

CAMBRIDGESHIRE HORIZONS

Agenda Item No:15a

Zero Carbon Package

To: **HORIZONS BOARD**

Date: **24th September 2009**

From: **Sheryl French**

Purpose:

- **To identify the implications of the Carbon Reduction Commitment for the delivery of new public buildings in the Growth Agenda**
- **To highlight the opportunities and risks relating to the delivery of new public buildings in the major growth sites as set against the zero carbon timeline**
- **To share progress on delivering low carbon infrastructure projects identified in the Carbon Appraisal of the Long Term Delivery Plan (CALTDP June 2008)**
- **To suggest investment priorities to deliver low carbon infrastructure on growth sites**

Recommendation: **Horizons Board is asked to:**

- **To support the recommendations in section 10**

Contact:

Name:	Sheryl French
Job Title:	Delivery Manager, Cambridgeshire Horizons
E-mail address:	Sheryl.French@cambridgeshirehorizons.co.uk
Telephone No.	01223 714052

Background

1.1 Horizons has continued to work with partners to develop plans for delivering the planned growth in a way that minimises the carbon emissions associated with development. A Climate Change Report and Action Plan was presented to the Board in September 2008, which included key findings arising from the Carbon Appraisal of the Long Term Delivery Plan (completed in June 2008).

1.2 The key findings of that report were that Cambridgeshire could only contribute fully to meeting long term carbon reduction targets¹ if:

- a) Significant reductions in carbon emissions can be made within the existing built environment, and transport emissions also reduced
- b) New homes, businesses and public buildings will need to be built to zero-carbon standards
- c) The growth process will need to be used as a key opportunity for rolling out low carbon infrastructure that can facilitate carbon reductions in the existing building stock.

1.3 The Carbon Appraisal identified the following main recommendations:

- i.* provide a strategic approach to facilitating low carbon energy infrastructure such as renewable energy, and local heat and power networks
- ii.* identify how Public Sector buildings can lead the way in installing renewable Combined Heat and Power (CHP) and other forms of renewables so as to provide 'anchor loads' for district heating and low carbon infrastructure networks;
- iii.* establish a ring-fenced carbon investment fund to provide upfront investment in low carbon infrastructure (initially financed by the public sector, but later reimbursed through payments from private sector developers) and additional measures to mitigate early stage infrastructure development risk such as those being proposed for Northstowe;
- iv.* identify a number of public sector demonstration projects within health and education;
- v.* provide further support for low carbon infrastructure, such as CHP systems and district heating networks, including planning policies that require district heating and CHP within large mixed use developments;
- vi.* ensure that the master plans for the strategic growth sites contain comprehensive zero carbon methodologies addressing buildings, low carbon infrastructure and transport;
- vii.* develop proposals on a 'sub regional carbon offset mechanism' that can enable residual carbon emissions associated with new development to be offset through energy efficiency activity within the existing communities.

1.4 National, European and international policy developments are also providing greater impetus for all public bodies to tackle climate change issues more vigorously. In the UK, this is being supported by a raft of emerging legislation,

¹ The UK is required to make an 80% reduction of CO₂ by 2050 (Climate Change Act 2008)

which creates new statutory and financial drivers for change. Some of the key elements of this are set out in the sections below, but essentially the need for action is even more urgent than previously considered.

2.0 Zero Carbon and Low Carbon Energy Infrastructure - Policy Drivers

2.1 Carbon Reduction Commitment

The Carbon Reduction Commitment (CRC) is a new mandatory emission-trading scheme for non-energy intensive organisations that aims to improve energy efficiency and reduce the amount of carbon dioxide (CO₂) emitted in the UK.

The CRC will cover all organisations whose electricity consumption through half hourly meters is greater than 6,000MWh/yr – equivalent to an annual electricity bill of @£500k. All energy other than transport fuels will be covered, such as electricity, gas, fuel and oil. During a planned introductory phase, due to start in April 2010, all allowances will be sold at a fixed price (e.g. ²£12 per tonne). From April 2013, allowances will be allocated through auctions with a diminishing number of credits available over time and the cost will be determined by the market

The CRC will affect large organisations in both the public and private sector. Organisations that meet the qualification criteria (based on how much electricity they consumed in 2008) must participate in CRC. Participants will have to monitor their emissions and purchase *allowances* for each tonne of CO₂ they emit. The more CO₂ an organisation emits, the more allowances it needs. So there is a direct financial incentive for these organisations to reduce their emissions.

In addition, the better an organisation performs in terms of reducing its emissions, the higher it will appear in the annual *performance league table* Government will publish, showing the comparative performance of all participants. This in turn provides a further benefit: all the revenue raised from selling allowances is 'recycled' back to participants, and the league table position will affect how much of the revenue each organisation receives or pays.

CRC starts in April 2010 in its introductory phase. All Central Government departments in Great Britain are included in CRC regardless of whether they meet the qualification threshold or not. Non-departmental public bodies and public corporations which are autonomous and have their own legal status participate separately, but only if they meet the qualification threshold. Local Authorities that meet this threshold are included, and the County Council will be within the scheme, not least because emissions from state-funded schools in Great Britain are included in the scheme through their local authority.

It would seem prudent for public sector bodies in Cambridgeshire to work together to consider the implications of the CRC. This could be facilitated by the Environmental Sustainability Partnership.

² Please note that the estimated cost of carbon being used is considered low compared to the estimated true cost. If social costs are included the cost of carbon reaches £50-70 per tonne.

2.2 Delivering New Public buildings at zero carbon

In the March 2008 Budget, Government announced its ambition that all new non-domestic buildings should be zero carbon from 2019. An earlier target in relation to schools is that all new school buildings should be zero carbon by 2016, with at least two zero carbon pathfinders in each government office region to be operational by 2016. Even without Government legislation in this area, the public sector would wish to be taking a lead in this area, and the number of new public buildings expected in Cambridgeshire as part of the growth agenda provides us with a particular opportunity to demonstrate this.

To illustrate the range and scale of the task of delivering zero carbon, figure 1 sets out the average emission rates for a range of buildings. It shows the broad pattern of distribution of different energy usage for each building type per m².

Figure 1 Average emission rates for buildings, which meet 2006 Building Regulations

kgCO ₂ /m ² /pa	Heating	Cooling	Auxiliary	Lighting	Domestic hot water	Equip-ment	All end uses
Commercial Offices	20	6	4	20	3	26	78
Communications and Transport	16	12	5	22	4	28	87
Education	10	0	2	15	6	15	48
Government	20	6	4	20	3	26	78
Health	17	0	12	27	9	62	127
Sports and Leisure	0	30	15	22	31	14	112
Other services	13	10	7	27	9	31	97
Average all sectors	12	8	7	28	5	16	76

2.3 Renewable Energy Directive

The UK has signed up to the [EU Renewable Energy Directive](#), which includes a UK target of 15 percent of energy from renewables by 2020. This target is equivalent to a seven-fold increase in UK renewable energy consumption from 2008 levels: the most challenging of any EU Member State. While such an increase is ambitious, and will be challenging, the UK is fully committed to meeting the target. The EU Directive also requires Member States to set minimum requirements for renewables on new and refurbished buildings where appropriate. The Strategy to deliver this target³ envisages:

³ Renewable Energy Strategy 2009

- More than 30% of electricity generated from renewables, up from approximately 5.5% today. Much of this to be from wind (on and offshore), but biomass, hydro wave and tidal power will also play an important role.
- 12% of our heat generated from renewables, up from very low levels today. It is expected that will come from a range of sources including biomass, biogas, solar and heat pump sources in homes, businesses and communities across the UK.
- 10% of transport energy from renewables, up from the current level of 2.6% of road transport consumption. Government will also act to support electric vehicles and pursue the case for further electrification of the rail network.

Market forces on their own may not achieve the necessary changes sufficiently quickly, even with a price put on carbon emissions. To support the rapid delivery of renewable and low-carbon technologies, Government will therefore:

- Expand and extend the long-term incentive for major renewable electricity developments – the Renewables Obligation – to ensure that it can deliver around 30% renewable electricity by 2020
- Introduce ‘clean energy cash-back’ for households, industry, businesses and communities to use renewable heat and small-scale clean electricity generation, by introducing new guaranteed payments through Feed-In Tariffs from 2010, and a Renewable Heat Incentive by 2011.
- Amend or replace the Renewable Transport Fuel Obligation to impose an obligation designed to deliver 10% renewable energy consumed in transport by 2020, subject to sustainability controls

3.0 Examples of local best practice

Across the public sector there is good best practice that can be shared to help develop our collective learning and understanding of what can be achieved to support Cambridgeshire’s transition to a low carbon economy, including:

3.1 The County Council has undertaken reviews (suitability surveys) of all its property assets (approx. 700 assets) against consistent criteria, classifying property into the following four categories:

- Continued maintenance (45 per cent).
- Better utilisation (33 per cent).
- Long-term development (16 per cent).
- Surplus (6 per cent).

The Audit Commission has included the work of the County Council as a case study for sharing best practice. The most recent review of assets forms the basis of the County Council’s 10 year Better Utilisation of Property Assets Programme (BUPA). The programme is aimed at realising £110 million of receipts through property disposals, investing £87 million in frontline services and achieving a surplus of £23 million for either reinvestment in accordance with the Council’s priorities or for the repayment of debt. In addition, County Council is looking at options in relation to its agricultural estate located around Cambridge, the market towns and villages as to how it may invest in low carbon energy solutions.

3.2 Cambridge City Council and South Cambridgeshire District Council have substantially raised the bar in for North West Cambridge, creating a national precedent on a par with the Merton Rule. Policies were upheld at the Public Inquiry for Code Level 5 market housing and a community scale decentralized energy scheme as part of the North West Cambridge Area Action Plan. This is an excellent example of Local Authorities raising the policy bar for new development.

3.3 The County Council has taken a lead role in ensuring progress towards zero carbon public sector buildings, by committing in its Climate Change and Environment Strategy to develop a minimum standard for all newly commissioned County Council Buildings, recognising the limitations of BREEAM, and ensuring progress towards zero carbon public sector buildings (Climate Change and Environment Strategy Action Plan 2008, Action 40). A workshop was held in Sept 2008 with colleagues from the District Councils and Horizons, the outcome of which was agreement that an approach was required to ensure preparedness for the introduction of zero carbon standards in public buildings, including a ramping up of existing build standards in advance of those dates. This work is now being progressed under the Quality Charter Training Programme.

4.0 What are the delivery implications for the Growth Agenda and the new public buildings being planned as part of the new developments?

4.1 A timeline for delivery of public buildings is being compiled across the Growth Sites in Cambridgeshire to identify when new buildings are likely to be designed and completed. Appendix A is still draft, and some of the timing is uncertain. However, using this timeline as a guide, we can estimate the following:

Building Type	Building Regs deadline for Zero Carbon	Total No currently planned	No. Complete before 2016	No. complete between 2016 -19	No.complete 2019-2021
Primary Schools	2016	At least 19	7	5	7
Secondary Schools	2016	At least 6 (incl an extension)	2	3	At least 1
Health facilities	2019	At least 6	2	3 (est)	At least 1
Library	2019	At least 7	2	4	At least 1
Community Facilities (youth, sports, centres)	2019	At least 22	At least 4	15	More than 3
TOTALS		At least 60	17	30	13

This table shows that there is a possibility that at least 9 schools will be built before the Building Regulations will require zero carbon schools (by 2016), and that a further 32 public buildings (community facilities, health and libraries) will be built before the Building Regulations for other non-domestic buildings will bite (at 2019). This gives a total of 41 public buildings potentially built before zero carbon standards are in place, with 13 public buildings expected to be built later and so captured by the relevant Building Regulations.

4.2 The balance of costs between investing upfront to deliver these public buildings to zero carbon compared to the possibility of paying more over the longer term as part of the carbon reduction commitment is an area for further detailed analysis. The key issue is to identify how much additional money is required to deliver the 41 public buildings at zero carbon (in advance of this becoming a statutory requirement) versus the annual cost for purchasing carbon credits plus any direct higher fuel costs. This calculation will help support decision makers identify if upfront investment by the public agencies (across Health, Local Authorities, Emergency Services etc) to deliver zero carbon sooner will save costs over the medium to longer term (in effect an 'Invest to Save' policy).

4.3 It is important to note that the current CRC is aimed at organisations using over 6000MWh per annum. However, as the challenge of delivering an 80% reduction in CO2 emissions becomes clearer, more organisations may be brought into the CRC or similar mechanisms.

4.4 Within this cost analysis, it will be important to include the existing standards and how they are affecting new public buildings CO2 emissions. For example if BREEAM very good or excellent standards are adopted by the public agencies then this is moving along the path towards zero carbon buildings. In addition local planning policies and RSS policy ENG 1 require a minimum percentage of renewables which also moves the issue forward. Assessing how far existing standards will reduce CO2 emissions will be part of the cost-benefit analysis.

4.5 Two other issues arising from existing standards for buildings are (a) different standards adopted across different segments of the public sector making a joined up approach on Growth Sites challenging (b) planning infrastructure on current local planning policy standards means that the economies of scale that can be gained over the longer term from strategic renewable energy solutions may be missed on some of the Growth Sites.

5.0 Risk Management

5.1 The Carbon Reduction Commitment will definitely affect Cambridgeshire County Council and Cambridgeshire NHS, and it will become clear if others will be affected over the next few months. A joined-up approach across public sector agencies would still seem desirable, regardless of the coverage of CRC.

5.2 Cambridgeshire County Council has estimated that the first year of the CRC scheme, will require them to purchase £670,000 carbon credits in March 2011. In addition it will need to purchase, in advance, credits for year 2 at the same time.

Total investment needed is therefore likely to be more than £1.2million in March 2011. Much of this money can be returned to CCC, if it is ranked high in the performance league table that Government will compile. But it is uncertain where CCC will come in this league table, as it is one of around 5000 organisations involved in the CRC.

5.3 The management of this risk is an important element of any forward strategy for those organisations in the CRC. Cambridgeshire County Council's energy management team analysed that the schools portfolio accounts for 62% of County's total CRC and 82% of the total usage for all CCC buildings.

5.4 The principle of designing new schools and community buildings to zero carbon standards as early as possible is therefore a key element of a risk management strategy if the return on investment in carbon credits is needed as the CRC develops. This is due to the fact that it is almost always cheaper to deliver high levels of carbon performance in new build compared to retrofit scenarios. Options might exist to design for an easy and cheap upgrade at a later date but cost benefit analysis would be needed to make the comparison, taking into account the impact of CRC. It may also be beneficial for certain sites and buildings to go beyond zero carbon to achieve 'carbon positive' buildings when all costs are taken into account.

6.0 Cost assessment

6.1 We estimate that the new public buildings expected as part of the growth agenda, if built at 2006 Building Regs Standard, would require over £220,000 per annum in CRC payments as a minimum. See box below for the calculation.

6.2 As new buildings are brought forward they may become more energy efficient (as they move to the target dates of 2016 and 2019) and so the total amount payable for these buildings to the CRC might be lower than £220K. However, this will be offset by the expected increased cost of carbon emissions in the interim, and the risk of not getting money returned as part of the CRC performance league table. If the cost of carbon moves closer to true costs (say £50-70 per tonne) then the whole life cost calculation becomes greater and annual savings of over £1m would need to be considered. This cost should be compared to the additional upfront capital costs of moving sooner to zero-carbon standards.

Calculation:

Using Figure 1 above and Figure 3 below, it is estimated that from 2011-2016 195,217 m² (approx 200,000m²) of new public buildings will be delivered. The average Kg/CO₂/m²/p.a. for public buildings is 92 or 0.092t/CO₂/m²/p.a. (This is the average of the education, health, sports and leisure).

The current (2010/11) CRC cost for credits equates to £12 per tonne/CO₂/p.a.

$0.092\text{t}/\text{CO}_2/\text{m}^2/\text{p.a.} \times 200,000\text{m}^2 = 18,400 \text{ tonnes CO}_2$

$18,400 \times \text{£}12 \text{ per tonne of CO}_2 = \text{£}220,800 \text{ per annum as a very minimum.}$

Figure 3 below: Phased growth in non-residential buildings by floor area (m²) shows that approximately (source: CALTDP, June 2008) 625,550 m² of public buildings (health, education, leisure and community) will be delivered as part of the Growth Agenda.

Although the CRC will cost £12 per tonne of CO₂ per year to purchase credits, it is worth remembering that organisations pay approx £150 per tonne of CO₂ per year for electricity and gas consumption, therefore the CRC will improve the financial viability of low and zero carbon energy measures by approx 8%. Any measure which can save a tonne of CO₂ for less than £162 per year is therefore financially viable, and this figure will continue to rise as energy becomes more expensive.

Building type	2006 - 2011	2011 – 2016	2016 - 2021	Total
Commercial	209,893	189,765	131,437	531,095
Retail	18,167	18,167	18,167	54,501
Health	107,500	107,500	107,500	322,500
Education	98,667	71,667	60,667	231,000
Leisure	13,050	11,300	17,600	41,950
Community	4,250	4,750	11,100	20,100
Total	451,527	403,149	346,471	1,201,146

6.3 If new public buildings are integrated with housing, community buildings and other development around them, then shared energy schemes become more viable. The opportunities for this, using public buildings for experimental projects such as sports centres and pools) need to be identified and developed, and could save revenue costs downstream.

7.0 Skills

Following on from the work started by Cambridgeshire County Council to develop a common specification for zero carbon for new buildings, more workshops are planned as part of the Quality Charter Training Programme for this Autumn. The workshops will develop knowledge and skills in the public sector to procure and design new public buildings to zero carbon standards, without losing any amenity. A key output from the workshops will be a common zero carbon specification.

8.0 Investing Housing Growth Funds in low carbon energy infrastructure

Delivering the renewable energy targets up to 2020 will be hugely challenging; any opportunities afforded by the growth agenda need to be explored and acted on

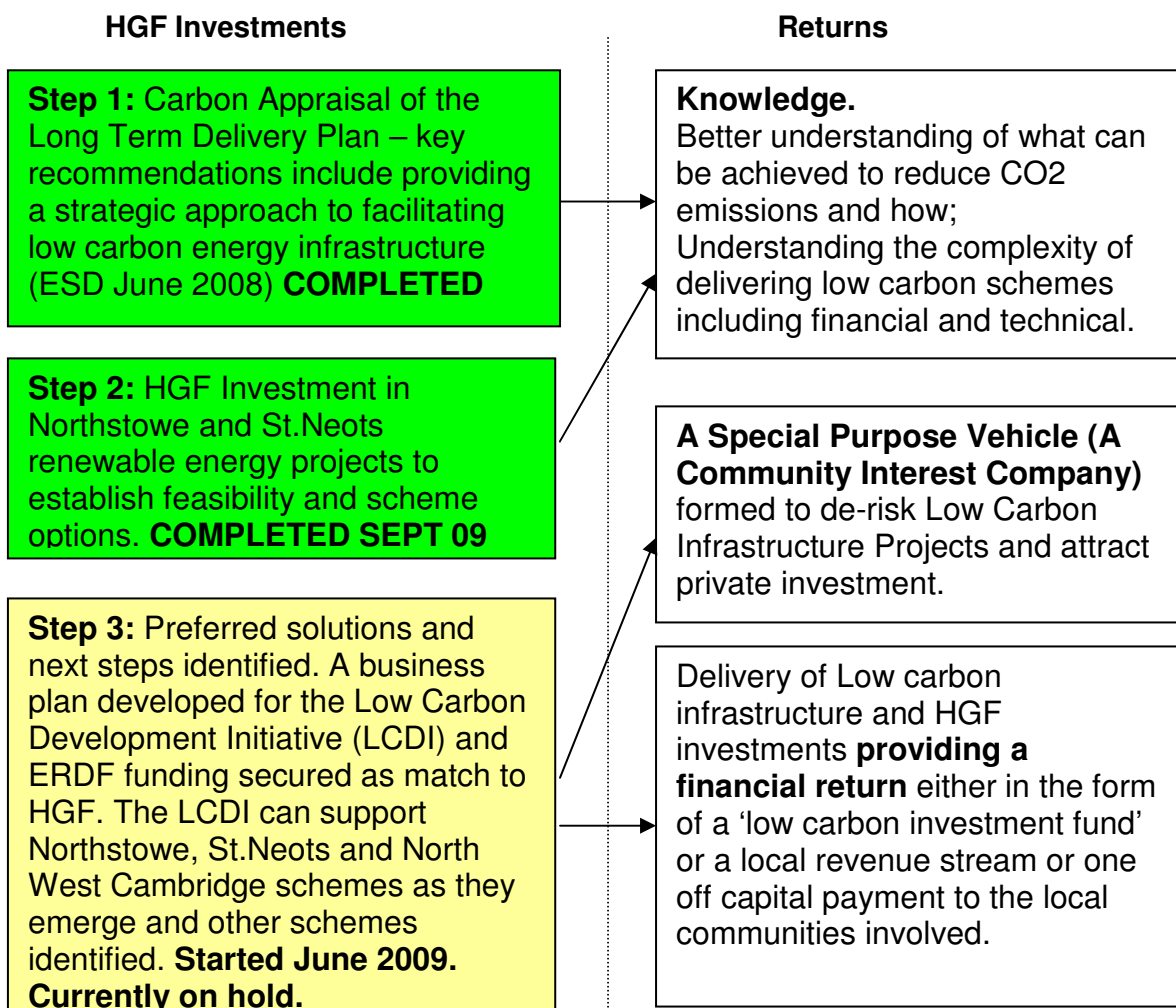
swiftly to support the pace of change required. The three key streams of work that need to be brought together are:

- Reducing CO2 emissions in existing housing stock and public sector assets
- Delivering low carbon new developments with decentralized renewable energy as part of the Growth Agenda
- Identifying the opportunities for growth to support investment in existing stock and visa versa opportunities for existing assets to support new infrastructure in the growth agenda

This paper does not attempt to scope all the work being undertaken across the three streams of work but highlights primarily the investments currently being made as part of the Managing Growth Partnership.

8.2 A total of £2,035,000 growth funding is currently allocated to a range of projects aimed at facilitating the delivery of low carbon energy infrastructure (excluding the proposed HGF contribution of £2.3 million for The Hive). Of this investment a total of £1.6m is from Housing Growth Funds, £490K from European Development Funding (ERDF) and £35K from local authority match funding.

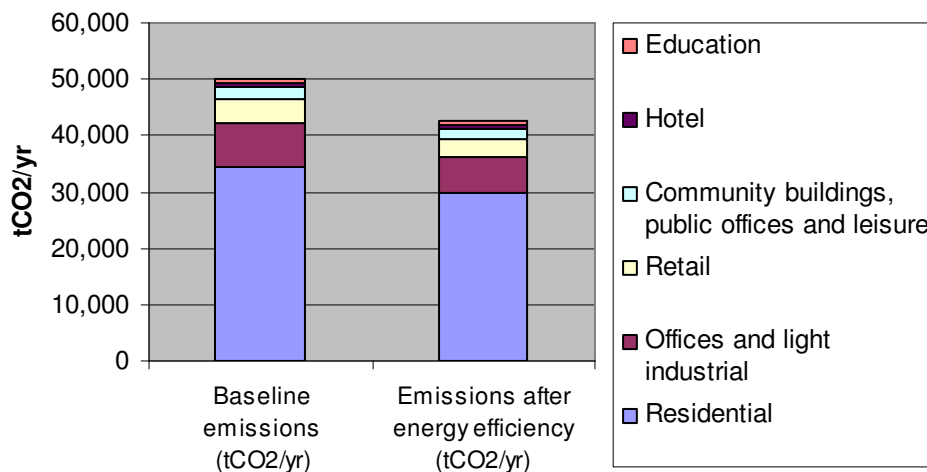
Figure 4: HGF Investments in Low Carbon Energy Infrastructure by the Growth Partnership



8.3 Projects currently supported include:

8.3.1 Viability of a Biomass Combined Heat, Cooling and Power Plant (CCHP) and community heat network for Northstowe. A series of detailed studies and predevelopment exercises have been carried out to appraise the technical, financial and social viability of the scheme. The business case for delivering a Biomass CCHP and community heating network for Northstowe has been established. The findings from this work are being shared with Partners/Stakeholders during September - November 2009. The work from this project will provide useful learning for other growth sites.

Figure 5: Baseline annual carbon emissions and emissions after energy efficiency for Northstowe Development



8.3.2 St.Neots Low and Zero Carbon Energy Strategy. A project to identify opportunities for low and zero carbon decentralised energy for St.Neots Eco-Quarter and the town. The study (final draft due September 2009) will identify a series of 'masterplan' options for low and zero carbon energy in the urban extension and the options for technologies based on demand, scale and location. This project is also considering the opportunity of investments in energy efficiency in existing stock as a mechanism to off- set CO2 emissions. Investments in energy efficiency in existing stock can bring larger CO2 reduction benefits for the same price as delivering code level 6, zero carbon for new homes.

8.3.3 The Low Carbon Development Initiative (LCDI). A special purpose vehicle to identify, manage, de-risk and attract private investment in bringing forward low carbon infrastructure. Essentially the public sector is investing a limited amount of money for a period of time to de-risk low carbon projects to the extent where they become an investment opportunity for commercial developers. The ultimate aim is for projects to achieve a development partner, utility company or long term project owner. Northstowe will be the first in a number of low carbon developments under the Low Carbon Development Initiative (LCDI) and the intention is to bring St.Neots into the LCDI during the next 6-9 months. Renewables East is championing the

LCDI with Cambridgeshire Horizons and it is supported by HGF and ERDF monies. The LCDI will become a Community Interest Company to carry out work in order to mitigate the early stage project development risks inherent in projects of this kind.

8.3.4 'The Hive' Enterprise and Education Park Programme led by Cambridgeshire County Council and Cambridge Regional College. A sum of £2.3 million HGF capital 08-11 has been earmarked for this scheme. The outputs will include upskilling the supply chain to support the transition to a low carbon economy. This project is potentially very important to the development of the long term skills base in Cambridgeshire and the ability to deliver new technologies and provide for effective ongoing maintenance of new technologies.

9.0 Priorities for investing in further low carbon infrastructure delivery

An investment of £100K of HGF Revenue has been identified to progress additional project work on the delivery of low carbon infrastructure for the growth sites. Three projects have been proposed as possible opportunities to be progressed. Two of these priorities are directly recommended by the CALTDP June 2008 and one project could support work linked to the Cambridge North West University development. The three proposals are:

- North West Cambridge –the total number of homes now expected for Cambridge North West Sector (University, NIAB, NIAB Extra and Orchard Park) is just under 6000 homes plus 2000 student homes, plus 100,000m² of research and academic space, as well as the range of community buildings that will be required to service these developments. Whilst the University appears to be well placed to deliver something exciting in relation to low carbon energy for their site the LCDI with Renewables East could help facilitate the delivery of a decentralised scheme and identify opportunities for wider community benefit.
- Using Public Buildings (both existing assets and potential new buildings) as 'anchor loads' to support financial viability for new decentralised energy schemes. This study would:
 - (a) identify the key opportunities and constraints for public sector buildings (both new and existing) to support the delivery of low carbon decentralised energy schemes such as CCHP, considering issues such as procurement of energy; cost benefit analysis; design of buildings etc.
 - (b) identify how public sector assets such as land holdings could either host renewable energy sources or provide renewable fuels
 - (c) help provide a route map by identifying institutional and policy barriers to delivering the above
- Develop proposals on a 'sub regional (or Cambridgeshire) carbon offset mechanism' that can enable residual carbon emissions associated with new development to be offset through energy efficiency activity in the existing community. The definition for zero carbon development identifies 70% of

energy load is required to be delivered on site – the residual 30% can be delivered off-site or a ‘pot’ of money equivalent to £100 per tonne of CO2 emissions be established. The ‘pot’ of money can be invested in a range of allowable solutions including energy efficiency in existing stock. How this could work for Cambridgeshire and what mechanisms need to be in place would form part of this project.

JSGIC and GPB have proposed project 3 as the top priority.

9 Recommendations

The Board is asked to agree the following recommendations:

- To prioritise the carbon offset fund as the priority investment for the £100K HGF revenue funding available (see section 8)
- That Cambridgeshire Local Authorities, working with a wider group of public bodies such as the Police, Fire and Health bodies, and supported by Cambridgeshire Horizons, should:
 - undertake detailed cost benefit analysis to identify whole life costs of new public buildings not built to zero carbon in advance of 2016 and 2019 and the cost implications for the public services involved and agree to identify who should be involved in this process;
 - identify appropriate mechanisms for public agencies to make decisions in the light of the cost-benefit analysis information, and;
 - that this should ideally lead to a joined up approach across the public sector on procurement and commissioning for delivering zero carbon public buildings, possibly as part of “Making Cambridgeshire Count”

References

1. *The Carbon Reduction Commitment User Guide, March 2009*
<http://www.defra.gov.uk/Environment/climatechange/uk/business/crc/pdf/crc-userguide-090312.pdf>
2. *Definition of Zero Carbon Homes and Non-Domestic Buildings, Consultation, Dec 2008*
<http://www.communities.gov.uk/documents/planningandbuilding/pdf/1101177.pdf>
3. *Towards Zero Carbon - Interim Report of the Zero Carbon Task Force*
4. *Carbon Appraisal of the Long Term Delivery Plan (CALTDP) June 2008*
5. *Climate Change Paper and Draft Action Plan to Horizons Board, September 2008*
6. *Environment and Climate Change Strategy 2008, CCC*
7. *North West Cambridge Area Action Plan 2009*