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SOUTH CAMBRIDGESHIRE DISTRICT COUNCIL

UTILISING RENEWABLE ENERGY RESOURCES WITHIN SOUTH CAMBRIDGESHIRE

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GLOSSARY

APPENDICES

1. Energy and CO_2 data for South Cambridgeshire
2. Existing Renewable energy installations in South Cambridgeshire
3. Grant and Funding Schemes
4. Regional Renewable energy installers and suppliers

EXECUTIVE SUMMARY

This study investigates the options for encouraging renewable energy development in South Cambridgeshire. The focus is on how to stimulate community involvement and encourage more community and household scale projects.

The three central objectives of this study are:

- Inform and support development of policy, for the Local Strategic Partnership
  - Identify and justify actions South Cambridgeshire District Council (SCDC) can take, using their own resources, to support renewable energy development.
- Provide an evidence base for development of planning policy in the Local Development Framework.
- Provide guidance on how the district council can provide leadership in the implementation of renewable energy technology.

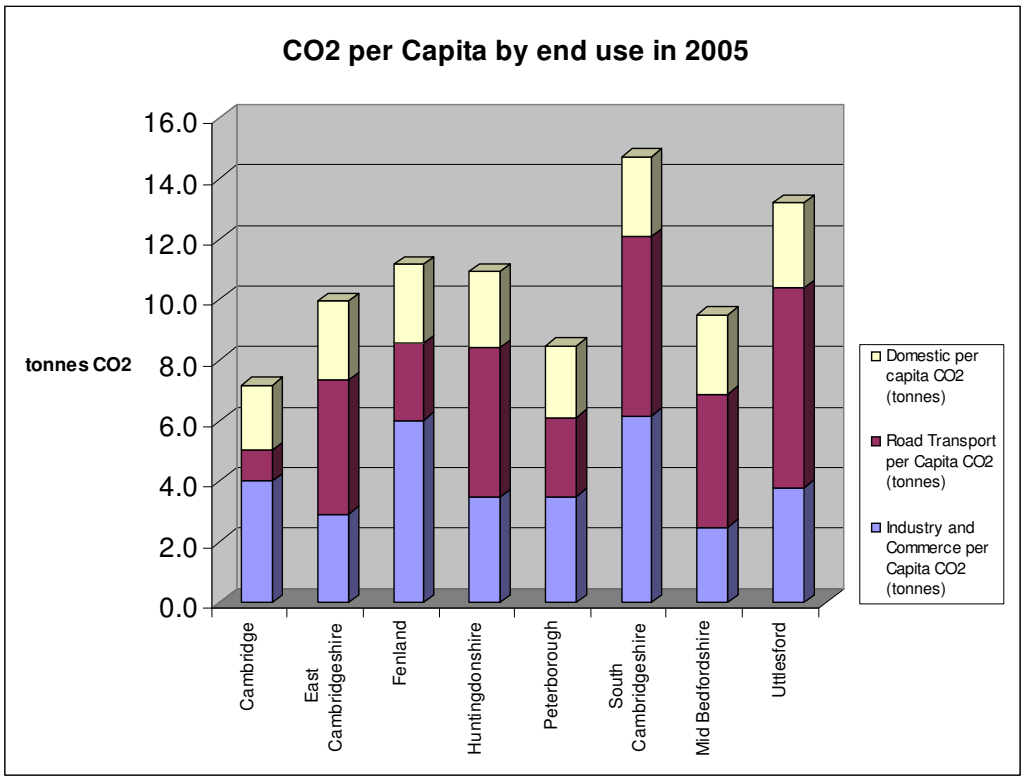
To achieve these objectives, this study has carried out the following tasks:

1. Establish current energy consumption and carbon emissions baselines for South Cambridgeshire
2. Identify existing renewable energy installations and review the current status of the local renewables market in South Cambridgeshire
3. Assess the availability of renewable energy resources in South Cambridgeshire
4. Review policies and schemes for supporting renewable energy development, and identify those appropriate for South Cambridgeshire.
5. Recommend practical actions that SCDC can take to support the use of the district's renewable energy resources, with a focus on the areas where they can have most influence - through supporting local community groups and through local planning policy.

Energy use in South Cambridgeshire

The current use of energy in South Cambridgeshire is higher than in neighbouring districts. This is likely to be due to the rural nature of the District combined with high levels of commercial and industrial development around Cambridge with the consequent high transport and commercial energy use. The higher use of energy results in higher CO_2 emissions. These will need to be tackled by a combination of energy demand reduction, energy efficiency and the deployment of renewable energy.

Comparing energy use in terms of CO_2 emissions per Capita



Renewable energy resource in South Cambridgeshire

The renewable energy resource across South Cambridgeshire is mixed with some windy areas (in the North, West and Southeast), a significant concentration of buildings (likely to provide easy access for solar energy) and major arable production (providing the possibility of biomass production). There are a number of recent renewable energy projects but the overall capacity is low. The greatest potential for local use of large scale wind is in the West and South East of the District. The District has a significant biomass resource in the form of straw, which in energy terms equals the amount of gas consumed by industry and commerce.

Key renewable energy resources readily accessible in South Cambridgeshire include

- **Wind**
- **Solar**
- **Biomass**
- **Ground Source**

Prioritising Community Renewables

There are a wide range of options and opportunities for developing renewable energy projects in South Cambridgeshire. These need to be prioritised to ensure limited resources and funding have the maximum impact in the short term. A short term strategy should focus on funding community projects which are quick to implement and have a demonstration value which will multiply the impact.

When comparing the technologies it is relatively easy to judge which give the greatest impact in CO_2 reduction terms for a given investment. However, it is not so easy to take into account the potential multiplier effect, which a community scheme may have. The following tables attempt to make this comparison.

Comparison of Community Renewables by payback and CO_2 savings costs

	kW				tonnes CO_2	
Photovoltaics	2	£12,000	£210	57	0.8	£15,929
Roof mounted wind	1	£3,000	£79	38	0.3	£10,619
Mast mounted small wind	6	£21,000	£946	22	3.4	£6,194
Medium scale wind	15	£45,000	£2,628	17	11.3	£3,982
Medium scale wind	50	£125,000	£8,760	14	37.7	£3,318
Large scale wind	2,000	£2,400,000	£350,400	7	1,883.4	£1,274
Small scale hydro power	10	£50,000	£4,380	11	18.8	£2,655
Solar thermal	2.5	£3,000	£84	36	0.5	£6,554
Ground Source Heat Pump	10	£10,000	£329	30	4.2	£2,403
Air source heat pump	10	£6,000	£183	33	4.2	£1,442
Wood pellet stoves	8	£2,400	-£26	-91	1.7	£1,384
Domestic scale wood boilers	15	£7,500	£123	61	5.4	£1,384
Larger scale wood boiler	300	£90,000	£9,444	10	108.4	£830
Wood fuelled CHP	150	£350,000	£60,293	6	179.0	£1,955

* * Assuming electricity 8 p/kWh (plus 4 p/kW ROC) heat 3.5 p/kWh; wood pellets 2.5 to 3 p/kWh, wood chip 1.25 p/kWh

Note the payback calculation is based on capital cost without grant. Also the fuel costs have been included but maintenance costs have not.

Table 3 compares the technologies in terms of payback and in terms of CO_2 saving per capital investment. It is clear that large scale applications such as wood heating and wind turbines have the quickest payback and the best CO_2 saving against capital investment. However, the capital investment required for just one large wind turbine runs in to millions.

Given a limited amount of capital to invest, say £100,000, it is interesting to see how far that goes and whether there is the potential for a multiplier effect. In other words, will a demonstration project help to inform and encourage others to invest in the same applications?

Comparison of technologies by "multiplier effect"

	Unit size kW	Cost per installation	CO_2 saving tonnes	Community demonstrations which can be funded with £100k*+	Overall saving tonnes CO_2	Multiplier to equal CO_2 saving from large scale wood boiler	Is this multiplier effect likely for this technology
Photovoltaics	2	£12,000	0.75	17	12.8	16	No
Roof mounted wind	1	£3,000	0.28	67	18.9	10	No
Mast mounted small wind	6	£21,000	3.39	10	33.9	5	No
Medium scale wind	15	£45,000	11.30	4	45.2	4	No
Medium scale wind	50	£125,000	37.67	2	75.3	2	?
Large scale wind	2,000	£2,400,000	1,883.40	0.08	157.0	0	?
Small scale hydro power	10	£50,000	18.83	4	75.3	2	No
Solar thermal	2.5	£3,000	0.46	67	30.7	6	Yes
Ground Source Heat Pump	10	£10,000	4.16	20	83.2	2	No
Air source heat pump	10	£6,000	4.16	33	137.3	1	Yes
Wood pellet stoves	8	£2,400	1.73	83	144.0	1	Yes
Domestic scale wood boilers	15	£7,500	5.42	27	146.3	0	Yes
Larger scale wood boiler	300	£90,000	108.41	2	216.8	-	Yes
Wood fuelled CHP	100	£350,000	179.03	0.57	102.3	1	?

* Assuming have £100,000 fund which provides 50% funding for demonstrations

\+ Assumes large wind tubine receives £100k partial investment

In table 4, the number of typical installations of each technology, which could be funded with £100,000 is calculated. The resultant total CO_2 savings are then calculated. £100,000 is enough to fund two large wood boiler installations (such as for a school) assuming 50% of the cost can be funded from elsewhere (Government grants for example). This results in 216.8 tonnes of CO_2 savings each year.

The same investment in photovoltaics results in 17 community installations (of 2 kW each) (such as for a village hall roof). However the CO_2 savings from this investment are only 12.8 tonnes of CO_2 each year. The next column shows how many further private installations would be required to reach the same CO_2 saving as the wood boiler investment. This is 16 household size photovoltaics installation inspired by each community installation. Even with other grants and incentives, this figure seems unlikely.

By comparison, the same £100,000 could fund 67 small scale solar water schemes (for a school, or a village hall or a pub). This achieves CO_2 savings of 30.7 tonnes of CO_2, better than the Photovoltaics but still a long way short of the wood boiler. However if just 6 installations are then inspired or prompted by each these 67 then

the overall CO_2 savings are the same as the wood boiler. This does seem achievable. Solar thermal systems are more affordable than Photovoltaics and there is greater availability of installers and suppliers.

The technologies most likely to have a multiplier effect are solar thermal, wood heating and air source heat pumps installed in community buildings such as village halls and schools.

This "multiplier effect" could be encouraged by asking community groups seeking funding for their community projects to set out in their applications how they will promote and disseminate information on the project and also how they will capture information on further installations and CO_2 results achieved. The new EEDA Cut Your Carbon Programme incorporates this approach.

Key technologies to promote in Community Projects, which will also encourage uptake by householders, include:

- **Solar thermal**
- **Wood heating**
- **Air source heat pumps**

Supporting Community Renewables

There are a number of new and continuing funding options for renewable energy projects. These include the government's Low Carbon Buildings Programme, EEDA's Cut Your Carbon programme and a new lottery fund managed by the Building Research Establishment called Community Sustainable Energy Programme.

Accessing funding and establishing projects can be daunting for community groups made up of volunteers often without relevant expertise. Establishing a network, supported by the council, would help facilitate a community approach by attracting support from private sector companies and by encouraging the sharing of ideas and support between communities.

Key Short Term Actions

- **Establish support network and help communities access other funding and support**
- **Target funding at whole village/community approach and encourage a "multiplier effect" from demonstration projects (link in with or use EEDA Cut Your Carbon methodology)**

Longer term development of Renewable Energy in South Cambridgeshire

There is a significant resource for larger scale renewable energy projects in the District. There include large wind turbines which could be installed to supply local industry/commercial customers and/or developed as a community projects. There is also a significant biomass resource in the form of straw which is a by product of

cereal production. Large scale projects can take several years to develop and require significant funding during the development stages, often a barrier to local community development of such schemes.

A longer term strategy should focus on developing planning policies and funding structures to support the development of community scale projects but also larger scale schemes such as large scale wind and biomass schemes. The Merton Rule policy in the Local Plan could be extended to apply more widely and or deeply in its requirements for renewable energy associated with new development. This could include refurbishments and extensions.

Apart from grant schemes, there are other more innovative funding support mechanisms such as Kirklees Councils “RECharge” scheme. This scheme proposes a second charge or an interest-free loan, secured against the value of the property, to be repaid to the authority when the property is sold. Therefore, the consumer does not need to pay upfront costs and there are no monthly loan repayments.

Key Long Term Actions

- **Develop or extend planning policies to widen scope of Merton Rule approach**
- **Investigate innovative funding options such as the Kirklees ReCharge scheme**
- **Develop support for large scale community renewable schemes such as large scale wind energy projects**

1. INTRODUCTION AND OBJECTIVES

The generation of energy from renewable energy sources is promoted in the UK by a range of central and local government policies and schemes: such as the Renewables Obligation (on electricity suppliers), grant schemes, and planning policies which support renewable energy. The main drivers for this Government support of renewables are currently a 2001 European Commission (EC) Renewable Energy Directive [1], and various policies aimed at reducing greenhouse gas emissions.

January 2008 saw the EC put forward a package of ambitious measures for reducing greenhouse gas emissions across the European Union. This includes targets for generation of 20% of all energy from renewable sources by 2020, which has been translated into an expected 15% target for the UK. The proposals will still need to be approved by the European Parliament, but it can be expected that a new Renewable Energy Directive will be introduced in the near future, pushing the UK Government to provide greater support for renewable energy.

Recent increases in the price of oil and concerns about supply highlight the need to take action. This is not just to combat climate change but also to deal with security of supply of energy issues. The current increase in the price of oil seems to be due to a surge in demand from growing economies such as China. Supply is not keeping up with demand and this has led to price increases. An increase in supply may well bring prices back down again. However, if the world has reached a situation of "Peak Oil" where supply will decrease in the future then the current level of oil prices may well be set to continue for some time.

There is also a need to address rural fuel poverty where hard to treat homes cannot easily be insulated. Renewable energy technologies can be a solution where fossil fuel prices are high. This is particularly the case off the gas network.

In order for these issues and targets to be met in the UK, community level and local authority support is likely to be essential. It is therefore very timely that South Cambridgeshire District Council (SCDC) on behalf of the South Cambridgeshire Local Strategic Partnership (SCLSP) has commissioned this study, with the objective of carrying out a detailed survey and analysis of potential renewable energy resources within South Cambridgeshire.

The results of this analysis provide an evidence base to inform the SCLSP partners (with a particular focus upon SCDC) how to make the most efficient and effective use of their local renewable energy resources in reducing local carbon emissions. This can then be translated into concrete policy measures to support renewable energy development and facilitate support and enthusiasm for the technologies in the South Cambridgeshire region.

As a summary, the three central objectives of this study are:

- Inform and support development of policy, for the Local Strategic Partnership
  - Identify and justify actions SCDC can take, using their own resources, to support renewable energy development.
- Provide an evidence base for development of planning policy in the Local Development Framework.

1 COM 2001/77/EC: Directive on Electricity Production from Renewable Energy Sources.

- Provide guidance on how the district council can provide leadership in the implementation of renewable energy technology.

To achieve these objectives, this study has carried out the following tasks:

6. Establish current energy consumption and carbon emissions baselines for South Cambridgeshire (SC)

7. Identify existing renewable energy installations and review the current status of the local renewables market in SC

8. Assess the availability of renewable energy resources in SC

9. Review policies and schemes for supporting renewable energy development, and identify those appropriate for SC.

10. Recommend practical actions that SCDC can take to support the use of the district's renewable energy resources, with a focus on the areas where they can have most influence - through supporting local community groups and through local planning policy.

2. ENERGY USE AND LOCAL GENERATION BASELINE

2.1 Local energy use and CO_2 emissions

The following graphs detail recent CO_2 data (largely resulting from energy use) for South Cambridgeshire district.

Figure 1 CO_2 emission by end use for South Cambridgeshire and neighbouring authorities

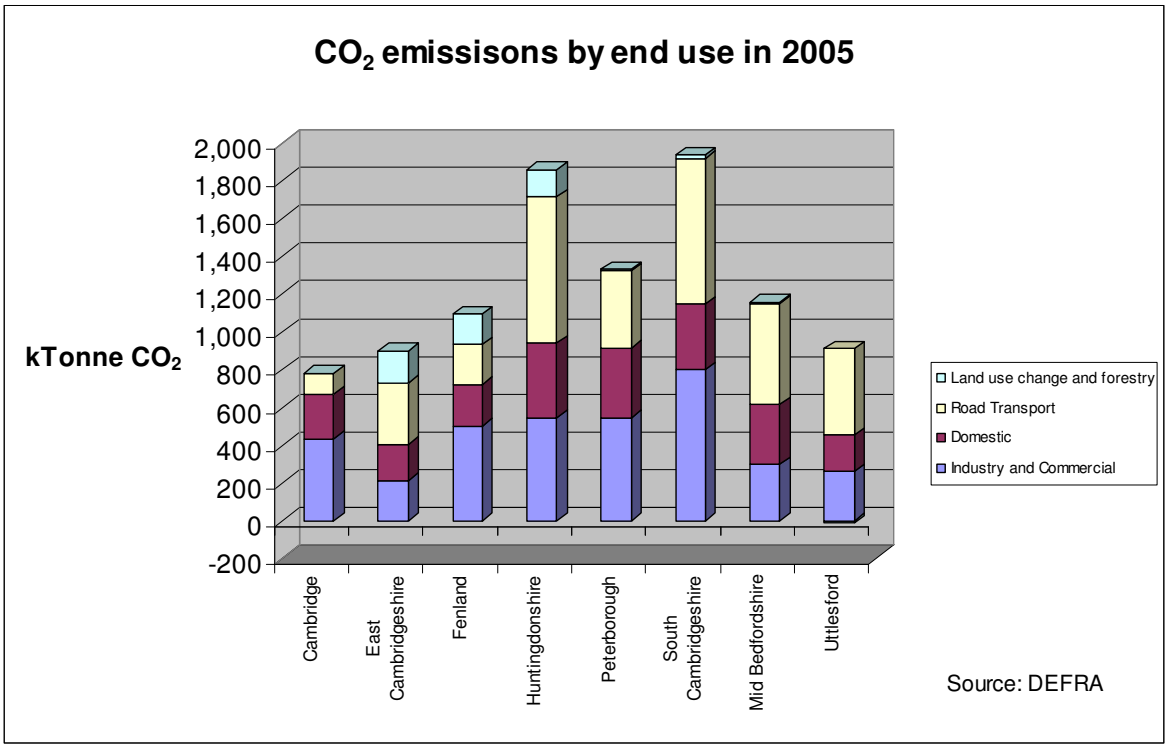
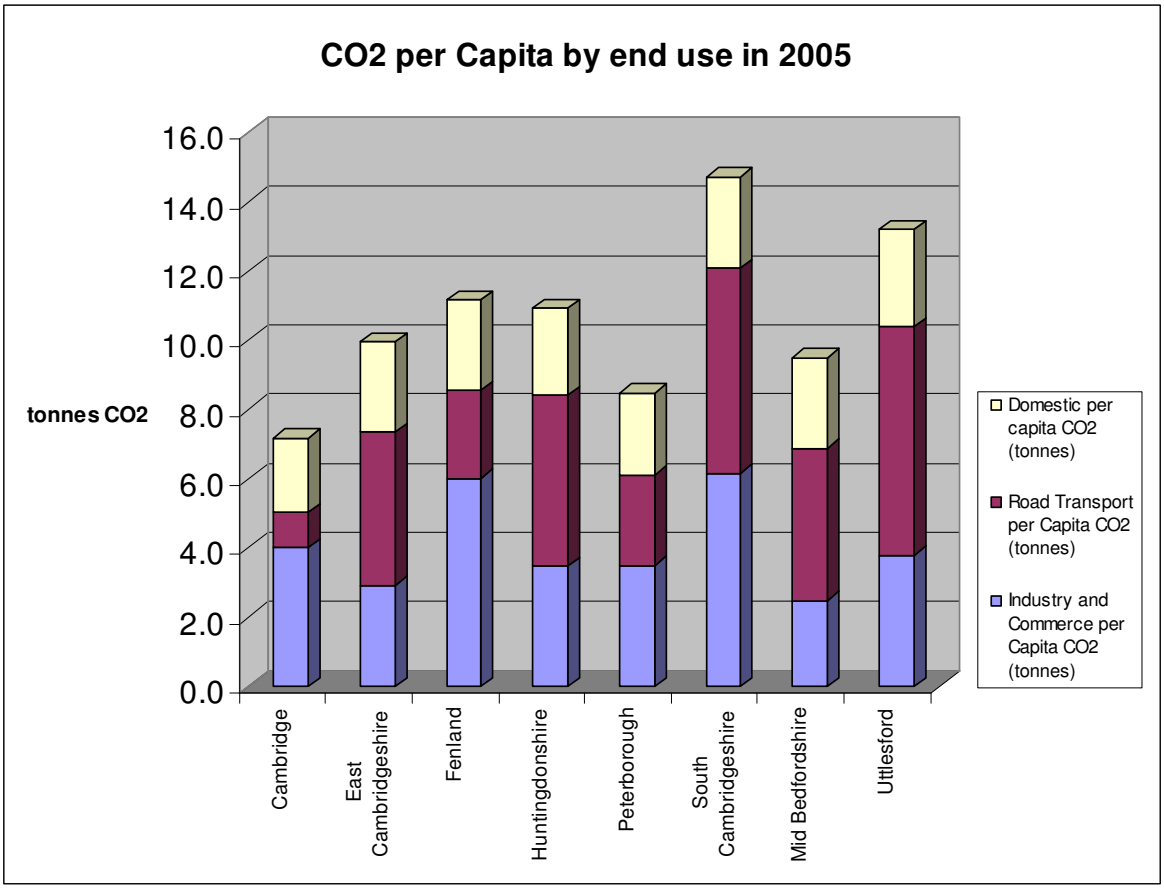


Figure 1 shows that South Cambridgeshire has higher CO_2 emissions than any of the other local authority areas in Cambridgeshire or of any of its neighbours in Bedfordshire and Essex. Primarily this relates to the high Industry and Commercial emissions and the high road transport emissions. When looking at these figures in relation to the population (see figure 2 below) the same picture emerges. South Cambridgeshire has higher Industry and Commercial emissions and higher road transport figures than its neighbours.

It is noticeable when making this comparison that Cambridge has much lower figures. It is perhaps not surprising that an urban area will have lower transport emission and a rural area higher. Perhaps more surprising are the Industry and Commercial CO_2 emissions although much of the industrial and commercial activity associated with Cambridge is on the outskirts of the City, actually in South Cambridgeshire District.

Figure 2 Carbon dioxide emissions per capita by end use in 2005



The per capita domestic CO_2 figures for South Cambs also appear high. At 2.7 tonnes/capita they are higher than the national average of 2.5. The higher per capita CO_2 emissions in rural areas may be partly explained by the larger house sizes and more detached houses in rural areas.

The overall impression is that South Cambridgeshire has more potential than many of its neighbours to reduce CO_2 emissions whether it be in the household, road transport or in industrial commercial sectors.

More detail on the energy and CO_2 emission for South Cambridgeshire can be found in Appendix 1.

2.2 Existing renewable energy schemes

Some 50 recently installed renewable energy installations have been identified in South Cambridgeshire. The most widespread technologies are solar thermal and photovoltaics, many associated with the recent Energy4Good programme (an initiative of The National Energy Foundation in partnership with SCDC and Cambridge City Council and part funded by the Energy Saving Trust).

Table 1 Recent renewable energy installations in South Cambridgeshire

Technology	Total kW	Installations	Notes
Landfill gas	4,264	2	
Small wind	37.5	9	2 of the installations have been assumed to have capacities of 2.5kW, so the total may in fact be higher.
PV	n/a	11	
Solar thermal	n/a	29	
GSHP	n/a	1	As we are not aware of a register of heat pump installations, this is likely to be an under estimate.
Large scale wind	*29,900*	*1*	*In planning- Wadlow Farm*
Large scale wind	*450*	*2*	*Consented- 225kW turbines at Bourn and Swavesey*

While the above data is a reasonable indicator of the current status of the market, we feel that there are likely to be several more renewable heat installations- solar thermal, heat pumps and biomass, which have not been captured in the above registers and recent programmes.

The full list of installations is presented in Appendix 2

3. REVIEW OF RENEWABLE ENERGY TECHNOLOGIES

Renewable energy is a term, which covers a range of energy sources and technologies. Typically, these technologies harness energy available in the environment and deliver it in a useable form resulting in zero or low carbon dioxide emissions without depleting finite fossil fuel resources. We need energy for heating, for the generation of electricity and for transport. Renewable energy is available for all these requirements.

So far, in the UK the main applications of renewable energy have been for electricity generation such as large-scale biomass power stations and large scale wind farms. However smaller scale renewable heating technologies such as solar thermal for water heating and wood heating are also well established in the UK. More recently, biodiesel and bioethanol is being produced in the UK and also imported, typically to be blended in small proportions into diesel and petrol.

Combined Heat and Power (CHP) is not covered in this study except where it uses a renewable fuel such as biomass. CHP is a more energy efficient way of producing electricity and heat from a fuel (often gas but sometimes oil). However its efficiency is very dependant on its use and having a constant demand for both electricity and heat. The latter is not usual for the majority of domestic or community applications.

3.1 Drivers for renewable energy development

The main drivers on a national level for the growth of renewable technologies are:

- Government Policy – European Governments have recently agreed to provide 20% of Europe's energy requirements from renewable technologies by 2020. The UK has a target of 15% of its electricity needs to be met from renewable sources by 2015. The UK government has a domestic target of increasing renewable electricity generation to 10% of electricity by 2010. In 2006 electricity supplied from Renewables Obligation eligible sources stood at around 4% of the UK's total.

- Grants – A range of national, local and European funding is available for individuals, communities and business. A review of the current funding schemes is provided in Appendix 3.

- Planning Policy – Planning on a national, regional and often local level is driving the use of renewable technologies often by specifying a proportion of energy to be provided from renewable sources.

    - On national level, the recently published Planning Policy Statement 1 (PPS1) on Sustainable Development and Supplementary Guidance to this document on Climate Change 'Expects a proportion of energy supply to new development to be secured from decentralised and renewable or low carbon sources' and requests that 'Local Planning authorities should set a target percentage [to be produced from renewable sources]'.

    - On a regional level, the East of England Regional Spatial Strategy will replace the Cambridgeshire and Peterborough Structure Plan. When it is published in its final form by the Secretary of State, it is likely to specify renewable targets for large developments.

- On a local level Policy NE/3 of the Development Plan Documents (DPD) within the emerging Local Development Framework (LDF) requires the provision of technology for renewable energy to provide at least 10% of predicted energy requirements.

- Gas and electricity prices – Rising gas and electricity prices are making the implementation of renewable energy technologies increasingly attractive.

3.2 Small scale community renewable energy technologies

The majority of renewable energy development in the UK is large scale requiring millions of pounds of investment for individual projects. However, there are plenty of small scale applications, which can be developed by communities or even individual householders. The table below outlines the main characteristics of smaller scale community renewable technologies.

Table 2 Community Renewable Energy Technologies

Technology	Requirements		Typical cost of one unit	Typical size in kW	Typical physical dimensions	Comments
Photovoltaics	roof or space facing south of east/west	can export electricity if connected to grid, more cost effective if high on site demand	£5k to £25k upwards	1 to 4 upwards	8m^2 to 30m^2 domestic scale, much larger possible	size limited by roof/space. Avoid shading
Roof mounted wind	roof exposed to prevailing wind	can export electricity if connected to grid, more cost effective if high on site demand	£2k to £20k	1 to 6	2 m diameter to 5 m diameter rotor	siting is crucial; very easy for buildings to reduce wind speed
Mast mounted small wind	location exposed to prevailing wind	can export electricity if connected to grid, more cost effective if high on site demand	£10k to £50k	1 to 20	2m diameter to 10m diameter rotor, 6m to 15m mast	siting is crucial; site at least 10 times height of obstacle away from obstacle
Medium scale wind	location exposed to prevailing wind	can export electricity if connected to grid, more cost effective if high on site demand	£50k to £500k	20 to 250	10m to 30m; 15m to 30m	siting is crucial; will begin to incur increased issues with planning
Large scale wind	location exposed to prevailing wind	can export electricity if connected to grid, more cost effective if high on site demand	£500k to £3Million	250 to 2,500	30m to 90m ; 30m to 100m	siting is crucial; will incur increased issues with planning
Small scale hydro power	location on fast moving river with at least 2 m of head	can export electricity if connected to grid, more cost effective if high on site demand	£15k to £100k	5 kW to 50 kW	often accommodated in old mill, otherwise need small building to house	very site specific
Solar thermal	roof or space facing south of east/west	hot water demand on site	£2k to £5k	2 to 3	3 m^2 to 4 m^2 for domestic scale, larger possible	size limited by hot water demand. Avoid shading
Ground Source Heat Pump	land area for ground collector or a water source	building with a space heating (and possibly cooling) demand and low temperature heating system (e.g. underfloor heating)	£5k to £25k upwards	3.5 kW to 15 kW upwards	one 50 m borehole or 140 m^2 of damp soil for a horizontal collector to three 75 m boreholes or 600 m^2 of land; larger systems possible	damp soil for horizontal collectors tends to be best and solid stone for boreholes
Air source heat pump	space outside the building to place unit where it will not cause a noise nuisance	building with a space heating (and possibly cooling) demand and low temperature heating system (e.g. underfloor)	£3k to £15k	3.5 kW to 15 kW upwards	vary compact similar to but larger than traditional air conditioner and more efficient	need planning permission because of potential fan noise issue
Wood pellet stoves	space in building for stove and flue	large rooms which require heating	£2k to £5k	6 kW to 15 kW	larger than log boilers as incorporate hopper for automatic feed of pellets	need to check has necessary clearance if in smokeless zone
Domestic scale wood boilers	space for boiler room and wood store	building with a space heating requirement	£5k to £15k	10 kW to 30 kW	similar in size or slightly larger than an oil boiler	will need fuel store, usually pellet boiler at this scale but log boiler also an option
Larger scale wood boiler	space for boiler room and wood store	building with a space heating requirement	£15k to £200,000	30 kW to 1,000 kW and upwards	space required for boiler and fuel store with automatic handling equipment	can be pellets but usually wood chips at the larger scale as cheaper than pellets but take up much more storage space

3.3 Barriers to market growth

A number of barriers have been identified to the growth of the small scale renewable technology industry. These include:

- Cost – Renewable technologies have long paybacks and are often only affordable or cost effective with significant grants. The size of assistance will differ for each technology.

- Financial return – In some countries such as Germany customers receive a guaranteed high price for grid exported electricity (feed-in tariff). This is currently not the case in the UK.

- Planning – Implementing some renewable energy technologies can be a lengthy process. Improvements are being made with changes to Permitted Development rights in the offing. However, this is unlikely to extend to Conservation Areas and so planning is likely to remain a barrier to renewable implementation in a number of cases.

3.4 Manufacturing and Skills

Manufacturing of small-scale renewable technologies in the UK is limited. However, there is a long established manufacturing base for solar thermal and a growing base in the small-scale wind sector. Most microgeneration technologies are produced outside the UK, often in countries where the technology is already well established – such as ground source heat pumps from the USA, Sweden and Germany.

It is considered that the UK has most of the technical expertise required for a market in small-scale renewable technologies (BERR 2005a).

There are number of benefits of the Government assisting and taking a leading role in training programmes to ensure consistency, quality and sustained growth in skills in the relevant renewable technologies. The Skills Sector is currently undertaking an assessment of the skills and training requirements needed to feed and provide confidence in a growing renewables market.

At a national level, small scale renewables could provide 30-40% of the UK's electricity needs by 2050, reducing household carbon emissions by 15% per annum (BERR 2005a).

3.5 Local Renewable Energy Technology Market

A review of the local and regional renewable technology market has been undertaken. This involved:

- Identifying the local installers, suppliers and manufacturers of the technologies (details of which can be found in Appendix 4)

- Consultation with a selection of local and regional renewable technology companies

3.6 Market Consultation

Interviews were undertaken to provide a qualitative understanding of the views of the companies in the South Cambridgeshire district and surrounding area on the state of the market, potential future growth, barriers to the market and potential ways that the local government could assist the industry in the future.

A list of questions and respondents to the consultation can be found in Appendix 4. The responses have been used to inform this document, with reference to the consultation made where appropriate.

A summary of the key responses and some conclusions to the analysis are presented below. Note that this analysis may not be representative of all the views of the renewable sector in the South Cambridgeshire and surrounding region, but the responses may be helpful in developing new or more targeted renewable policies in the future.

3.6.1 Market State and Potential

Responses differed depending on the company and technology. Overall it was felt that across all the technologies there was significant capacity and potential for growth, though recent sales have been low.

A number of the suppliers consulted it was felt that business had either stagnated or reduced in the last year. There hasn't necessarily been less interest in the technologies, but sales are down. The reasons for this were given as confusion over the grant process, and competitors who provide cheaper but inferior quality work and products. It was also felt by some that there had been a reduced public perception of some technologies, such as solar thermal and domestic wind turbines, due to reduced quality of work by some competitors, and some negative press.

Some respondents specifically quoted a lack of awareness of renewables technologies among the public as a major barrier to growing their business. However, it was mentioned that the population of South Cambs is generally better informed than the national average.

3.6.2 Feedback on national policies and schemes

Erratic grant schemes were identified as key barriers across all technologies, to the uptake of renewable technologies. It was felt that the Low Carbon Building Programme (LCBP) grants were too small and the process too convoluted for customers to undertake..

The UK Microgeneration Certification Scheme (UK MCS) has also proven controversial among the industry. Accreditation under this scheme is now required for access to the LCBP grants. However, several respondents reported their frustration with the relatively high, additional costs of joining the scheme.

3.6.3 Feedback on local policies and schemes.

A number of respondents expressed strong support for a planning requirement for renewable energy, such as the 'Merton Rule'. In short, this planning policy requires a minimum amount of energy to be generated (or emissions reduced) onsite from renewables, in order to gain planning permission. It is a measure that can be implemented at the local or regional level. It was viewed by respondents as a very successful tool for promoting renewables and providing a consistent demand for the technology.

In general, there was positive feedback on the previous Energy4Good scheme. The majority of the companies surveyed noted the benefits of marketing and promotional support from the council, and would be keen to receive similar support in future. This can be explained to an extent by the fact that most of the companies surveyed are small, or even family businesses, so struggle to market their businesses widely.

3.6.4 Recommendations from respondents

Most of the respondents were able to provide specific suggestions and requests for support from SCDC:

- Introduce (or start enforcing) a planning policy which actively favours and promotes onsite renewables in new developments. This could be in the form of a minimum requirement, such as the 'Merton Rule', or more inventive measures such as allowing larger developments if they incorporate onsite renewables.
- Introduce a local grant or funding scheme that is more accessible and offers increased sums than the LCBP.
- Provide an incentive to householders, such as reduced council tax bills for a limited period
- Repeat the seminars and solar fair run by the Energy4Good programme.
- Assist local suppliers and installers gain accreditation to the UK MCS
- Assist with promotion and advertising campaigns

3.7 Local renewable energy advice

The Energy Saving Trust Sustainable Energy Centre based in Peterborough provides resources for renewable education and promotion across Norfolk, Suffolk and Cambridgeshire including in the South Cambridgeshire District. The main programmes to promote renewables are:

- Renewable Energy Showcases – events held in towns and villages for public to educate on renewable energy technologies. Installers on the BERR accredited installers list are invited to demonstrate products.
- Village Green project – from an initial competition, three villages Ashill, Thurton and Filby in Norfolk were chosen as the focus of attention for energy efficiency and renewable promotion. The winning villages will have a carbon footprint calculated, will receive education on suitable renewable technologies and will be given help with improving the energy efficiency of buildings.

3.8 Local skill base

Smart Life Centre provides a new location for sustainable construction training and education. The centre provides a large training area where students can practice new skills in house construction. The building course provides hands-on training and insights into the construction industry. With energy coming from an array of renewable energy technologies and the building designed to include passive design

measures, it provides a demonstration of low energy design for both students and those attending events and conferences.

Bedford College has achieved Centre of Vocational Excellence (CoVE) in Skills for Energy Services. This course provides training in Renewable Energy Technologies and Sustainable Built Environments. It is possible that partnerships could be developed between this course and local installers to aid the growing renewable technology market.

4. MAPPING RENEWABLE RESOURCES

The renewable energy resource for South Cambridgeshire, which could be utilised, depends on a number of factors some of which we have attempted to map. These include areas of high wind speed, existing woodlands, energy crop potential and the by product of cereal production namely straw. The utlisation of this resource is best effected locally so an attempt to illustrate where energy demand and resource has been made.

The following maps are show data according to Statistical areas called Middle Layer Super Output Areas (MLSOA). These are based on Ward and Parish groupings. The areas are numbered and don't have names. The table below lists some of the main settlements in each area. The data contained in the maps is also produced as tables in Appendix 1.

Table 3 Middle Layer Super Output Areas

MLSOA Number	Main Settlements
1	Willingham, Oyer
2	Cottenham
3	Swavesey
4	Waterbeach
5	Bar Hill, Boxworth
6	Histon
7	Fen Ditton
8	Cambourne
9	Girton, Grantchester
10	Comberton, Harwick
11	Fulbourn
12	Great Shelford
13	Gamlingay
14	Haslingfield, Foxton
15	Sawston
16	Linton
17	Duxford
18	Melbourn
19	Bassingbourn

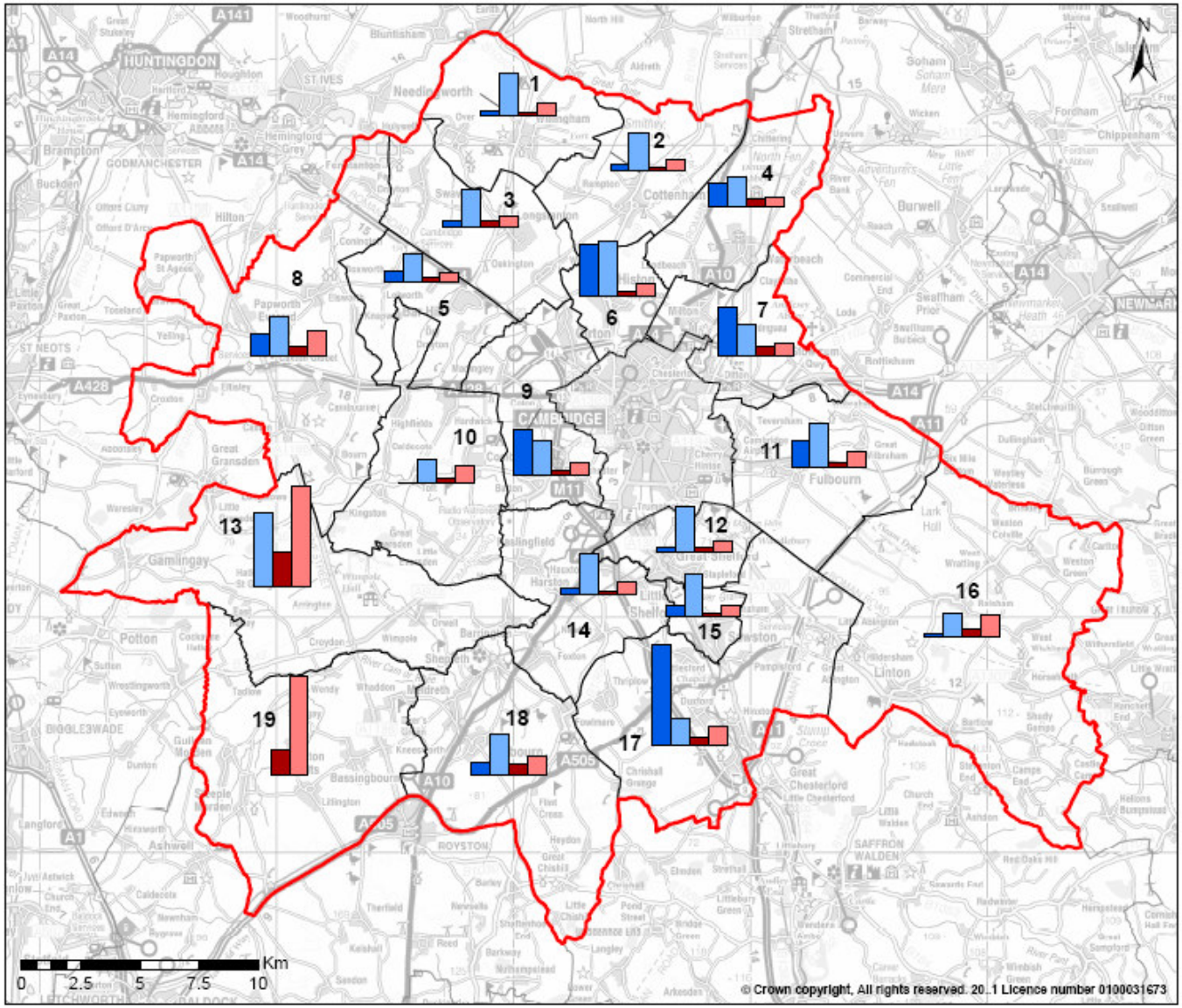
The following three maps show the following:

Figure 3: The variation in energy consumption across the District

Figure 4: The variation in average wind speed across the District and the electricity consumption

Figure 5: The potential biomass resource across the District and the proportion of households not connected to the gas mains.

Note the data is not complete and that Industrial Gas consumption in areas 8 and 9 is aggregated together in the official statistics. For the purposes of this report we have disaggregated it in proportion to electricity use in these locations. This has not been possible in areas 13 and 19.



ENVIROS

Renewable Energy Resource Survey

Figure 3: Energy Data

Key:

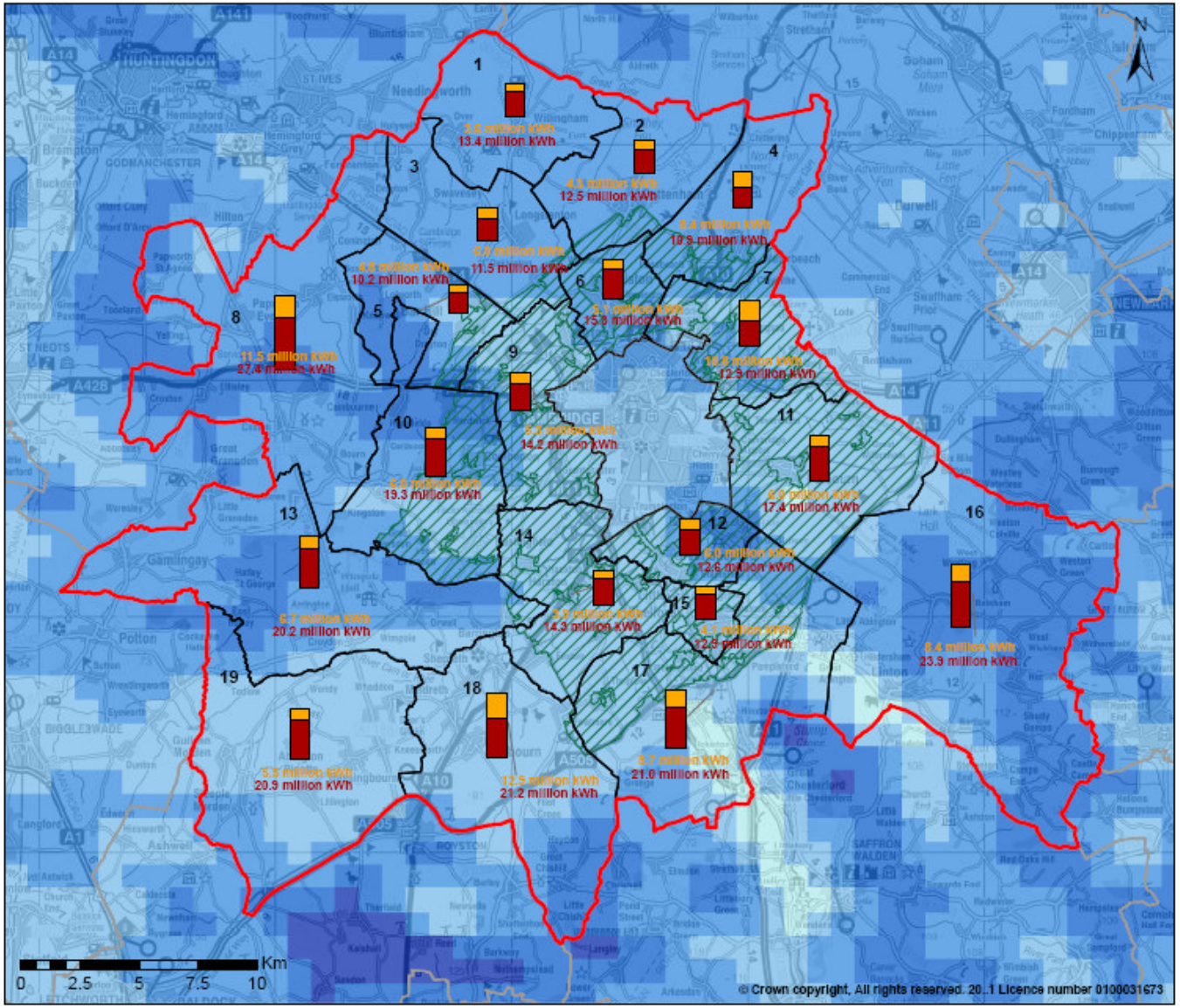
- South Cambridgeshire District
- MLSOA Area Numbers 1-19

Energy Consumption (kWh)

- Total Industry Gas
- Total Domestic Gas
- Total Industry Electricity
- Total Domestic Electricity

Note: There is an absence of information for industry gas for area. Similarly, area 19 is missing both the industry and domestic gas data. In addition to this, only a combined value for areas 008 and 009 was available and so it has been split using a ration of 1:2, as per electricity values of the same areas.

CAN: SO0790002
Scale: 1:150,000 (at A3)
Drawn: FJ
Edinburgh Office
June 2008



ENVIROS

Renewable Energy Resource Survey

Figure 4: Estimated annual mean wind speed and electricity consumption

Key:

- South Cambridgeshire District
- MLSOA Area Numbers 1-19
- Designated Green Belt Region

Electricity Intensity (kWh) Calculated Middle Layer Super Output Area level

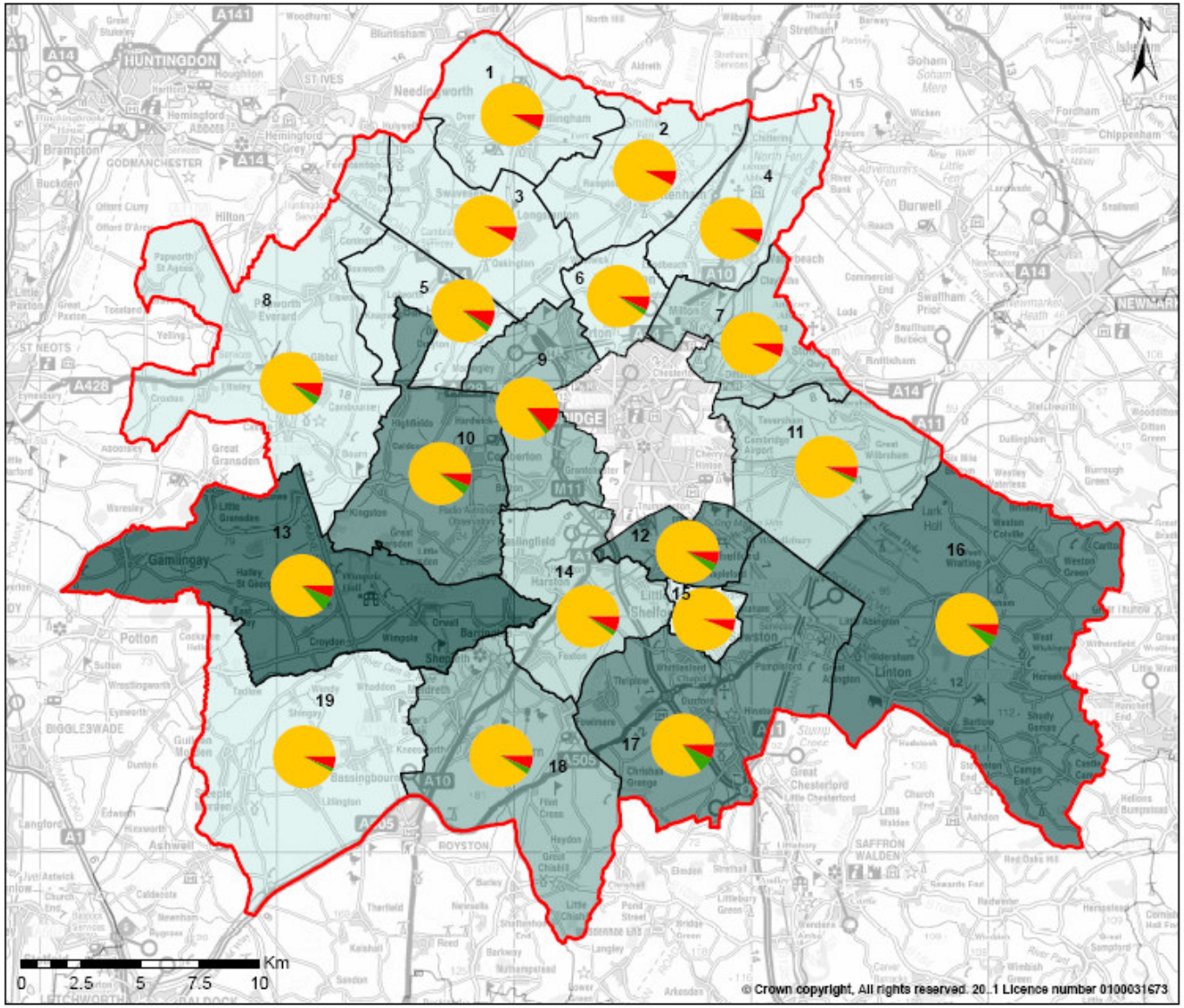
- Industrial / Commercial
- Domestic

Estimated windspeed (m/s) 45m above ground level (agl)

- 5.5 - 5.7
- 5.8 - 6.0
- 6.1 - 6.3
- 6.4 - 6.6
- 6.7 - 6.9
- 7.0 - 7.2

Wind speed data acquired from the Department for Business, Enterprise & Regulatory Reform's (BERR) database online.
www.berr.gov.uk

CAN: SO0790002
Scale: 1:150,000 (at A3)
Drawn: FJ
Edinburgh Office
June 2008



ENVIROS

Renewable Energy Resource Survey

Figure 5: Biomass and Off Gas Grid

Key:

South Cambridgeshire District

MLSOA Area Numbers 1-19

Biomass Type

Straw

Wood Fuel

Energy Crop

Off Gas Grid (Percent)*

0 - 10

11 - 20

21 - 30

31 - 40

41 - 50

51 - 60

61 - 70

** Off gas grid (percent) based on domestic properties not connected to gas grid compared with domestic electricity connections.*

CAN: SO0790002
Scale: 1:150,000 (at A3)
Drawn: FJ
Edinburgh Office
June 2008

4.1 Energy consumption

The consumption of gas and electricity[2] varies considerably across the District. The former is partly due to a lack of gas network as illustrated in figure 5. However, there is clearly a heavy consumption of gas by the industrial/commercial sector in areas 6, 7 and 17 (these include the settlements of Histon, Fen Ditton and Duxford respectively). There is also a high consumption of electricity by the industrial/commercial sector in areas 7, 8 and 18 (including the settlements of Fen Ditton, Cambourne and Melbourn).

4.2 Average wind speed and electricity consumption

The map showing wind speeds[3] at 45 m height clearly indicate that the areas of greater wind speed are in the South East and the West of the District. Wind speeds of over 6 m/s at 45 m height are of interest to Wind Farm Developers assuming that all other requirements for a project were ideal (such as ease of connection to the grid, planning issues and access).

The wind resource does not appear to correlate very well with electricity with low consumption in the North of District were much of the wind resource is. However areas 8 and 16 in the West and South East (including Cambourne and Linton respectively) do appear to have higher electricity consumption, including industrial, and also suitable wind resource. This suggests there may be some potential to look at wind generation for local consumption in these areas. Just four or five wind turbines would be required to produce the same amount of electricity as is consumed by industry in these two areas.

4.3 Potential biomass production and proportion of households without gas connections

The biomass potential[4] is calculated for the following three sources:

- Straw – based on 2.5 tonnes/annum per ha of cereal production
- Wood fuel – based on 2.5 tonnes/annum of wood fuel from managed woodland (assuming all existing woodland is brought into management)
- Energy crops – assuming 1% of land is set aside for energy production and a 10 tonne/annual yield is achieved

South Cambridgeshire farmland is very arable and as a result the straw resource is fairly evenly distributed across the whole District. The woodland resource is distributed more across the south of the District. Energy crops potential exists again across the whole district. In total the straw resource (approx 490 Million kWh) exceeds the current gas consumption by Industry (456 Million kWh) in energy terms.

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2 Data taken from 2006 Local Authority consumption statistics from BERR Energy Trends December 2007 http://www.berr.gov.uk

3 Data taken form BERR windspeed database http://www.berr.gov.uk/energy/sources/renewables/explained/wind/windspeed-database/page27326.html

4 Based on data taken from DEFRA statistics for 2004 http://farmstats.defra.gov.uk/cs/farmstats_data/DATA/soa_data/repop_results.asp

5. PLANNING POLICY

This section discusses the existing planning policies affecting renewables in SCDC, with a focus on building integrated and on-site renewable energy technologies.

5.1 New development

5.1.1 Central government

The Government's recently published Supplementary Guidance on Climate Change to Planning Policy Statement (PPS) 1 on Sustainable Development outlines that planning authorities should expect 'a proportion of energy supply to new development to be secured from decentralised and renewable or low carbon sources'. It also states that in specific sites where there may be greater potential for renewables than specified in the target proportion, increased targets should be put in place to secure this potential.

There is a requirement with this PPS that local authorities should have an "evidence-based understanding of the local feasibility and potential for renewable and low-carbon technologies, including microgeneration, to supply new development in their area." The targets should be set with this feasibility assessment in mind.

5.1.2 Regional Spatial Strategy

The draft Regional Spatial Strategy for the East of England, the 'East of England Plan', expected to be published in Spring 2008, contains specific references to renewable energy. There is a target to ensure at least 10% of energy in new developments is supplied from renewable sources (ENG2). This should be expected to result in a requirement for planning authorities to include a similar planning regulation.

5.1.3 Local authority policy

The SCDC Local Development Framework (LDF) already contains provisions in accordance with the central and regional Government guidance- policy NE/3, adopted in July 2007. This requires all development proposals greater than 1,000 m^2 or 10 dwellings to provide at least 10% of their predicted energy requirements from onsite renewable energy, in accordance with policy NE/2. This type of policy was first implemented in the London Borough of Merton, and has since become known as the "Merton Rule".

Policy NE/2 of the SCDC LDF, a general policy on all types of renewables development, states that planning permission will be given to all applications for renewable energy installations, providing they are viewed to be in accordance with policy DP/1 to DP/3. These set out the council's requirements for developments to be consistent with the principles of sustainable development, with specific requirements including conservation of biodiversity, landscape and neighbourhood character, and minimisation of flood risk. The interpretation of policy NE/2, with its requirement to comply with policies DP/1 to DP/3, is very important for deciding whether major renewable energy installations, such as wind farms, are given planning permission.

Policy NE/2 has a clause which requires all renewable energy installations to be efficiently connected to national grid infrastructure. Commentators, such as the Town and Country Planning Association, have specifically noted that this

requirement may preclude the installation of renewables in off grid, on site and private wire situations, and seems to exclude district heat. This issue warrants further attention.

From consultation with renewable energy suppliers operating in the region, it was apparent that there is poor awareness amongst the renewables sector of the existence of LDF policy NE/3 in South Cambridgeshire. This may be because there have not yet been any high profile projects to highlight that renewables are now required on developments of a certain size.

This type of policy has proven to be very popular among the renewable energy industry, as it provides a steady demand for building integrated installations. It has also been demonstrated to be an effective, if somewhat inflexible, tool for reducing carbon emissions from new developments.[5] Greater promotion of the policy, and potentially increasing the percentage requirement of policy NE/3 or lowering the thresholds at which it applies should be seriously considered by SCDC as a relatively short term means of accelerating the uptake of renewables in the district.

SCDC could also consider the feasibility of stronger, more prescriptive regulations. For example, there may be a case for regulating that all new dwellings are built to incorporate solar thermal and/or photovoltaic technology, unless not feasible for the site. A pioneering new regulation is now written into Spanish national building regulations. It states that all new and refurbished buildings must include solar thermal systems to meet between 30-70% of the building's hot water requirements- the amount varying with the Spanish region, and the hot water demand of the building.[6]

Alternatively, SCDC could consider increasing the percentage requirement for renewables, as well as the range of developments captured. For example, policy 4A.7 of the London Plan, implemented in February 2008, places an increased requirement for 20% carbon reduction from onsite renewables.

5.1.4 Development specific planning

The volume of new housing to be developed in South Cambridgeshire in the near future is very significant. Planning applications for large developments that are currently being considered are:

- Northstowe – Proposed new town encompassing approximately 9,500 dwellings, a town centre, open space and a wide range of community and sports facilities
- Cambourne – Outline planning application for 950 new homes
- Arbury Camp – being developed – 900 homes
- Cambridge Southern Fringe – 1,200 new homes, a primary school and a 60 hectare country park

These developments all represent excellent opportunities to implement a range of renewable energy technologies. The implementation and enforcement of district wide, and potentially development specific pro-renewable energy policies are probably the most significant influence that SCDC can have to exploit this

5 South Bank University has estimated that the London Plan's requirement for renewable energy in new buildings reduced CO_2 emissions by around 6% in 2004 to 2007. This is set to increase as higher requirements are being introduced. http://www.london.gov.uk/mayor/planning/docs/lsbu-research.pdf
6 See note by European Solar Thermal Industry Federation http://www.estif.org/fileadmin/downloads/CTE_solar_thermal_sections_ENGLISH.pdf

opportunity. That is not to say that action is not already being taken. For example, the Northstowe Area Action Plan sets a target of 20% of predicted energy needs to be generated from renewable energy, and announces a feasibility study for a renewable Energy Services Company (ESCO) at Northstowe, which could provide green energy on a town wide scale.

5.2 Current policies- existing buildings

5.2.1 Permitted development rights

Householders have normally had to consider the need for planning permission when installing any external renewable energy technologies. However, central Government has announced its intention to give permitted development rights to solar thermal, solar photovoltaics, ground source heat pumps and biomass heating systems, provided they fit within a certain size limit[7], and are not within certain heritage and conservation areas. These rights are expected to be written into secondary legislation by mid 2008. Permitted development rights are also expected for small wind turbines and air source heat pumps, once noise and vibration standards have been established. Though there are still financial and feasibility barriers, this ruling is a small but significant help to householders wanting to install renewable energy technology.

5.2.2 Planning regulations for existing buildings

It is worth noting that the renewable energy requirements that can be placed on new developments could also be applicable to extensions and conversions- essentially any activity requiring planning permission. For example, the London Borough of Croydon's existing Unitary Development Plan requires the installation of renewable energy systems to offset at least 10% of a development's carbon emissions, be it a brand new development, or a conversion (over 1000m^2 or 10 or more units). This captures developments such as changes of use in industrial units which require planning permission, and sizable extensions.

It is currently intended that the new Local Development Framework for the London Borough of Merton, due in mid 2009, will include a specific requirement for a proportion of renewable energy in *all* developments requiring planning permission, from eligible house extensions and flat conversions, to major new developments.[8]

7 "Permitted Development Rights for Householder Microgeneration: Government response to consultation replies" (December 2007) http://www.communities.gov.uk/documents/planningandbuilding/pdf/565952
8 Personal Communication, April 2008 with Adrian Hewitt, Principal Environment Officer, Merton Council.

6. COMMUNITY RENEWABLES PROJECT DEVELOPMENT

The suitability of renewable technologies for a particular application will depend on a number of factors. Here are some of the issues a community organisation will have to address:

1. Determine aims and objectives:

    a. CO_2 reduction – zero carbon will usually require a combination of renewables

    b. Cost saving – larger scale wind and biomass give the best paybacks

    c. Self sufficiency – will require combination of renewables and storage for the energy produced – can be very expensive

    d. Promotion – solar panels and wind turbines are very visible

2. Assess capability to carry out project

    a. Ownership and management of site – owner may be required to submit funding applications

    b. Necessary permissions – planning, grid connection

    c. Project team – need a mix of skills

3. Assess renewable resources

    a. Roof space facing south – ideal for solar thermal and PV

    b. Open space to the south west – exposed to prevailing wind

    c. Large garden or open space – room for a ground collector for GSHP

    d. Building new or replacing boiler or roof – time to consider solar thermal, PV, GSHP…..

    e. Nearby woodland or arable area – biomass may be available at reasonable cost

4. Seek further information and suppliers of equipment

    a. Householders and communities - EST Helpline 0800 512012

    b. Businesses – Carbon Trust 0800 085 2005

    c. Finding equipment – Accreditation scheme: www.UKMicrogeneration.org; Trade Associations : Renewable Energy Association, Solar Trade Association, British Wind Energy Association, Ground Source Heat Pump Association

5. Access funding and grants

    a. Grants - Low Carbon Building Programme, Cut Your Carbon, Community Sustainable Energy Programme

b. Renewables Obligation – ROCs funding for electricity generated

c. Other sources – Energy Companies, Local Council, Carbon Trust

6.1 Prioritising investment in Community Renewables

Community Renewables are a means of reducing carbon emissions in the community. They are also a means of raising awareness about the viability of the technologies encouraging others to invest and to also reduce carbon emissions.

When comparing the technologies it is relatively easy to judge which give the greatest impact in CO_2 reduction terms for a given investment. However, it is not so easy to take into account the potential multiplier effect, which a community scheme may have. The following tables attempt to make this comparison.

Table 4 Comparison of Community Renewables by payback and CO_2 savings costs

	kW				tonnes CO_2	
Photovoltaics	2	£12,000	£210	57	0.8	£15,929
Roof mounted wind	1	£3,000	£79	38	0.3	£10,619
Mast mounted small wind	6	£21,000	£946	22	3.4	£6,194
Medium scale wind	15	£45,000	£2,628	17	11.3	£3,982
Medium scale wind	50	£125,000	£8,760	14	37.7	£3,318
Large scale wind	2,000	£2,400,000	£350,400	7	1,883.4	£1,274
Small scale hydro power	10	£50,000	£4,380	11	18.8	£2,655
Solar thermal	2.5	£3,000	£84	36	0.5	£6,554
Ground Source Heat Pump	10	£10,000	£329	30	4.2	£2,403
Air source heat pump	10	£6,000	£183	33	4.2	£1,442
Wood pellet stoves	8	£2,400	-£26	-91	1.7	£1,384
Domestic scale wood boilers	15	£7,500	£123	61	5.4	£1,384
Larger scale wood boiler	300	£90,000	£9,444	10	108.4	£830
Wood fuelled CHP	150	£350,000	£60,293	6	179.0	£1,955

* * Assuming electricity 8 p/kWh (plus 4 p/kW ROC) heat 3.5 p/kWh; wood pellets 2.5 to 3 p/kWh, wood chip 1.25 p/kWh

Note the payback calculation is based on capital cost without grant. Also the fuel costs have been included but maintenance costs have not.

Table 3 compares the technologies in terms of payback and also in terms of CO_2 saving per capital investment. It is clear that large scale applications such as wood heating and wind turbines have the quickest payback and the best CO_2 saving against capital investment. However, the capital investment required for just one large wind turbine runs in to millions.

Given a limited amount of capital to invest, say £100,000, it is interesting to see how far that goes and also whether there is the potential for a multiplier effect. In other words, will a demonstration project help to inform and encourage others to also invest in the same applications?

Table 5 Comparison of technologies by "multiplier effect"

	Unit size kW	Cost per installation	CO_2 saving tonnes	Community demonstrations which can be funded with £100k*+	Overall saving tonnes CO_2	Multiplier to equal CO_2 saving from large scale wood boiler	Is this multiplier effect likely for this technology
Photovoltaics	2	£12,000	0.75	17	12.8	16	No
Roof mounted wind	1	£3,000	0.28	67	18.9	10	No
Mast mounted small wind	6	£21,000	3.39	10	33.9	5	No
Medium scale wind	15	£45,000	11.30	4	45.2	4	No
Medium scale wind	50	£125,000	37.67	2	75.3	2	?
Large scale wind	2,000	£2,400,000	1,883.40	0.08	157.0	0	?
Small scale hydro power	10	£50,000	18.83	4	75.3	2	No
Solar thermal	2.5	£3,000	0.46	67	30.7	6	Yes
Ground Source Heat Pump	10	£10,000	4.16	20	83.2	2	No
Air source heat pump	10	£6,000	4.16	33	137.3	1	Yes
Wood pellet stoves	8	£2,400	1.73	83	144.0	1	Yes
Domestic scale wood boilers	15	£7,500	5.42	27	146.3	0	Yes
Larger scale wood boiler	300	£90,000	108.41	2	216.8	-	Yes
Wood fuelled CHP	100	£350,000	179.03	0.57	102.3	1	?

* Assuming have £100,000 fund which provides 50% funding for demonstrations

\+ Assumes large wind tubine receives £100k partial investment

In table 4, the number of typical installations of each technology, which could be funded with £100,000 is calculated. The resultant total CO_2 savings are then calculated. £100,000 is enough to fund two large wood boiler installations (such as for a school) assuming 50% of the cost can be funded from elsewhere (Government grants for example). This results in 216.8 tonnes of CO_2 savings each year.

The same investment in photovoltaics results in 17 community installations (of 2 kW each) (such as for a village hall roof). However the CO_2 savings from this investment are only 12.8 tonnes of CO_2 each year. The next column shows how many further private installations would be required to reach the same CO_2 saving as the wood boiler investment. This is 16 household size photovoltaics installation inspired by each community installation. Even with other grants and incentives this figure seems unlikely.

By comparison, the same £100,000 could fund 66 small scale solar water schemes (for a school, or a village hall or a pub). This achieves CO_2 savings of 30.7 tonnes

of CO_2, better than the Photovoltaics but still a long way short of the wood boiler. However if just 6 installations are then inspired or prompted by each these 66 then the overall CO_2 savings are the same as the wood boiler. This does seem achievable. Solar thermal systems are more affordable than Photovoltaics and there is greater availability of installers and suppliers.

This "multiplier effect" could be encouraged by asking community groups seeking funding for their community projects to set out in their applications how they will promote and disseminate information on the project and also how they will capture information on further installations and CO_2 results achieved. The new EEDA Cut Your Carbon Programme incorporates this approach.

6.2 Role of Renewable Energy in Tackling Fuel Poverty

Renewable energy can help tackle the problem of fuel poverty[9], particularly in homes that are not connected to mains gas, have solid walls or have a non-traditional construction[10]. Before considering renewable energy in a fuel poor household, it is important to minimise energy use through energy efficiency measures. National Energy Action (NEA) also suggests that any renewable energy system must provide whole-house heating, must use a proven technology and must be user friendly. This would seem to seem to favour the application of heat pumps.

Renewable energy heating systems are particularly useful in tackling fuel poverty in homes off the gas network because heating and hot water costs can be over double those in areas that have a connection to mains gas[11]. Approximately 16% of homes are off the gas network and most use solid fuel for heating. Even in areas on the gas network, with gas prices more than doubling in the last three years[12] and set to continue increasing, renewable energy is becoming more important in tackling fuel poverty.

The impact that renewable energy can have on fuel poverty depends on the technology being considered and the current pattern of energy use in the home. For example, solar hot water will have more of an impact in reducing fuel poverty if it is installed in a family property where hot water use represents a high proportion of the overall fuel bill, where hot water is used throughout the day and where water was previously heating by a fuel other than gas.

NEA is currently researching the impact of renewable energy on fuel poverty by installing and monitoring the performance of air source heat pumps in 100 homes , and by installing and monitoring the performance of multi-fuel burning stoves in 10 homes. NEA has combined air source heat pumps with fan-assisted convector radiators to produce a cost-effective and controllable heating solution. Initial data suggests that running costs are comparable to main gas, with the additional benefit of the systems being suitable for locations off the gas network. For example, when installed on a park home in Peterborough, the heat pumps resulted in a 70% saving on fuel bills[13].

It is clear that renewable energy technology can help eradicate fuel poverty, but to ensure it has maximum impact, the technology must be appropriate to the energy demand, to the building in which it will be installed and to the client who will be using the system[14].

9 http://www.dsdni.gov.uk/idg_group_report_fuel_poverty.pdf
10 http://www.nea.org.uk/Policy_&_Research/Policy_Briefings/New_Energy_Technologies
11 http://www.nea.org.uk/Policy_&_Research/Policy_Briefings/Renewable_Energy_Technologies
12 ibid
13 ibid
14 ibid

The Centre of Sustainable Energy host a Fuel Poverty Indicator website http://www.fuelpovertyindicator.org.uk/. This provides more information on the likely prevalence of fuel poverty across the country.

6.3 Short term strategies for developing Community Renewables

Renewable energy projects can take a long time to develop. The experience of the Community Renewable Initiative set up by DTI in 2003 suggested that 18 months was typical for most projects and 5 years not unusual for the larger or more complex projects.

In the short term, the focus should be on delivering current national and regional policies and opportunities for the uptake of renewable technologies. This coupled with picking technologies and projects, which can be implemented quickly, will ensure that the maximum impact is gained.

6.3.1 Technologies

Renewable energy technologies, which can be quickly deployed, include building integrated renewables such as small-scale wind, biomass (biofuel) boilers, solar thermal technology, ground source heating and photovoltaics.

6.3.2 Promotion / advertising

One of the key areas identified in the market survey was the potential benefit of marketing and education assistance provided by the SCDC. Some respondents felt that consumer confidence in renewable technologies has reduced recently- due to a number of poor quality installations and complicated, erratic grant schemes. There is also recognition that the majority of the general public still have a limited understanding of the technologies and the opportunities they can offer. Some ideas on promoting renewable technologies are outlined below:

Demonstration – Installation of high profile demonstration projects on public buildings or other high profile buildings and schemes would provide useful advertising for renewable technologies.

Publicity and Education – Changing public perception of renewable technologies through a week-long publicity and education campaign. (comparable to energy efficiency week organised by the Energy Saving Trust) where a host of activities, commercials and events are organised focusing on the renewable technologies.

6.4 Longer term strategies for developing Community Renewables

A longer term strategy could look at projects likely to take 3 years or more to implement. These include larger scale renewable projects with a more complicated funding arrangement, such as a number of partners and sponsors, a lengthy development process and those that involve innovative renewable technologies or fuels.

6.4.1 Council led projects

Kirklees MBC has identified significant potential for using biomass, such as wood fuels, to meet local energy requirements and contribute towards the borough's

carbon emissions reduction targets. Around £1.5m of start up funding has been committed to the council's Environmental Unit, which is in the process of developing the following initiatives, as part of an innovative and notably integrated bioenergy strategy:

- Create a management plan for harvesting and planting additional trees in local woodland.
- Assess the sustainable harvest potential, in energy terms, of local woodland
- Create a biomass fuel supply chain that will give the local private sector confidence to invest in biomass heating systems
- Install biomass heating systems in several council buildings, including offices and schools, to be fuelled by locally produced wood chips
- Ensure the RECharge scheme is compatible with domestic scale biomass heating (see below)
- There are also strong aspirations to install:
  - A district heating system, supplied by a waste wood fuelled CHP plant. (WID compliant)
  - Obtain regional funding assistance to construct a wood pellet production plant.

6.4.2 Community projects

Empowering community groups whilst making use of existing community structures and organisations can be one of the key vehicles to fostering sustainable practices, such as renewable technologies. The new EEDA Cut Your Carbon Campaign aims to build on this to deliver carbon savings through a variety of measures including renewable energy projects.

The renewable energy industry is also recognising the importance of achieving community involvement in their projects. For example, wind farm developers will now typically establish a community fund which in essence directly pays the local residents an annual fee as long as the wind farm is in operation.

An example of community action includes Ashton Hayes Parish Council who voted in 2005 to take steps towards becoming the first carbon neutral village. The community aims to determine energy consumption for the village and make reductions where possible. Carbon offsetting will be employed through local renewable energy projects and forestry planting schemes to further lower emissions, after energy demand measures have been addressed.

The Dyfi Valley community energy project is a good example of where leadership and access to funding has led to real progress in the community. The project aimed to encourage local people to engage with energy issues and to establish community based renewable energy installations. It aims to benefit the community's 12,500 residents.

Sixty-five scheme proposals were carried through to 28 grant offers. Schemes completed to date include:

- a 112kW grid-connected hydro-electric unit, installed by a farmer

- three 800–1000W (domestic) solar electric installations, one of which powers a ground-source heat pump
- a 1.4kW solar electric array at Dyfi Eco Park and two 690W solar electric arrays at schools
- 124m^2 solar thermal array, plus a 'heat main' (carrying heat between buildings), installed at the Centre for Alternative Technology
- 14 solar hot water systems in the Dyfi Valley and ten more in the rest of Powys.
- A 75kW V17 community wind turbine was installed through the Bro Dyfi Community Renewables Ltd.
- A PV system has been installed in a social housing development of ten flats and in a semi detached property.

Two factors have been identified that have led to the success of the scheme:

- each scheme had access to grant aid, officer support, technical expertise and assistance
- the involvement of keen individuals and leadership

Funding: The European Commission provided 35% of the funding from the European Regional Development Fund through the Objective 5b structural funding programme. The Welsh Development Agency, Powys County Council, Dulas Ltd and the Shell Better Britain Campaign all contributed. Funding was also provided by private sector investors. Local councils and development agencies also helped fund feasibility studies.

Management: Several organisations came together to enable local people to carry out small-scale schemes using various renewable energy technologies. The Dyfi Eco Valley Partnership, a company limited by guarantee now known as ecodyfi, managed the project. It was created by Powys and Gwynedd county councils, Dulas Ltd, the Centre for Alternative Technology, the Welsh Development Agency and Snowdonia National Park.

Use existing structures

A range of community groups, such as religious groups and neighbourhood community schemes, already have existing structures that can facilitate the introduction of renewable energy projects. It may also be the case that these groups are currently working on sustainable schemes.

It is recommended that these community structures are contacted and advice provided on the possibilities for renewable energy in their community.

The community areas that SCDC is currently working in is presented below:

- Community development grants for local projects
- Funding for village consultation initiatives

- Ongoing support for parish councils and young people through various initiatives
- Involvement in local democracy initiatives, including e-democracy
- Information sharing and signposting.

Information on local authority grant initiatives for renewable energy technologies is provided in Section 6.4 below.

6.4.3 Schools

Schools provide an excellent focal point for demonstrating renewable energy technologies to the local community. The current Low Carbon Building Programme Phase 2 (see Appendix 3) aims to support small-scale renewable energy projects in schools. Promoting renewable energy in schools in South Cambridgeshire requires the cooperation of Cambridgeshire County Council. There are already two examples of Photovoltaic's in schools in Cambridgeshire. The response from contacting the County Council was that it is up to individual schools who have the budget but that they would support decent proposals as it is in line with their environmental policies. There is already a Sustainable Procurement policy and handbook, which allows local public sector bodies to buy microgeneration technologies, amongst a whole range of other items, at favourable prices. http://www.espo.org/index.asp?CMD=SDS .

6.4.4 Innovative renewable energy schemes

With SCDC backing, it may be possible to deliver innovative, larger scale and longer term renewable energy projects. Some examples are provided below of potential projects that could be undertaken in SCDC relevant to the local resources – physical, geographic and economic.

Anaerobic Digestion

Being a rural area the use of medium to large scale anaerobic digestion could be a feasible option. It is considered that small-scale facilities similar to those found across south and south-west rural China would not be viable for the majority of residents in South Cambridgeshire. This technology is relevant to the rural population of China as in many cases there is no formal waste management systems, especially for human wastes. In the UK, if waste management system for human wastes is available the Environment Agency is unlikely to allow permission to take the waste to an alternate waste stream. This technology would therefore only be relevant on the domestic level if the household was not connected to the sewage system.

Anaerobic digestion may be viable at a medium to large scale on farms with significant quantities of animal and agricultural wastes. These could be built for individual farms or could be developed at a community level, taking waste from a number of farms and generating electricity for export to the grid and potentially generating heat for local communities.

Anaerobic digesters can be used on farms utilising waste from animals and agricultural waste. Due to the energy content, AD plants are most viable on farms with animal wastes. It is recommended that farmers are contacted and given information on the potential benefits of on-site AD plants.

A large regional anaerobic digestion plant may require assistance and resources from SCDC and other partners. Methods of developing these partnerships are discussed in the next section.

An example of a medium scale anaerobic digestion plant is the Greenfinch Site in Ludlow run in partnership with Greenfinch and South Shropshire District Council. Funding was secured from the Defra New Technology Demonstration Programme and Advantage West Midlands.

This facility utilises household waste from kitchens and gardens across South Shropshire. The Greenfinch site is currently considering options to make use of the heat generated from the CHP generator. If this technology is considered viable for South Cambridgeshire, the site should be located close to a proposed new town or major development so that the heat generated can also be utilised.

Walford College Farm -Anaerobic Digestion Case study

A farm run by Walford Agricultural College installed an Anaerobic Digester plant to environmentally dispose of waste manure from approximately 300 cows and pigs on the farm. Approximately 3,000 tonnes of manure waste feeds a 35 kWe CHP unit (58 kWth) CHP unit. This unit in reality produces about 18 kWe for 20 hours a day. Electricity is used in the farm and the heat is used to run the AD plant and for hot water generation.

Capital costs were £134k, with funding from the college and the EU LIFE grant programme. Savings in the first year were calculated at over £20,000.

Biodiesel projects

On a community level, there may be scope to introduce additional biodiesel fuels into the transport sector. This can be undertaken in several ways:

Community purchase: Members contribute to pay for a community tank that is accessible to those who are members of a 'biodiesel club'. The tank is filled with 100% biodiesel (or alternative blend) by an external supplier providing members with a supply of fuel to use in their road or farm vehicles. The National Energy Foundation operate such a scheme for their staff.

Community production: It may be possible to produce biodiesel at a community, village or parish level. Waste cooking oils could be collected from homes and restaurants and processed into biodiesel in a central location.

A number of regulations relate to the production of biodiesel from cooking oils, adding to administration and costs, so making the process prohibitively bureaucratic and expensive. The producer of biodiesel has to notify HM Revenue and Customs (HMRC) and provide evidence that their product meets all aspects of the legal definition of biodiesel with tests required to prove that the specification is met. HMRC must all be notified of how much fuel is used so that sufficient duty is paid.

If the fuel meets the required standards, it is eligible for a 20p discount on fuel duty, although the 2008 budget stated that this would be withdrawn in 2010. If a product does not meet all aspects of the definition, it is a fuel substitute and will attract a higher rate of duty. As a result, producing biodiesel from cooking oils may not be particularly viable.

Sundance Renewables - biodiesel cooperative case study

Sundance Renewables initiated a small scale biodiesel production facility in 2004. It has been set up as a cooperative which aims to assist community regeneration through renewable energy projects. Sundance Renewables works closely with New Ventures Panel and Sustainability Working Group of Co-operatives UK and is a member of the Good Fuel Cooperative whose members are other co-operatives producing and supplying biodiesel and other low carbon fuels in their local area.

Sundance Renewables makes biodiesel from locally sourced used vegetable oil at its small chemical plant in South Wales. They offer a local collection service to businesses and organisations for used vegetable oils. They run training courses and can assist other communities in developing their own biodiesel production.

Further information can be found at:

http://www.sundancerenewables.org.uk/biodp/index.html

6.4.5 Larger scale renewable technologies

Wind

At least three large scale wind farms have been proposed in South Cambridgeshire, so it is evidently an attractive region for wind energy development. A number of constraints determine the suitability of a particular location. The key variable is wind speed as the higher the wind speed the more energy a wind turbine will produce (a map of the wind resource is presented in Section 2 above).

Large wind turbines could be viable for farmers, businesses or communities without additional capital support, as output is subsidised effectively with the Renewables Obligation. However, especially at the community or farm level, support may be required with education, development stage costs and planning proposals.

In the example of the Dyfi Valley community energy project outlined in Section 6.3.2 above the community formed a company called Eodyfi to manage the project. Communities elsewhere in the UK have formed co-operatives to develop wind turbines or wind farms and divided the profits amongst the members. In some cases this has become so profitable that the co-operative has undertaken further projects in other parts of the country.

For a potential wind farm developer – business, community or individual - there are physical, planning and financial constraints that need to be overcome for a successful project.

In summary, large scale wind projects can be the most economically viable of the renewable technologies. Resource mapping can be used to identify sites and then consultation can begin with local community groups or land owners.

Cambridgeshire County Council looked into the development of wind turbines on council property, and carried out a feasibility study about 8 years ago. The Red Tile wind farm was built on council owned farm land, for example. Cambridgeshire has the largest county owned land estate in the UK.

6.5 Examples of funding initiatives

See Appendix 3 for a selection of the major grants and funding opportunities currently identified for renewable energy projects for communities and individuals.

In order to determine the most appropriate new funding scheme or suite of funding mechanisms, it is helpful to consider what other councils, communities and businesses around the country are doing.

6.5.1 Council – Kirklees Metropolitan Borough Council

RECharge Scheme

To assist home owners with funding for renewable technologies, Kirklees Council, assisted by the Renewable Energy Association, has developed the RECharge scheme. This scheme proposes a second charge or an interest-free loan, secured against the value of the property, to be repaid to the authority when the property is sold. Therefore the consumer does not need to pay upfront costs and there are no monthly loan repayments.

There is a maximum loan of £10,000 which allows for some of the more costly renewables to be incorporated. Funding is cycled back into the pot to finance new installations. The average house is sold every seven years so money would move in and out of the pot quite quickly. It is hoped that the lack of time restriction will increase investor confidence in the sector.

The Council will invest £3million into the scheme. There will be interest to pay. The REA believes interest on the loans could either be paid by the government, by the fund itself, or by gas and electricity companies, for whom it would be a relatively cheap way for them to meet their commitments on energy efficiency. The scheme has just started, and a number of organisations will be monitoring its success to see if it can be more widely implemented.

6.5.2 Council - Merton Borough Council

To help small businesses install renewable energy systems, Merton recently ran a grant scheme. The total funding was limited, but while it ran in late 2007 the scheme filled the gap left by the Low Carbon Buildings Programme, which no longer offers grants to the commercial sector.

6.5.3 Communities – East of England Development Agency 'Cut your Carbon' Campaign

East of England Development Agency (EEDA) is running a competition for grants for communities to cut carbon. SCDC can assist communities in the area developing project ideas and proposals for the competition.

Communities can seek between £5,000 and £200,000 for capital assets that will cut their carbon emissions. They are taking a broad approach as to what this could include, but some examples are:

- renewable / sustainable energy solutions
- reducing waste or water usage
- cutting carbon from transport

7. POSSIBLE ACTIONS FOR SOUTH CAMBRIDGESHIRE DISTRICT COUNCIL

This report has identified a number of strands that South Cambridgeshire could bring together in order to drive renewables growth in the district. These include funding (including local support), grants, local renewable technology promotion, technical support, planning policies, leadership, partnerships, market stability and local support.

7.1 Capital funding

Renewable energy projects can take a long time to develop particularly large scale projects such as large wind or biomass schemes. Timescales of 3 to 5 years for such projects would not be unusual. Small scale microgeneration projects such as solar or small scale wind are more likely to be implemented in a 6 month to 18 month timeframe. To make an early impact, it is recommended that initial capital funding is directed at smaller scales schemes which can demonstrate the potential to be developed quickly.

Focusing on smaller schemes would have the advantage of spreading the funding more widely, maximising the promotional impact and encouraging more community groups. The downside would be the lack of initial impact on CO_2 emission reduction. However if the capital funding can be targeted at technologies which can be easily taken up by others and can also be part of a longer term strategy with early projects facilitating and encouraging more projects then the cumulative impact will build. A revolving fund would fit with such a longer term strategy and enable an initially small pot of funding to lead to significant CO_2 savings in the long term.

7.2 Planning

As discussed in sections 5.1 and 5.2, local development and planning policies have a significant impact on renewable energy development. The actions that SCDC's planning department could take, while still complying with the current Local Development Framework, are:

- Promote the existing requirement for 10% onsite renewable energy, as stated in policy NE/3, and consider extending its scope either in terms of the size or type of development to which it applies.

- Consider increasing the percentage requirement, as is being implemented in the London Plan, where policy 4A.7 states that 20% of carbon emissions must be offset by onsite renewables, in new developments where feasible. It could be argued that a mainly low density, highly residential district such as South Cambridgeshire could aim for an even higher target.

- Explore the feasibility of routinely implementing large development-specific targets for renewables and district energy, such as that included in the Northstowe Area Action Plan.

- Comply, as early as feasible, with the soon to be implemented Permitted Development Rights for certain microgeneration technologies.

- Ensure all planning officers who will be exposed to planning applications for renewable energy facilities have been trained to a level that allows them to fully understand the benefits of renewable energy technologies.

- Consider introducing more innovative measures for incentivising onsite renewables through the planning process, permitting greater development if renewables requirements are exceeded.

- Identify technologies for which in depth planning guidance should be developed.

- Establish whether policy NE/2 is precluding development of onsite generation, district heating, off grid and private wire networks. If so, adapt NE/2 in order to avoid precluding these potentially beneficial solutions, while still achieving the original policy intent. If the policy intent was to preclude these solutions, urgently consider whether this is still appropriate.

One of the biggest barriers to the development of renewable energy is a lack of awareness and information. It is also important that local efforts are coordinated to ensure that limited resources are used efficiently. The council is well placed to address these issues if sufficient resource is available.

7.3 Organisational support – establishing a Renewable Energy Network

One of the key factors for successful renewable projects and growth within the UK has been strong and organised leadership at the local level.

It is therefore recommended that if SCDC is to succeed in utilising the resources available in the South Cambridgeshire District and drive the growth of renewable technologies – both supply and demand – the Council should consider developing a network to facilitate the further introduction and growth of the market. This would be a powerful way of bringing together the factors outlined in 7.1 to 7.3 above.

It is envisaged that this network would act as a meeting place for partnerships to be developed, an education and information centre for individuals, communities and businesses, whilst assisting to provide and leverage funding for renewable projects in the area.

7.3.1 Key Partners to involve in a Renewable Energy Network

There need to be strong linkages with other Agencies promoting renewable energy. These include:

- EEDA (Cut Your Carbon Campaign)
- Cambridgeshire County Council
- Cambridgeshire ACRE
- EST Anglia Sustainable Energy Centre

It is also important not to forget the Business Community and local Educational and Training providers, so the network should also develop links with:

- Smart Life Centre

- University of Cambridge
- Cambridge Energy Forum

Community groups and parish councils will be key partners in the delivery of community projects and should also be represented and linked into the network.

7.3.2 Supporting the development of projects

Building on this report, the SCDC Renewable Energy Network (REN) would take on implementing a vision for the short term and long term renewable energy projects and market in the District.

Some of the key areas that the REN should focus on include:

- **Facilitate local partnerships:** The key to successful renewable energy projects will be a facility to bring together partners interested in developing community projects that meet the expectations of all involved. The key partnerships that are likely to be forged are between:
    - Business and communities and/or schools and villages;
    - Communities/villages and schools;
    - Different community groups
    - Parish councils
    - Local land owners and communities and villages

  Within each of these areas, there could be a role for the Council to play in providing information, guidance and access to funding. By acting as a central facilitator the Council could be a focal point to leverage funding from business and national and European governments.

- **Education and information:** Has been raised by a number of installers as a barrier to the uptake and growth of the renewables market in the district. Roadshows, talks, leaflets, promotional advertising are all areas where the Council could assist. Examples of actions include:
    - Organising promotion days/events for local renewable industries
    - Facilitating community/village education and promoting renewable ideas at community meetings, parish councils

- **Use centres of learning:** The REN could include the activities of local centres of learning Smart Life and Bedford College to assist in the development of renewable energy projects.

- **Disseminate lessons learnt from previous projects:** Being involved in a number of different schemes that potentially have a wider range of funding sources and partners across a spectrum of renewable technologies will provide the REN with important information to assist with the successful of similar schemes in the future.

- **Develop plan of action:** This project has identified short term and longer term renewable energy projects. SCDC, possibly through the REN should develop a short and long term plan of action. This Renewable Action Plan could set targets for renewable capacity installed in the District and allocate finances to achieve this target.

8. CONCLUSIONS AND RECOMMENDATIONS

The main conclusions are:

1. South Cambridgeshire has a pressing need and also the opportunity to develop renewable energy projects. As the District is largely rural, its energy consumption is higher than surrounding areas. Larger houses and greater transport distances than in an urban environment are the main explanation for this. However, the rural context provides a greater access to renewable energy resource compared with urban areas.

2. Renewable energy resources, which are available locally, include wind, solar, biomass and ground source energy. Large scale wind is a commercially viable proposition in the windier parts of the District but proximity to housing and impacts on landscapes will make obtaining planning difficult. The productive agricultural nature of the district provides ample potential for energy crops or crop residues to be utilised as biomass. The large number of buildings provides opportunities for solar and ground source energy to be exploited.

3. There are a wide range of options and opportunities for developing renewable energy projects in South Cambridgeshire. These need to be prioritised to ensure limited resources and funding have the maximum impact in the short term.

4. A short term strategy to focus on funding projects with a demonstration value will have the greatest impact as it will encourage others to also install similar systems. These projects include technologies such as solar thermal, wood heating and air source heat pumps being installed in community buildings such as village halls and schools.

5. The focus should be on whole community or whole village schemes with individual community building projects only being supported as part of a parish-wide project to reduce CO_2 emissions. Parish councils will be key partners in the delivery of this approach. The EEDA Cut Your Carbon campaign provides a ready-made structure for delivering this approach.

6. Establishing a network, supported by the council, would help facilitate this community approach by attracting support from private sector companies and by encouraging the sharing of ideas and support between communities.

7. A longer term strategy should focus on developing planning policies and funding structures to support the development of community scale projects but also larger scale schemes such as larger scale wind. The Kirklees ReCharge scheme shows tremendous potential to encourage the adoption of micro renewables. This should be monitored and adopted if successful. The Merton Rule policy in the Local Plan could be extended to apply more widely and or deeply in its requirements for renewable energy associated with new development. It could be expanded to include refurbishments and extensions.

GLOSSARY

Biomass: Biomass is organic material, produced directly from plants or indirectly from industrial, commercial, domestic or agricultural products. It is also called bioenergy or biofuel. Biomass can be used to provide space heating and hot water heating. Biomass is not a zero carbon technology as the CO_2 released during production, transportation and combustion is slightly higher than to the CO_2 absorbed during growth of the wood, and therefore it is a low carbon fuel.

Ground souce heat pumps: Heat pumps upgrade heat from one source and deliver it to another location using electricity to create the driving force. Ground source heat pumps (GSHP) use a buried ground loop to transfer heat between the ground and the building. They can be used for space heating, space cooling and hot water heating. The efficiency of a GSHP is measured by the coefficient of performance (COP), which is the ratio of units of heat output for each unit of electricity input. Typical GSHPs are very efficient with 4 to 5 units of heat produced for each unit of electricity used.

Air source heat pumps: Air source heat pumps are similar to ground source heat pumps, but they absorb heat from the outside air rather than from the ground.

Solar thermal: Solar water heating uses roof-mounted panels to collect heat from the sun to pre-heat water. It works alongside conventional water heating and can provide up to 60% of a dwelling's annual hot water requirement.

PV: Photovoltaic (PV) cells use energy from the sun to generate electricity for consumption in the building or for export to the grid. The panels can be roof or wall mounted or integrated into the façade.

Low Carbon Buildings Programme: The programme provides grants for the installation of microgeneration technologies in a range of buildings including households, community organisations, public, private and the non-profit sectors.

EEDA's Cut Your Carbon Programme: This programme is a regional initiative, led by the East of England Development Agency (EEDA), with the goal of helping communities respond to climate change by reducing their carbon emissions. Groups taking part will be able to: measure their carbon footprint online, take action to become more energy efficient and seek up to £200,000 for carbon cutting projects in the £2.5 million funding competition

Community Sustainable Energy Programme: This programme will provide £8 million to community-based organisations to install microgeneration technologies, such as solar panels or wind turbines and energy efficiency measures including loft and cavity wall insulation. It will also provide £1 million for project development grants that will help community organisations establish if a microgeneration or energy efficiency installation is feasible.

Merton Rule: The Merton rule was named after the London Borough of Merton, which became the first local authority in the UK to include a policy in its Unitary Development Plan that requires new non-residential developments, above a certain size threshold, to generate at least 10% of their energy needs from renewable energy.

Kirklees ReCharge: This scheme helps finance the initial costs of installation of renewable energy in the home and allows for this cost to be paid off when the property is sold, permitting residents to get the benefit of solar panels and other clean energy technology with no upfront costs.

Renewables Obligation: This is the Government's main mechanism for supporting the generation of renewable electricity. The obligation requires licensed electricity suppliers to source a specific, and annually increasing, percentage of the electricity they supply from renewable sources. The current level is 15.4% for 2007/08, rising to 15.4% by 2015/16. The BERR website provides details of what technologies are counted as renewable under the obligation [15] .Since 2002, the Renewables Obligation has stimulated the renewables market, resulting in a more than doubling of the amount of renewable electricity generated

Renewables Obligation Certificates (ROCs): A Renewables Obligation Certificate (ROC) is a green certificate issued to an accredited generator for eligible renewable electricity generated within the UK and supplied to customers within the UK by a licensed electricity supplier. One ROC is issued for each megawatt hour (MWh) of eligible renewable output generated. Suppliers meet their Renewables Obligation by presenting sufficient ROCs. Where suppliers do not have sufficient ROCs to meet their obligations, they must pay an equivalent amount into a fund, the proceeds of which are paid back on a pro-rated basis to those suppliers that have presented ROCs.

Energy4Good: This programme aimed to encourage the uptake of energy efficiency measures and renewable energy technologies by households and organisations in the Cambridge area. The project team offered free technical advice and assistance with procuring low-energy systems and provided grants through the city and district councils, as well as facilitated access to other grants, subsidies and discounts.

Combined Heat & Power (CHP): Combined Heat and Power (CHP) is the simultaneous generation of usable heat and power (usually electricity). It takes advantage of waste heat generated when electricity is produced. The heat can be used for space heating and hot water. This is more efficient than the process used in conventional power stations, where the waste heat is simply discharged to the atmosphere

Microgeneration: Microgeneration is defined in section 82 of the Energy Act 2004[1] as the small-scale production of heat and/or electricity from a low carbon source. The technologies covered by this definition include PV to provide electricity and solar thermal to provide hot water, micro-wind, micro-hydro, air source and ground source heat pumps, biomass, micro combined heat and power (micro CHP) and small-scale fuel cells.

Energy Services Company: An energy services company supplies a comprehensive energy package, from equipment procurement through to implementation and maintenance, rather than just (one of) the separate components. For example, an ESCo may provide: an appliance, the financing required to purchase it, the expertise needed to maintain it, advice on operating it properly and the energy required to operate it

15 http://www.berr.gov.uk/energy/sources/renewables/policy/renewables-obligation/what-is-renewables-obligation/page15633.html

UK Microgeneration Certification Scheme: This scheme run by the department for Business, Enterprise and Regulatory Reform (BERR formerly DTI), is designed to evaluate products and installers against robust criteria for microgeneration technologies, providing greater protection for consumers and ensuring that the Government's grant money is spent effectively.

Community Renewable Initiative: This initiative was a five year programme, which closed in April 2007. It was coordinated by the Countryside Agency and aimed to improve community energy security, local skills, livelihoods, and education. The CRI stimulated community action on renewable energy and delivered over 150 exemplar community projects across England.

European Regional Development Fund: This fund aims to promote regional development. It provides funding to create and safeguard sustainable jobs, to invest in infrastructure to diversify, revitalise, improve access and regenerate areas. The target areas are economic sites and industrial areas suffering from decline, depressed urban areas, rural areas and areas dependent on fisheries.

APPENDICES

1. ENERGY AND CO_2 DATA FOR SOUTH CAMBRIDGESHIRE

Table 6 CO_2 Figures for South Cambs and neighbouring areas

Local Authority and Government Office Region CO_2 figures 2005	Industry and Commercial	Domestic	Road Transport	LULUCF	Total
Cambridge	437	234	110	0	781
East Cambridgeshire	214	192	323.7	170	899
Fenland	503	220	210.8	161	1,094
Huntingdonshire	547	393	774.6	142	1,856
Peterborough	546	370	407.9	7	1,331
South Cambridgeshire	**801**	**345**	**770.6**	**19**	**1,936**
Mid Bedfordshire	300	316	534.6	7	1,157
Uttlesford	262	194	455.1	-8	903
EAST OF ENGLAND	17,306	13,430	15,468.1	605	46,808
UK TOTAL	248,511	149,504	149,816.1	-2,056	545,775

LULUCF refers to land use emissions

Table 6 is derived from DEFRA CO_2 data for 2005

Table 7 CO_2 Figures per Capita for South Cambs and neighbouring areas

Local Authority and Government Office Region CO_2 figures 2005	Per capita Total CO_2 (tonnes)	Industry and Commerce per Capita CO_2 (tonnes)	Road Transport per Capita CO_2 (tonnes)	Domestic per capita CO_2 (tonnes)
Cambridge	7.2	4.0	1.0	2.1
East Cambridgeshire	12.3	2.9	4.4	2.6
Fenland	13.1	6.0	2.5	2.6
Huntingdonshire	11.8	3.5	4.9	2.5
Peterborough	8.5	3.5	2.6	2.4
South Cambridgeshire	**14.9**	**6.2**	**5.9**	**2.7**
Mid Bedfordshire	9.6	2.5	4.4	2.6
Uttlesford	13.1	3.8	6.6	2.8
EAST OF ENGLAND	8.7	3.2	2.9	2.5
UK TOTAL	9.3	4.2	2.5	2.5

Using 2001 Census data for population

Table 7 is derived from Table 5 and the 2001 Census population figures.

Table 8 The distribution of energy consumption across the district

MLSOA Name	Domestic electricity kWh	Industry/Commerce Electricity kWh	Domestic gas kWh	Industry/Commerce Gas kWh
South Cambridgeshire 001	13,468,873	3,614,482	46,823,942	3,690,980
South Cambridgeshire 002	12,526,247	4,374,718	41,964,252	7,295,520
South Cambridgeshire 003	11,504,569	6,070,342	42,297,025	6,896,781
South Cambridgeshire 004	10,904,734	8,407,903	32,265,079	25,393,799
South Cambridgeshire 005	10,279,836	4,834,944	32,136,186	12,554,277
South Cambridgeshire 006	15,321,217	5,127,872	62,260,654	59,097,421
South Cambridgeshire 007	12,965,592	10,822,672	34,021,392	53,756,453
South Cambridgeshire 008	27,402,409	11,538,254	43,364,323	0
South Cambridgeshire 009	14,262,206	5,336,529	38,657,010	0
South Cambridgeshire 008 and 009	0	0	0	74,707,639
South Cambridgeshire 010	19,379,958	6,083,004	26,815,518	966,612
South Cambridgeshire 011	17,425,587	6,055,402	49,909,816	30,581,250
South Cambridgeshire 012	12,620,486	6,045,910	50,366,487	6,105,900
South Cambridgeshire 013	20,229,534	6,744,580	14,828,195	0
South Cambridgeshire 014	14,386,156	3,941,642	44,852,056	6,755,338
South Cambridgeshire 015	12,941,788	4,173,662	48,296,580	13,310,257
South Cambridgeshire 016	23,914,784	8,400,823	26,766,620	2,750,430
South Cambridgeshire 017	21,057,566	8,725,214	29,279,893	111,259,816
South Cambridgeshire 018	21,202,486	12,962,270	44,708,722	13,622,266
South Cambridgeshire 019	20,912,065	5,541,179	0	0
South Cambridgeshire 013, 019 and Unallocated	0	0	0	27,492,071
Unallocated	764,102	2,857,429	15,662,920	0
Total	313,470,194	131,658,829	725,276,670	456,236,810

Table 8 is derived from BERR Energy Statisitics2006

Table 9 Potential biomass yield and access to gas

MLSOA Name	Straw	Wood fuel	Energy crops	Households not connected to gas
	tonnes	tonnes	tonnes	
South Cambridgeshire 001	3,950	45	308	
South Cambridgeshire 002	3,743	23	314	10%
South Cambridgeshire 003	2,673	25	225	
South Cambridgeshire 004	3,970	45	320	10%
South Cambridgeshire 005	2,770	100	206	10%
South Cambridgeshire 006	1,855	60	147	
South Cambridgeshire 007	1,775	5	130	20%
South Cambridgeshire 008	8,918	465	725	5%
South Cambridgeshire 009	3,063	90	452	25%
South Cambridgeshire 010	5,425	303	381	50%
South Cambridgeshire 011	5,395	123	359	20%
South Cambridgeshire 012	1,880	88	132	50%
South Cambridgeshire 013	10,848	943	766	70%
South Cambridgeshire 014	2,240	63	191	15%
South Cambridgeshire 015	843	-	54	
South Cambridgeshire 016	14,603	1,040	1,007	60%
South Cambridgeshire 017	7,445	723	609	50%
South Cambridgeshire 018	6,320	215	461	30%
South Cambridgeshire 019	9,765	203	640	no data

Notes: Straw yield based on 2.5 t/ha; Wood fuel on 2.5 t/ha; and Energy crops on 10 t/ha

Table 9 is derived from DEFRA agricultural statistics from June 2004. The straw yield is taken as 2.5 t/ha for the cereal area in each MLSOA area. The wood fuel is taken as 2.5 t/.h for all the woodland in each area and energy crops is taken as 10 t/ha for 1% of all land area.

2. EXISTING RENEWABLE ENERGY INSTALLATIONS IN SOUTH CAMBRIDGESHIRE

This is the full list of recent renewable energy installations in South Cambridgeshire:

Technology	Address	Capacity (kw)	PostCode/ Grid Ref	Status	Data source
Ground source heat pump	Cambrige Regional College, Kings Hedges Road, Cambridge	0	CB4 2QT	Operational	South Cambs planning
Landfill gas	Butt Lane, Milton, Cambridge	2136	CB4 4DG	Operational	Ofgem/ Restats
Landfill gas	Milton Landfill Site, Butts Lane, Milton, Cambridge	2128	CB4 6DQ	Operational	Ofgem
Solar PV	Horseheath Road, Linton		CB21 4LU	Operational	Energy 4 Good
Solar PV	See post code (Bullrush Lane, Cambourne)	2	CB23 6BG	Operational	Ofgem/ Renewables East
Solar PV	See post code (Hines Lane, Comberton	3	CB23 7BZ	Operational	Ofgem
Solar PV	Waterbeach (Long Drove)		CB25 9LW	Operational	NEF
Solar PV and Solar thermal	Back Lane, Cambourne		CB23 6FY	Operational	Energy 4 Good
Solar PV and Solar thermal	New Hall Lane, Cambourne		CB23 6GE	Operational	Energy 4 Good
Solar PV and Solar thermal	New Hall Lane, Cambourne		CB23 6GE	Operational	Energy 4 Good
Solar PV and Solar thermal	Sackville Way, Cambourne		CB23 6HL	Operational	Energy 4 Good
Solar PV and Solar thermal	Sackville Way, Cambourne		CB23 6HL	Operational	Energy 4 Good
Solar PV and Solar thermal	Sackville Way, Cambourne		CB23 6HL	Operational	Energy 4 Good
Solar thermal	Weston Green (Common Road, Weston Coalville)		CB21 5NS	Operational	NEF
Solar thermal	Great Wilbraham		CB21 5JF	Operational	NEF
Solar thermal	Kings Mill Lane, Great Shelford		CB22 5EN	Operational	Energy 4 Good
Solar thermal	Stonehill Road, Great Shelford		CB22 5JL	Operational	Energy 4 Good
Solar thermal	Whittlesford Road, Newton		CB22 7PH	Operational	Energy 4 Good
Solar thermal	Lawrence Lea, Harston		CB22 7QR	Operational	Energy 4 Good
Solar thermal	Great Shelford		CB22 5JL	Operational	NEF
Solar thermal	Kentings, Comberton		CB23 7DT	Operational	Energy 4 Good

Solar thermal	Green End, Comberton		CB23 7DY	Operational	Energy 4 Good
Solar thermal	High Street, Harlton		CB23 1ES	Operational	Energy 4 Good
Solar thermal	Comberton		CB23 7DT	Operational	NEF
Solar thermal	Telegraph Street, Cottenham		CB24 8QU	Operational	Energy 4 Good
Solar thermal	Over (Mill Road		CB24 5PY	Operational	NEF
Solar thermal	Saxon Way, Willingham		CB24 5UR	Operational	Energy 4 Good
Solar thermal	New Road, Cottenham		CB24 9RF	Operational	Energy 4 Good
Solar thermal	Waterbeach (High Street)		CB25 9JU	Operational	NEF
Solar thermal	Thornton Close, Girton		CB3 0NF	Operational	Energy 4 Good
Solar thermal	Girton (Woodlands Park)		CB3 0QB	Operational	NEF
Solar thermal	Cambrige Regional College, Kings Hedges Road, Cambridge		CB4 2QT	Operational	South Cambs planning
Solar thermal	Over		CB4 5PY	Operational	NEF
Solar thermal	Histon		CB4 9LR	Operational	NEF
Solar thermal	High Street, Orwell		SG8 5QN	Operational	Energy 4 Good
Solar thermal	Bassingbourn		SG8 5LG	Operational	NEF
Wind	Mill Way, Swavesey	225	CB24	Awaiting construction	Renewables East/ South Cambs
Wind	0	29900	CB21	Under appeal since 12/07	Restats/ S Cambs
Wind	Primary School Site, Arbury Camp, King Hedges Road, Cambridge	6	CB4	Approved 14.5.07	South Cambs planning
Wind	See post code (N End Road, Bassingbourn)	5	SG8 5PD	Operational	Ofgem/ Renewables East
Wind	Rockery Farm, Broadway, Bourn	225	533065 258036	Approved, awaiting construction	Restats/ S Cambs
Wind	Land adj. to Back Lane and Country Park Lane, Cambourne	2.5	531500 259200	Operational	South Cambs planning
Wind	Cambridge Regional College, Kings Hedges Road, Cambridge	6	545000 261000	Operational	South Cambs planning
Wind	37 Kingfisher Way, Cottenham	6	544888 268210	Approved 22.1.07	South Cambs planning
Wind	74 Angle End, Great Wilbraham	2.5 (estimated)	544932 257823		South Cambs planning
Wind	169A St Neots Road Hardwick	1	537480 259580	Approved 11.9.07	South Cambs planning

Wind	Site at junction of Sackville Way and Back Lane, Cambourne	6	532245 259686	Submitted 10.8.07	South Cambs planning
Wind and Solar PV	Cambridge Road (A1301)	2.5 (estimated)	CB22	Operational	Energy 4 Good

These sources were consulted for evidence of local renewable energy installations:

- Ofgem- list of Renewables Obligation accredited installations
- RESTATS- list of operational and planned renewables projects
- Renewables East- online list
- South Cambridgeshire planning department- in house records
- National Energy Foundation- in house records
- Energy4Good- installations from online map

Local large scale renewables installations

There are currently only two significant renewable power installations in South Cambridgeshire, both of which are generators at the Milton landfill site, with a combined capacity of around 4MW. Our research also found that there are at least two medium scale (225kW) turbine installations with planning permission in the district, at Swavesey and Bourne.

There have recently been two planning applications by renewable energy developers to construct large scale wind farms in South Cambridgeshire. One of the projects, Wadlow Farm Wind Farm, is discussed below. In addition, there is a proposal by Enertrag UK for an 8 turbine, 24MW wind farm near Linton, south of Cambridge. A planning application has not yet been submitted.

Case Study: Wadlow Farm Wind Farm

Renewable Energy Systems (RES), a major wind farm developer based in Hertfordshire, submitted their planning application for a 29.9 MW, 13 turbine wind farm in May 2006. The intended location is in a rural location, south east of Cambridge city.

After detailed consultation, in mid 2007 South Cambridgeshire Council decided to refuse planning permission for this development, because of concerns that the wind farm would dominate the character and quality of the landscape. It was ruled that these impacts outweigh the benefits gained from increased renewable energy generation.

RES has since lodged an appeal, and the decision has yet to be announced at the time of writing.

Sources: www.wadlow-farm.co.uk , South Cambs. Planning App no. S/1018/06/F

Cambridge Wind Farm was a proposal by Your Energy, for 16 turbines of approximately 2MW each, located near Boxworth, NW of Cambridge. This planning

application was refused, after appeal, in December 2006, for much the same reason as the above case study.

It is notable that both the above wind farms have been refused, or are facing difficulty obtaining planning permission because of their impact on the landscape. Along with the Linton wind farm, they have been subject to vociferous local opposition, for similar landscape reasons. While there will always be a need for detailed consideration of the impacts of large wind turbines on the local environment, it is clear that community support is vital in the success of such a development. Schemes such as that described in Section 7.3 may help to foster greater community support.

3. GRANT AND FUNDING SCHEMES

One of the key funding streams available to the renewable industry is the Renewables Obligation.

The Renewables Obligation (RO) is a certificate-based market mechanism, which sets a rising quota of renewable electricity that must be supplied to consumers by Licensed Electricity Suppliers. The existing target is for around 15% of electricity to be provided by renewables by 2015/16. The certificates are called Renewable Obligation Certificates (ROCs) and they are traded separately to the electricity produced. Like the electricity, they have a value per MWh.

Currently, all types of eligible renewable electricity generators receive one ROC for each MWh produced. However, the Government is proposing that the amount of ROCs earned by generators will change, depending on the fuel or technology used. Reform of the Obligation is intended to provide additional incentive and support for technologies not yet fully established in the market and to provide additional support for small scale technologies. These changes are due to come into force from April 2009. A summary of the modifications in presented in the Table below.

Table 10 Summary of Reform of Renewables Obligation

Technology/ fuel	ROCs per MWh
Landfill gas	0.25
Sewage gas, co-firing of non-energy crop biomass	0.5
Onshore wind; hydro-electric; co-firing of energy crops; EfW with combined heat and power; geopressure; other not specified	1.0
Offshore wind; dedicated regular biomass	1.5
Wave; tidal stream; fuels created using an advanced conversion technologies (anaerobic digestion; gasification and pyrolysis); dedicated biomass burning energy crops (with or without CHP); dedicated regular biomass with CHP; solar photovoltaic; geothermal, tidal Impoundment (e.g. tidal lagoons and tidal barrages (<1GW)); Microgeneration (<50kW)	2.0

Additionally, there are a number of grant and funding schemes available for renewable technologies. Outlined in the table below is a summary of a selection of the current national and local funding schemes.

Table 11 A summary of a selection of current national and local funding schemes

Grant Name	Funding Source	Description	Coverage	Eligibility Criteria	Funding available and status
Low Carbon Building Programme	BERR Phase 1 managed by EST	Provides capital grants towards the cost of purchasing and installing a wide range of renewable energy generation equipment.	National	Stream 1 – for home owners Stream 2 – for medium and large scale microgeneration projects. Available to public, not for profit and commercial organisations Stream 2A - retro-fit installations and smaller new build projects Stream 2B - Exemplar, major projects Now closed	Stream 1 – differs for each technology (still open)
Low Carbon Building Programme	BERR Phase 2 managed by BRE	Provides capital grants towards the cost of purchasing and installing a wide range of renewable energy generation equipment. Cannot be used in conjunction with other grants from nation or devolved administration	National	Public sector organisations (including schools, hospitals, housing associations and local authorities) and charitable bodies only	Upto £1m Open until mid 2009. Public sector organisations (including schools, hospitals, housing associations and local authorities) and charitable bodies
Bio-Energy Capital Grants	Defra Managed by AEA technology	Promotes the efficient use of biomass for energy, by stimulating the early deployment of biomass fuelled heat and biomass combined heat and power projects	National	Community and public bodies	£25,000-£1m Will shortly open again for this financial year
Anaerobic Digestion demonstration	DEFRA	To establish commercial scale anaerobic	National	To be confirmed	2008 – Details to be

programme		digestion plants			confirmed £10 million overall fund
Biofuel Subsidy	HMRC	Biofuel transport fuel subsidy	National	Transport	20p/litre fuel subsidy – to be withdrawn Spring 2010
Biogas for transport subsidy	HMRC	The fuel duty incentive for biogas, which is a duty reduction.	National	Transport	40p per litre, will remain at its current level until spring 2012.
Awards for All	National Lottery	Promote education, the environment and health in the local community.	National	Communities	£300-10,000
Ashden Awards for Sustainable Energy	Ashden Awards	Awards for the promotion of renewable energy at the community level	National	Communities	3 x £30,000 awards (Annual)
Cut your Carbon	East of England Development Agency	Funding for capital assets that will cut community carbon emissions	National	Communities	£5,000 and £200,000
E.Source	E.ON	Offers grants to community groups and not for profit organisations to implement sustainable energy and energy efficiency projects in their buildings.	National	Communities	£30,000 Subscribe by - 25 April 2008 -3 October 2008
Scottish Power Green Energy Trust	Scottish Power	Assistance and awards for community based renewable energy projects	National	Communities	Not stated
Energy 21	Energy 21	Energy 21 Trust is a registered educational charity (number 1082482) who unites local actions and groups that are driving change towards the use of renewable energy at a local and community level.	National	Communities	Not stated

Community Project Grants	South Cambridgeshire District Council	Community Project Grants are aimed at enabling local community groups and organisations to plan, develop and implement Community Development based projects and activities.	Local	Communities	75% of local community development project. Max to date £3000

4. REGIONAL RENEWABLE ENERGY INSTALLERS AND SUPPLIERS

In order to carry out the consultation discussed in Section 3.5, we identified and contacted a number of renewable energy technology suppliers and installers based in the East of England. These companies are listed in Table 12.

Table 12 Renewable energy companies consulted

Company	Town	County	Technologies supplied	Contact notes
Aran Services Ltd	Bury St. Edmunds,	Suffolk	Solar Thermal	Phone interview done
Bowller Solar Energy	Cambridge	Cambridge City	Solar thermal & PV	Phone interview done
Carbon Free Energy Solutions Ltd	Ely	Cambridgeshire	Wind, Heat Pumps, Solar thermal, PV, Biomass	
David Roitman Heating & Plumbing	Newmarket	Suffolk	GSHP	Phone interview done
Econergy	Sandy	Bedfordshire	Biomass heat	
Ecowarm Solar Ltd	Bury St Edmunds	Suffolk	Solar Thermal	Phone interview done
Energy Innovations (UK) Ltd	Woodbridge,	Suffolk	Biomass heat, solar thermal	Responded
FBC	Royston	Hertfordshire	Biomass boilers	Phone interview done
I C Rumbold Solar Hot Water Systems	Melbourn	South Cambridgeshire	Solar Thermal	Phone interview done
Micro-Generation Systems Ltd	Hertford,	Hertfordshire	Biomass, wind, PV, solar thermal, Heat pumps, Hydro, Gas CHP	Phone interview done
Mint Solutions Limited	Northampton,	Northamptonshire	Wind, PV	
Mosscliff Environmental Ltd	Earl Soham,	Suffolk	Wind, PV	Phone interview done
P J Brown Plumbing & Heating Ltd	Cottenham	South Cambridgeshire	Solar Thermal	Phone interview done
RD Associates Ltd	Biggleswade	Bedfordshire	Biomass boilers	
Renpower Ltd	Wellingborough	Northamptonshire	Wind turbines	
Roland Amey Heating & Plumbing Services	Babraham	South Cambridgeshire	Solar Thermal	Phone interview done
Solar Home	Bury St Edmunds	Suffolk	Solar Thermal	

Technologies Ltd				
Solaris Free Energy Ltd	Bedford,	Bedfordshire	Biomass, solar thermal	Phone interview done
SRE Technologies Ltd	Wellingborough	Northamptonshire	Wind, PV	Phone interview done
Viridian Solar,	Bassingbourn	South Cambridgeshire	Solar Thermal	Phone interview done
W.A.T.M. Services	Luton	Bedfordshire	Solar thermal	
West Anglia Insulation	Bury St Edmunds	Suffolk	PV, Solar thermal, GSHP	

The consultations with the above companies were carried out in an informal phone interview style. The topics covered are listed below.

- How many installations have you carried out or supplied to in South Cambridgeshire, and/or Cambridgeshire?
- Have you observed any contrasts between the market in South Cambs and the market in general? E.g.
  - More or less competition or customers- now and in future
  - Is South Cambs notably more or less attractive for your business than other parts of the country or region?
  - Is it an area you have identified for significant future growth? For example, the new housing developments in Northstowe, Cambourne, Arbury Camp and Cambridge Southern Fringe
- What are the barriers to market growth in the region, and generally e.g. planning, funding, competition?
- What would help to promote or grow your business ?
  - In South Cambridgeshire
  - Nationally

Case Study: Viridian

Viridian is independently owned company founded by a group of engineers and scientists from Cambridge University. Viridian market solar thermal panels called 'Clearline' that are thinner than conventional systems and can form an integrated part of the roof.

Viridian has developed a simulation solar house to study different patters of hot water use and storage and to measure the energy contribution from the solar panel. This research will help to identify optimum use and solar storage parameters.

- Do you have any other comments on the opportunities or limitations for market growth of your business and renewables in general in the area?