories:*
  General occupancy – 20% (e.g. buildings occupied during working hours)
  Service applications – 45% (e.g. swimming pools and hospitals)
  Process applications – 60% (e.g. horticulture, food and drink)
- *Many regional studies adopted 45% as a more realistic 'median' figure using the Carbon Trust guidance or information gained from other sources. Regions with a dominance of residential properties (South West and South East) opted for 20%. Provision of a range of heat plant availability values for different plant categories would allow scenarios for different mixes of domestic and commercial or process heating plants to be compared against the accessible biomass energy resource.*

[6] Carbon Trust, Biomass heating. A Practical Guide for Potential Users (CTG012) published January 2009

North East

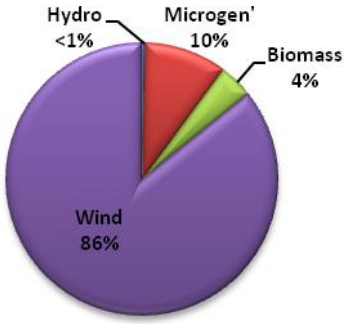

Figure 2: Potential renewable energy plant capacity by technology (MW) that could be supported in 2020 in the North East

53. The North East Renewable and Low Carbon Energy Capacity Assessment report is available from the DECC website: http://www.decc.gov.uk/en/content/cms/meeting_energy/renewable_ener/ored_news/ored_news/method_assess/method_assess.aspx

54. The North East report presents findings for 2020, in line with the RLCECM approach. The North East report concludes that there is potential to support around 16GW of onshore renewable energy capacity in the region primarily derived from wind resources (**Table 4**).

- Wind 14GW
- Biomass 0.7GW
- Small scale hydro power 55MW
- Microgeneration 1.6GW

55. Additional analysis indicates the potential for this resource to deliver between 5.4% and 13.5% of the regions 2020 energy demand.

North East Deviations from RLCECM

56. Deviations from the methodology that affect the results include:

Plant Biomass: Managed Woodland

57. The RLCECM methodology requires that woodfuel that is uneconomic to harvest, and woodfuel that will or could go to alternative markets should be excluded from the available wood fuel resource. The North East report used the alternative assumption that only 7.95% of the future woodland resource will be available for biomass energy use, which is a simple extension of the percentage of the resource that is currently used for biomass energy applications in the region (i.e. no allowance is made any for proportionate growth in use for biomass energy applications).

- *It is not clear from the report what percentage of the woodland resource is considered to be uneconomical to harvest. This has a potential significant impact on the managed woodfuel resource available.*
- *The managed wood fuel resource for heat applications is expected to be significantly greater in future than that currently exploited, as for example uptake*

of wood fuels is likely to be stimulated by the forthcoming Renewable Heat Incentive (RHI).

Plant Biomass: Managed Woodland and Energy Crops

58. The North East assessment uses a heat plant availability of 50% (rather than 80%) for managed woodlands, waste wood, agricultural arisings (straw) and energy crops. These were derived from the parallel Yorkshire and Humber Renewable and Low Carbon Capacity Study.

- *A plant heat availability factor of 50% is potentially still too high and could result in an under estimated of the heat capacity that could be established based on the potentially available energy crop resource.*

Table 4: Summary of potential renewable energy plant capacity in the North East that could be supported by regional renewable energy sources in 2020

Figures are highlighted where deviations from the methodology affect the results

Category	Sub-category level 1	Sub-category level 2	North East		
			Electricity (MWe)	Heat (MWth)	Total Energy (MW) by group
Wind	**Wind – commercial scale**	Wind – commercial	11,000		
	Wind – small scale	Wind – small scale	2,700		
					13,700
Biomass	**Plant biomass**	Managed woodland	4		
		Managed woodland (heat)		9	
		Energy crops	15		
		Energy crops (heat)		93	
		Waste wood	47	111	
		Agricultural arisings (straw)	22		
	Animal biomass	Wet Organic Waste	40		
		Poultry Litter	3		
	Municipal Solid Waste		141		
	Commercial & Industrial Waste		108		
	Biogas (aka EfW)	Landfill gas	41		
		Sewage gas	5		
	Co-firing of biomass		12		
					650
Hydro	**Small scale hydropower**	Small scale hydropower	**55**		
					55
Microgeneration	**Solar**	Solar Photovoltaics	788		
		Solar Water Heating		776	
	Heat pumps	Ground Source Heat Pump		4	
		Air Source Heat Pump			
					1,568
Totals			**14,979**	**993**	**15,972**
Percentages			94	6	100%

Yorkshire and Humber

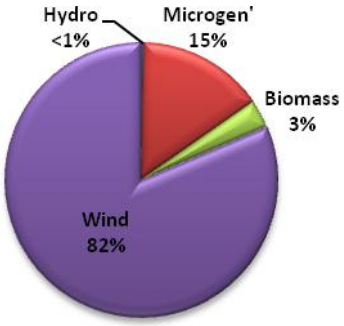

Figure 3: Potential renewable energy plant capacity by technology (MW) that could be supported in 2020 in Yorkshire and Humber

59. The Low carbon and renewable energy capacity in Yorkshire and Humber report and Low carbon and renewable energy capacity in Yorkshire and Humber Part B report are available from the DECC website: http://www.decc.gov.uk/en/content/cms/meeting_energy/renewable_ener/ored_news/ored_news/method_assess/method_assess.aspx

60. The main Yorkshire and Humber report presents findings for 2025, contrary to the RLCECM methodology. However, Part B of the report presents findings for 2020, in line with the RLCECM methodology. The 2020 data are highlighted in **Table 5**. The report concludes that there is potential renewable energy resource to support up to 59GW of installed renewable energy capacity in the region, with wind-derived energy making the largest contribution.

- Wind 48GW
- Biomass 1.9GW
- Small scale hydro power 185MW
- Microgeneration 9GW

61. Based on a set of scenarios derived to gain a better assessment of actual deployment potential, the contractors concluded that it would be very difficult to achieve a target to replace 12% of heat and 30% of electrical energy through generation from regional renewable resources.

Yorkshire and Humber Deviations from RLCECM

62. Deviations from the methodology that affect the results include:

Plant Biomass: Energy Crops

63. A heat plant availability of 50% (rather than the recommended 80%) was used, based on AECOM experience of conducting feasibility studies for CHP schemes and reflects the fact that not all heat output will be used.

   - *Although this is considered to be an improvement on the RLCECM methodology, 50% is potentially still too high and could result in an under estimation of the potential renewable heat capacity that could be supported.*

64. The Yorkshire and Humber study was unable to gain access to any data relating to areas of energy crops grown in the region and it was assumed that no energy crops are currently grown in the region. It also assumed that costs of establishment would limit future uptake.

- *There are currently around 5,700 hectares grown in Yorkshire and Humber for use by Drax alone[7].The energy crop resource is therefore underestimated to some extent.*

Plant Biomass: Waste Wood

65. A heat plant efficiency factor of 50% was used to estimate the potential heat plant capacity, similar to the approach used for energy crops. Again this is based on AECOM experience of conducting feasibility studies for CHP schemes.

- *Although this is considered to be an improvement on the RLCECM, 50% is potentially still too high and could derive an under estimate of the heat plant capacity that could be supported by the regional waste wood resource.*

Biomass: Municipal solid waste (MSW) and commercial and industrial (C&I) waste arisings

66. The Yorkshire and Humberside report failed to differentiate between MSW and C&I waste arisings. A single heat plant efficiency factor of 50% was also used to convert from generated heat energy to installed plant capacity. The impacts of this are the same as for treatment of energy crops and waste wood.

Biomass: Straw, poultry litter and wet organic wastes

67. In converting to heat plant capacity, a single heat plant efficiency factor of 59% was used for straw and poultry litter and 80% for wet organic wastes.

- *The efficiency factor for wet wastes is likely to be too high, resulting in an overestimate of installed heat plant resource. However in this case, such materials are likely to be used in large-scale heat plants delivering process or base-load heat and the overall impact is relatively small.*

68. For straw, the resulting heat plant capacity figure is likely to be closer to what is possible, using a more realistic plant availability factor.

- *However, it's not clear whether poultry litter would be used in small-scale heat applications other than in on-farm applications and use of the 59% for estimating plant availability may overestimate the potential for heat applications using poultry manure.*

[7] Rob Wood, Biomass Buyer for Drax Power

Table 5: Summary of potential renewable energy plant capacity in the Yorkshire and Humber region that could be supported by regional renewable energy sources in 2020

Figures are highlighted where deviations from the methodology affect the results

Category	Sub-category level 1	Sub-category level 2	Yorkshire & Humber		
			Electricity (MWe)	Heat (MWth)	Total Energy (MW) by group
Wind	**Wind – commercial scale**	Wind – commercial	46,533		
	Wind – small scale	Wind – small scale	1,132		
					47,665
Biomass	**Plant biomass**	Managed woodland	0		
		Managed woodland (heat)		50	
		Energy crops	168		
		Energy crops (heat)		335	
		Waste wood	17	33	
		Agricultural arisings (straw)	263	371	
	Animal biomass	Wet Organic Waste	42	34	
		Poultry Litter	49	70	
	Municipal Solid Waste		161	162	
	Commercial & Industrial Waste				
	Biogas (aka EfW)	Landfill gas	153		
		Sewage gas	16		
	Co-firing of biomass				
					1,924
Hydro	**Small scale hydropower**	Small scale hydropower	185		
					185
Microgeneration	**Solar**	Solar Photovoltaics	1,522		
		Solar Water Heating		1,516	
	Heat pumps	Ground Source Heat Pump		5,775	
		Air Source Heat Pump			
					8,813
Totals			**50,241**	**8,346**	**58,587**
Percentages			86	14	100%

West Midlands

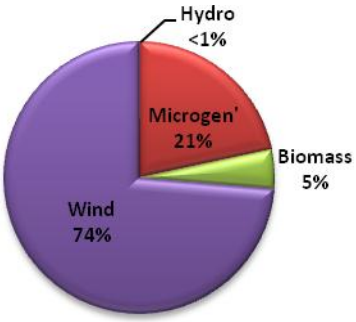

Figure 4: Potential renewable energy plant capacity by technology (MW) that could be supported in 2030 in the West Midlands

69. The Renewable Energy Capacity Study for the West Midlands is available from the DECC website: http://www.decc.gov.uk/en/content/cms/meeting_energy/renewable_ener/ored_news/ored_news/method_assess/method_assess.aspx

70. The West Midlands report presents renewable energy resource potentials for 2030 rather than 2020 (for the reasons mentioned in the introduction to this section) which is contrary to the timeline originally specified by DECC.

71. Findings from the report are highlighted in **Table 6**. The West Midlands report concludes that there is around 54.2GW of potential renewable energy capacity that could be supported in the region, predominantly by capturing wind energy.

- Wind 38GW
- Biomass 2.4GW
- Small scale hydro power 72MW
- Microgeneration 14GW

West Midlands Deviations from RLCECM Methodology

72. The West Midlands report applies the RLCECM methodology with little deviation. Deviations that affect the results and include:

Plant Biomass: Managed Woodland

73. Following discussions with experts in the Forestry Commission, a heat plant availability factor of 45% was adopted (rather than 80%), similar to the figure provided by the Carbon trust for 'service applications' of heat.

   - *Heat plant availability of 45% is potentially still too high and could derive an under estimate of the heat plant capacity that could be supported by the regional managed woodland resource*

Plant Biomass: Energy crops

74. The RLCECM required assessment of existing areas of established energy crops (short rotation coppice (SRC), miscanthus and short rotation forestry (SRF)). The h West Midlands study was unable to gain access to data from the Rural Payments

Agency, and Natural England confirmed that no applications were made under the Energy Crops Scheme for either 2009 or 2010.

- *While no applications for planting grant were reported in 2009 or 2010, this does not necessarily mean that there were no energy crops in the region as these could have been planted previously (though it is anticipated that these would be on relatively small areas).*

75. A heat plant availability figure of 45% was used (rather than 80%).

- *45% is potentially still too high and could derive an under estimate for the heat plant capacity that could be supported from the energy crop resource.*

Table 6: Summary of potential renewable energy plant capacity in the West Midlands that could be supported by regional renewable energy sources in 2030

Figures are highlighted where deviations from the methodology affect the results

Category	Sub-category level 1	Sub-category level 2	West Midlands		
			Electricity (MWe)	Heat (MWth)	Total Energy (MW) by group
Wind	**Wind – commercial scale**	Wind – commercial	36,727		
	Wind – small scale	Wind – small scale	1,634		
					38,361
Biomass	**Plant biomass**	Managed woodland	31		
		Managed woodland (heat)		36	
		Energy crops	229		
		Energy crops (heat)		1,321	
		Waste wood	37	32	
		Agricultural arisings (straw)	51		
	Animal biomass	Wet Organic Waste	165		
		Poultry Litter	18		
	Municipal Solid Waste		209		
	Commercial & Industrial Waste		145		
	Biogas (aka EfW)	Landfill gas	11		
		Sewage gas	34		
	Co-firing of biomass		106		
					2,425
Hydro	**Small scale hydropower**	Small scale hydropower	72		
					72
Microgeneration	**Solar**	Solar Photovoltaics	1,378		
		Solar Water Heating		1,153	
				2,215	
	Heat pumps	Ground Source Heat Pump		8,859	
		Air Source Heat Pump			
					13,605
Totals			**40,847**	**13,616**	**54,463**
Percentages			75	25	100%

East Midlands

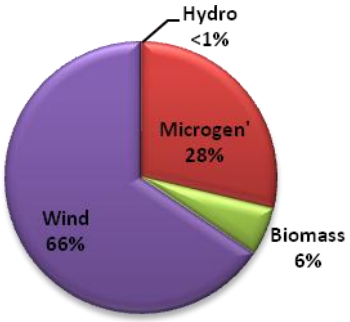

Figure 5: Potential renewable energy plant capacity by technology (MW) that could be supported in 2020 in the East Midlands

76. The *Low Carbon Energy Opportunities and Heat Mapping for Local Planning Areas Across the East Midlands* report is available from the DECC website: http://www.decc.gov.uk/en/content/cms/meeting_energy/renewable_ener/ored_news/ored_news/method_assess/method_assess.aspx

77. The East Midlands report presents findings for 2020, in line with the RLCECM. Findings from the report are highlighted in Table 7 below. The East Midlands report concludes that there is around 39GW of potential onshore renewable energy plant capacity in the region, predominantly based on capture of wind energy.

- Wind 26GW
- Biomass 2GW
- Small scale hydro power 19MW
- Microgeneration 11GW

East Midlands Deviations from RLCECM

78. Deviations that affect the results are highlighted in **Table 7**, and include:

Plant Biomass: Managed Woodland

79. Discussions with the Forestry Commission's Regional Woodland Officer and reference to Carbon Trust guidelines (biomass heating publication) resulted in use of a plant heat availability factor of 45% rather than 80%

- *45% is potentially still too high and could derive an under estimated finding for the generation of heat from the energy crop resource*
- *For waste wood, the East Midlands report uses a 60% availability factor referencing DECC's Digest of UK Energy Statistics, 2010, Table 7.4 (however this figure refers to power generation not heat. It is not clear whether the 60% capacity factor has also been applied to the generation of heat).*

Table 7: Summary of potential renewable energy plant capacity in the East Midlands that could be supported by regional renewable energy sources in 2020

Figures are highlighted where deviations from the methodology affect the results

Category	Sub-category level 1	Sub-category level 2	East Midlands		
			Electricity (MWe)	Heat (MWth)	Total Energy (MW) by group
Wind	**Wind – commercial scale**	Wind – commercial	24,366		
	Wind – small scale	Wind – small scale	1,430		
					25,796
Biomass	**Plant biomass**	Managed woodland	108		
		Managed woodland (heat)		29	
		Energy crops	608		
		Energy crops (heat)		170	
		Waste wood	27	23	
		Agricultural arisings (straw)	166		
	Animal biomass	Wet Organic Waste	119		
		Poultry Litter	20		
	Municipal Solid Waste		148		
	Commercial & Industrial Waste		127		
	Biogas (aka EfW)	Landfill gas	51		
		Sewage gas	18		
	Co-firing of biomass		609		
					2,225
Hydro	**Small scale hydropower**	Small scale hydropower	19		
					19
Microgeneration	**Solar**	Solar Photovoltaics	1,379		
		Solar Water Heating		1,502	
	Heat pumps	Ground Source Heat Pump	8,372		
		Air Source Heat Pump			
					11,254
Totals			**37,569**	**1,725**	**39,293**
Percentages			96	4	100%

East of England

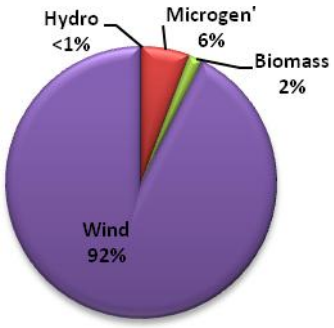

Figure 6: Potential renewable energy plant capacity by technology (MW) that could be supported in 2020 in the East of England

80. The East of England renewable and low carbon energy capacity study is available from the DECC website: http://www.decc.gov.uk/en/content/cms/meeting_energy/renewable_ener/ored_news/ored_news/method_assess/method_assess.aspx

81. The East of England report presents findings for 2020, in line with the RLCECM methodology. Findings from the report are highlighted in **Table 8**. The East of England report concludes that there is potential to support around 75GW of onshore renewable energy plant capacity in the region, predominantly based on wind turbines.

- Wind 70GW
- Biomass 1.3GW
- Small scale hydro power 1.5MW
- Microgeneration 4GW

82. Addition information is supplied in the East of England report on the potential for large scale solar photo voltaic (PV) arrays in the region; which suggested a potential for 2,800MW of installed capacity.

83. The contractors estimated that delivering around 9.3% of regional energy demand from use of regional renewable resources is a more reliable estimate of what might be achievable in the region.

East of England Deviations from RLCECM

84. Deviations that affect the results include:

Plant Biomass: Managed Woodlands

85. A heat plant availability factor of 34% rather than 80% was used in the East of England report to estimate the likely installed capacity of wood fuel plant for heat production, and 50% and 80% for heat and electricity production respectively from CHP plants.

- *This is an improvement on the original RLCECM and is more representative of likely levels of utilisation.*

Plant Biomass: Energy Crops

86. The RLCECM requires data on existing areas of established energy corps and proposes three scenarios for estimating the amount of land that could be made available for growing additional energy crops. It is acknowledged in the methodology that the high scenario is neither possible nor desirable due to other uses of the land, most notably for food production.

87. The East of England assessment followed the RLCECM approach but the the results were not used because the Environment Agency; who are responsible for issuing water extraction licenses, considered that most of areas identified as suitable for energy cropping would be affected by water stress, and access to abstraction licences would be limited. The Environment Agency advised that the most likely scenario for Energy Crops was a negligible change due to the water restrictions. This proposition was adopted for projections in the East of England report.

    - *This has a significant impact in restricting the estimated potential energy crop resource and the plant capacity that could be supported, which is the lowest of all regional assessments at 3MW (other than that for London with a limited agricultural land area).*

88. A heat plant availability factor of 50% was used rather than 80%, based on AECOM experience of conducting feasibility studies for CHP schemes and reflects the fact that not all heat output will be used.

    - *Although this is considered to be an improvement on the RLCECM, 50% is potentially still too high and could derive an under estimated of the capacity for heat that could be supported by the energy crops resource.*

Plant Biomass: Waste Wood

89. A heat plant availability factor of 50% was used as for energy crops rather then 80%.

Table 8: Summary of potential renewable energy plant capacity in the East of England that could be supported by regional renewable energy sources in 2020

Figures are highlighted where deviations from the methodology affect the results

Category	Sub-category level 1	Sub-category level 2	East of England		
			Electricity (MWe)	Heat (MWth)	Total Energy (MW) by group
Wind	**Wind – commercial scale**	Wind – commercial	69,218		
	Wind – small scale	Wind – small scale	48		
					69,266
Biomass	**Plant biomass**	Managed woodland	27		
		Managed woodland (heat)		259	
		Energy crops	1		
		Energy crops (heat)		2	
		Waste wood	23	47	
		Agricultural arisings (straw)	43		
	Animal biomass	Wet Organic Waste	13	11	
		Poultry Litter	76		
	Municipal Solid Waste		152	76	
	Commercial & Industrial Waste		235	118	
	Biogas (aka EfW)	Landfill gas	169		
		Sewage gas	27		
	Co-firing of biomass				
					1,279
Hydro	**Small scale hydropower**	Small scale hydropower	1.5		
					1.5
Microgeneration	**Solar**	Solar Photovoltaics	1,936		
		Solar Water Heating		1,496	
	Heat pumps	Ground Source Heat Pump		857	
		Air Source Heat Pump			
					4,289
Totals			**71,970**	**2,866**	**74,836**
Percentages			96	4	100%

London

90. The final version of the London report was not available at the time of writing as the data formed part of a larger study of decentralised energy capacity for London. It has since been published as separate reports covering the opportunity for renewable energy (phase 1 report) and constraints (phase 2 report) both of which are available to view on the DECC website: http://www.decc.gov.uk/en/content/cms/meeting_energy/renewable_ener/ored_news/ored_news/method_assess/method_assess.aspx

91. NNFCC was provided with a draft version of the report. The draft currently presents data for 2031.

92. Draft findings from the report are highlighted in **Table 9**. The assessment concludes that there is potential for installation of around 45GW of onshore renewable energy plant capacity in the region. In contrast to all other regions this is dominated by the potential for microgeneration, particularly from ground and air-source heat pumps.

- Wind 746MW
- Biomass 196MW
- Small scale hydro power 3MW
- Microgeneration 44GW

London Deviations from RLCECM

- It has not been possible to assess the adherences to, and deviations from, the RLCECM due to the draft status of the London regional report at the original time of writing. The potential of landfill and sewage gas had not been assessed or reported at the time of writing.

Table 9: Summary of potential renewable energy plant capacity in the London region that could be supported by regional renewable energy sources in 2020 (Draft data)

Category	Sub-category level 1	Sub-category level 2	London		
			Electricity (MWe)	Heat (MWth)	Total Energy (MW) by group
Wind	Wind – commercial scale	Wind – commercial	746		
	Wind – small scale	Wind – small scale			
					746
Biomass	Plant biomass	Managed woodland	0.6		
		Managed woodland (heat)			
		Energy crops	2		
		Energy crops (heat)			
		Waste wood	67.5		
		Agricultural arisings (straw)	0.5		
	Animal biomass	Wet Organic Waste	0.1		
		Poultry Litter	0.01		
	Municipal Solid Waste		70		
	Commercial & Industrial Waste		56		
	Biogas (aka EfW)	Landfill gas	-	-	
		Sewage gas	-	-	
	Co-firing of biomass				
					196
Hydro	Small scale hydropower	Small scale hydropower	3		
					3
Microgeneration	Solar	Solar Photovoltaics	3,688		
		Solar Water Heating	1,872		
	Heat pumps	Ground Source Heat Pump		11,624	
		Air Source Heat Pump		26,564	
					43,748
Totals					44,693
Percentages					100%

South West

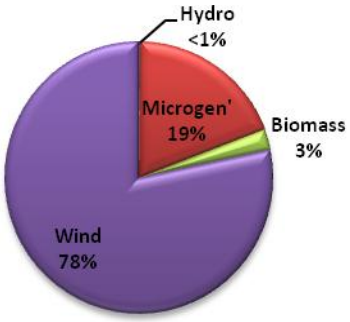

Figure 7: Potential renewable energy plant capacity by technology (MW) that could be supported in 2020 in the South West

93. The *South West Renewable Energy Resource Assessment: Methodological Report* is available from the DECC website: http://www.decc.gov.uk/en/content/cms/meeting_energy/renewable_ener/ored_news/ored_news/method_assess/method_assess.aspx

94. The South West report presents findings for 2020, in line with the RLCECM. Findings from the report are highlighted in Table 10. The South West report concludes that there is potential to install around 64GW of onshore renewable energy capacity in the region, predominantly driven by capture of wind energy.

- Wind 50GW
- Biomass 1.6GW
- Small scale hydro power 74MW
- Microgeneration 12GW

95. The report for the South West has been compiled from several different sub-regional studies, some commissioned especially for this regional study, some from previous studies and others from work already commissioned and in progress for which it was possible to manipulate the work to follow the RLCECM approaches.

South West Deviations from RLCECM

96. Deviations that affect the results:

Plant Biomass

97. Data for biomass technologies were limited to pooled results for biomass resources provided by AEA, who were commissioned separately to report to the Environment Agency before the RLCECM analysis was commissioned. While the approach was similar the biomass sub-categories evaluated differed.

98. Plant capacity figures were not calculated for each biomass resource and no attempt was made to separate into potential for heat and power applications. The South West report concentrated primarily on refining estimation of the biomass resource available in the region, as it was felt that the RLCECM was less robust.

- *As a result of such differences in approach it is difficult to compare findings with those of other regions.*

99. The South West Report uses a heat plant availability figure of 20% to reflect the more rural nature of the region and likely dominance of domestic and small scale heat technologies in such situations.

- *This is the correct decision for the region but perhaps needs some indication of the approach adopted where data is presented as use of 20% will effectively boost the 'installed plant capacity to biomass-energy resource' ratio.*

Microgeneration: Solar

100. Because the RLCECM uses a single set of parameters for solar energy and does not provide guidance on the breakdown of this potential between PV and SWH, cumulative totals are used for both solar and heat pump technologies.

- *It is thereby difficult to separate findings but the total capacity should be unaffected.*

Table 10: Summary of potential renewable energy plant capacity in the South West that could be supported by regional renewable energy sources in 2020

Figures are highlighted where deviations from the methodology affect the results

Category	Sub-category level 1	Sub-category level 2	South West		
			Electricity (MWe)	Heat (MWth)	Total Energy (MW) by group
Wind	**Wind – commercial scale**	Wind – commercial	47,765		
	Wind – small scale	Wind – small scale	2,207		
					49,972
Biomass	**Plant biomass**	Managed woodland	68	1,497	
		Managed woodland (heat)			
		Energy crops			
		Energy crops (heat)			
		Waste wood			
		Agricultural arisings (straw)			
	Animal biomass	Wet Organic Waste			
		Poultry Litter			
	Municipal Solid Waste				
	Commercial & Industrial Waste				
	Biogas (aka EfW)	Landfill gas			
		Sewage gas			
	Co-firing of biomass				
					1,565
Hydro	**Small scale hydropower**	Small scale hydropower	74		
					74
Microgeneration	**Solar**	Solar Photovoltaics	2,594		
		Solar Water Heating			
	Heat pumps	Ground Source Heat Pump		9,595	
		Air Source Heat Pump			
					12,189
Totals			**52,708**	**11,092**	**63,800**
Percentages			83	17	100%

South East

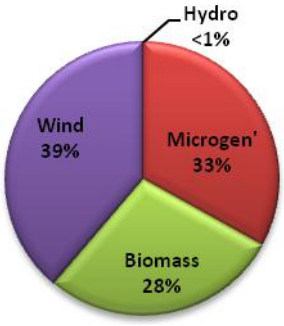

Figure 8: Potential renewable energy plant capacity by technology (MW) that could be supported in 2020 in the South East

101. The Review of Renewable and Decentralised Energy Potential in the South East report is available from the DECC website: http://www.decc.gov.uk/en/content/cms/meeting_energy/renewable_ener/ored_news/ored_news/method_assess/method_assess.aspx

102. The South East report presents findings for 2020, in line with the RLCECM methodology. Findings from the report are highlighted in Table 11. The South East report concludes that potentially around 56GW of onshore renewable energy plant capacity could be supported from the regional renewable energy resource available in 2020, primarily driven by a combination wind and biomass energy and heat pump technologies. This contrasts with the domination of wind-powered installations in all other regions except London.

- Wind 22GW
- Biomass 16GW
- Small scale hydro power 41MW
- Microgeneration 18GW

South East Deviations from RLCECM

103. The South East report applies the RLCECM methodology with little deviation. Deviations that affect the results and include:

Woodland and energy crops

104. As in the South West analysis, the South East analysis also uses a heat plant availability figure of 20% (rather than 80%) which is seen to reflect the more rural nature of the region and likely dominance of domestic and small scale heat technologies in such situations.

   - *As with the South West analysis, this is the correct decision for the region but perhaps needs some indication of the approach adopted where data is presented as use of 20% will effectively boost the 'installed plant capacity to biomass-energy resource' ratio.*

Table 11: Summary of potential renewable energy plant capacity in the South East that could be supported by regional renewable energy sources in 2020

Figures are highlighted where deviations from the methodology affect the results

Category	Sub-category level 1	Sub-category level 2	South East		
			Electricity (MWe)	Heat (MWth)	Total Energy (MW) by group
Wind	**Wind – commercial scale**	Wind – commercial	19,832		
	Wind – small scale	Wind – small scale	1,801		
					21,633
Biomass	**Plant biomass**	Managed woodland	81		
		Managed woodland (heat)		1,325	
		Energy crops	64		
		Energy crops (heat)		828	
		Waste wood	30	459	
		Agricultural arisings (straw)	421		
	Animal biomass	Wet Organic Waste	4,167		
		Poultry Litter	11		
	Municipal Solid Waste		2,429		
	Commercial & Industrial Waste		4,974		
	Biogas (aka EfW)	Landfill gas	72		
		Sewage gas	56		
	Co-firing of biomass		810		
					15,728
Hydro	**Small scale hydropower**	Small scale hydropower	41		
					41
Microgeneration	**Solar**	Solar Photovoltaics	2,538		
		Solar Water Heating		2,182	
	Heat pumps	Ground Source Heat Pump		13,685	
		Air Source Heat Pump			
					18,405
Totals			**37,327**	**18,479**	**55,807**
Percentages			67	33	100%

Additional comments raised by contractors applying the RLCECM

105. Common comments from contractors involved in the assessments and in relation to issues encountered in following the RLCECM approach are summarised by technology below. The linked annex to this report provides a longer description of issues raised by consultants undertaking the RLCECM assessments.

Wind

106. The RLCECM was followed consistently in all regional assessments. While some minor deviations occurred, they had little or no impact on the data and findings. Examples include using source data from the Ministry of Defence which relates to areas where wind developments are unlikely to be permitted. In other cases difficulties were encountered in getting information from the MoD on where wind farm developments would be permitted (due to potential interaction with radar systems).

107. Issues were consistently raised by all the contractors in terms of additional constraints that should be considered, including protected boundaries from buildings for wind turbines (even for small scale wind) and to take account of noise restrictions. The methodology was also criticised for not attempting to take into account the cumulative impact of wind turbines both on the electricity grid (intermittency issues) and in the landscape.

Biomass

108. The range of adherence and deviations from the RLCECM in different reports highlights the more complicated nature of dealing with assessment of the biomass resource. Most deviations from the methodology occurred in relation to assessment or utilisation of biomass resources.

109. Plant availability factors used for biomass for heat applications were most commonly challenged and revised, as described previously. In most cases the positions adopted represent an improvement on what was a flawed methodology in this instance.

110. Another issue commonly encountered was the difficulty in obtaining information and data on the areas of energy crops already established in any given area. In some cases this may reflect difficulties in working with the relevant Agencies under short deadlines. In addition, although the methodology proposes three different scenarios for predicting future energy crop growth (two of which are not dependent on estimates of current areas of energy crops) many contractors felt that the forward estimates would have been more reliable with access to better data on existing energy crop areas.

Hydro

111. There were no significant deviations from the RLCECM with regards to assessing the potential of hydropower and no issues were raised by the contractors.

Micro

112. The RLCECM approach for assessment of the micro-generation capacity was followed consistently by all contractors. Where minor deviations occurred they usually represented an improvement on the original methodology; for example using more detailed and specific regional data to help better target the resource potential.

113. However, issues were consistently raised by all the regional report contractors in relation to the approach for assessing the resource and the suitability of buildings to employ air-source and ground-source heat pumps as well as photovoltaic and solar hot water technologies. It was felt that the RLCECM approach was too brief and limited in scope and as a result resulted in significant overestimation of potential. It was also difficult to allocate solar capture resources between power and heating applications while avoiding double-counting (as both capacity assessments rely on the same resource base).

Potential for low-carbon technologies (primarily for heating)

114. The RLCECM guidance does not provide a detailed method to enable assessment and mapping of the potential to supply low carbon heat through district heating networks and CHP.

115. Generally in the regional reports, only outline assessments of the potential for low carbon renewable energy have been carried out, based on the potential for combined heat and power (CHP) and district heating schemes. In the main this has been limited to mapping of heat demand. In the absence of a common methodology, different approaches were taken across the regions. Only 7 regions to date have attempted to take the first steps to assess or map the potential. Typically and where assessed, a regional low-carbon CHP/heat plant capacity demand of between 1-2.4GW_{th} was identified (but only 32MW_{th} of potential was identified in the North East).

116. District heating utilising biomass CHP is the most cost-effective solution for the supply of low carbon heat in terms of cost per tonne of carbon saved[8]. Once heat networks are in place they are flexible enough to be served by a range of low carbon fuel sources, which could change over time in response to available incentives and the availability of fuel supply.

117. Although all the reports indicate that there is potential for district heating networks, delivering district heating networks at scale has proved difficult to date and there are a range of planning, financial and technical hurdles identified that need to be overcome including;

- Securing the scale, diversity and security of heat load required to create a viable network - a strategic approach to the planning and phasing of district heating infrastructure and plant is crucial for success;
- Uncertainty around timescales for delivery of local heat networks leads to lack of confidence in developers committing to solutions outside the boundary of their own sites;
- Variation in local authority capacity and commitment to lead and enable delivery.

Conclusions

Value of the outputs

118. Through use of the RLCECM approach, the individual regional studies highlight the potentially very significant contribution that onshore renewable energy resources could theoretically make towards regional renewable energy deployment. Though the contributions from biomass resources and micro-generation may look proportionately

[8] The potential and costs of district heating networks, Faber Maunsell and Poyry, April 2009

small compared to that which could potentially be delivered from harnessing wind energy, in their own right the potential contribution from these resources is still very significant and needs to be promoted alongside that of wind.

119. Different approaches to some aspects of the methodology have been adopted in different regions and this makes comparison between regions more difficult. While there may be a wish from nationally-interested perspectives to try and amalgamate results from different regions, this is not what the original RLCECM was designed to achieve and such temptations should be resisted due to slight differences in approach and the coarse nature of the assessment which could lead to over-optimistic proposals for target setting.

120. It is recognised that the resource assessment delivered is of a coarse regional nature and further work is required to take account of the additional constraints that will affect local deployment to enable better targeting and priority setting to promote the step change in deployment that is required nationally.

121. Since the work was commissioned, the change in Government has led to scrapping of Regional Spatial Strategies (subject to consultation) and Regional Delivery Agencies with responsibility for helping to target and deliver the low-carbon agenda in the regions. As a result key question going forward is what is the value of the information gathered to date and how might it be capitalised upon?

122. Key responsibilities for delivering renewable and low-carbon energy are likely to be devolved back to Local Authorities that have a more narrow view in terms of national priorities and constraints but a strong interaction with the communities affected by developments. Local Authorities can influence the uptake of renewable and low carbon technologies in several ways;

- through its influence on local economic development and waste policies
- by setting strategies that promote the use of sustainable energy
- by setting local planning guidance to encourage use of renewable energy in new developments
- by granting planning consent to good quality and appropriately-sited development
- through educational and promotional campaigns
- by supporting other local promoters of renewable energy
- by signposting to grant and support schemes
- by acting as an exemplar and encouraging change in others
- by creating partnerships with like-minded organisations to foster a common purpose

123. The outputs of the RLCECM furnish Local Authorities and other interested parties with a broad overview of the regional renewable energy potential. This should enable the first steps to be taken in developing or refining local energy planning strategies and policies which will be key to any future local development of renewable and low carbon energy uptake.

124. With a clear understanding of the limitations of the RLCECM data, it can be used as a basis to influence opinion and help develop local strategies and development plans. In turn these may require more locally-refined assessments of renewable energy potential and targeting of work to help overcome development barriers. In part this may be through refining the RLCECM approaches at a local scale, using more spatially refined data, local knowledge and an understanding of local planning policy to better define the available resource potential. There are already numerous examples across

many regions where the RLCECM approach has been used to provide localised wind and heat maps.

125. Building consensus and common guidance to undertake such local assessments would reduce costs and delivery timescales and help to co-ordinate activities and learning experiences between Local Authorities.

126. It was always going to be difficult to create a methodology that could be applied universally by different regions using very different consultants without any problems arising. However, the flexibility and robustness of the core of the RLCECM approach has allowed it to be used as intended in the most part, and adapted where better regional information or data has been available to refine the outputs. The RLCECM has attempted to harmonise a process that was already happening in some regions though on a piecemeal basis. On this basis alone and in focussing thoughts in this area it has achieved much as a starting point for further work and analysis.

127. The RLCECM approach to date has been more successful in supporting assessment of renewable energy capacity than that of CHP or district heating. However, it has stimulated many regions to produce some of the first regional heat density maps (of varying sophistication) which will be important tools for targeting future actions.

Issues arising with the RLCECM

128. An overview of the regional and technology related patterns of deviations from the RLCECM methodology can be seen in **Table 1**.

Biomass technologies

129. Dealing with biomass resource assessments was responsible for all the deviations from the methodology where revised approaches or assumptions had a significant impact on the results. In part this reflects the more complicated nature of biomass categories and related technologies for exploitation. The main deviations were associated with disagreement over heat plant availability figures (the amount of time that biomass-fuelled plants are generating heat). As a result the capacity assessments are more representative of what theoretically could be delivered. This was recognised as a key oversight error in the original methodology which in this case led contractors to question the assumption and source better alternative data.

130. There were also uncertainties around the proportion of managed and unmanaged wood land resource that could be used for heat applications. This is an area where more detailed information would help. However, there are uncertainties around how initiatives such as the Renewable Heat Incentive will stimulate such markets. It is likely that some increase in use is inevitable.

131. Gaining access to underlying data on energy crops proved to be a problem in some cases. A centralised request for information may have helped to ease the problem.

Wind energy

132. While there was no problem following the RLCECM approach for assessing the wind resource potential, there was common consent that the method was not detailed enough in taking account of additional constraints on wind turbine potentials, and the impacts of concentrations of wind-farm developments. As a result the potential is seen to be the extreme upper limit of potential.

133. As with biomass, problems were also experienced in securing information from the MoD in terms of where wind turbines could be situated without affecting radar systems. Again a centralised request for information may have helped to ease the problem.

Microgeneration

134. As with assessment of wind potential, there were no problems following the methodology and some contractors found data sources on usable buildings of a higher resolution than that prescribed in the methodology. However, the potential for exploitation of resources (solar, ground and air source heat pumps) was seen to be too high by all contractors and there was difficulty allocating solar energy to power or heat applications without clear guidelines.

Possible Improvements

135. One clear factor that could have alleviated some of the problems with the assessments would have been central co-ordination of the resource assessments so that common approaches to problems could have been agreed and resolved. However, it is recognised that the disruption caused by the change of Government and changed priorities for the work led to disruptions in progress and priorities between regions that would have made co-ordinated actions more difficult. Consideration should be given to the need for central co-ordination and support in any similar exercises.

Further work

136. Leadership and delivery of renewable and low-carbon energy initiatives is best driven through local ownership. The absence of 'ownership' through direct involvement, or through local development plans or local energy planning means that there is no consequence for local councils when renewable and low carbon energy plans are rejected or shelved. It is therefore crucially important that sustainable energy features strongly in local development plans. This can be promoted by highlighting the existence of, and opportunities highlighted within, the regional reports to regional and local developers and Local Authorities.

137. Local Authorities will require support and guidance in developing and refining local energy plans to ensure they take full account of the potential of renewable and low carbon energy technologies. Support will also be required by Local Authorities to undertake any further analysis of economic viability and deployment constraints, required to underpin any detailed target setting for use in local energy plans.

138. Alongside the above, education and awareness-raising activities are required to build an understanding of, and confidence in, renewable energy technologies as opposition to wind and energy from waste technologies has stalled or halted potential developments in many cases.

139. In the absence of the former co-ordination provided by the Regional Development Agencies, Local Authorities will also have to find ways of working together through developing local partnerships to help deliver on large strategic initiatives such as the roll-out of renewable and low carbon energy technologies and in co-ordinating the development of grid and other infrastructure (e.g. district heating systems) that will be required to support deployment of more renewable and low carbon energy technologies.