



OXFORD
ECONOMICS

Hertfordshire County Council

A Low Carbon Economy for Hertfordshire

Final Report

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Executive Summary

Background

Oxford Economics was commissioned by Hertfordshire County Council in August 2009 to produce a report aiming to define the low carbon economy and set out its practical implications for Hertfordshire. Specifically, its objectives were:

- To understand what a low carbon economy is;
- To understand what a low carbon economy may mean for Hertfordshire;
- To understand how a coherent, strategic approach to a low carbon economy can be developed in Hertfordshire.

Our report is based on a detailed literature review, consultations with 20 stakeholders across the county, an economic analysis of key sectoral and geographic trends, and modelling of future carbon emissions based on predicted trends in employment, transport, domestic energy consumption and land use.

Drivers of a low carbon economy

A low carbon economy is not an industry which Hertfordshire can choose whether or not to support, safe in the knowledge that the county has other industries which can grow whilst businesses in other parts of the country pursue the low carbon market. A low carbon economy is not an industry, it is a constraint – and it is a constraint on all industries within an economy. And as with all constraints, it will be the most entrepreneurial of businesses who adapt most quickly and most smartly, who maintain their competitiveness and who exploit the challenges it poses for commercial purposes.

The imperatives to develop a low carbon economy are manifold, as summarised in this report:

- The urgent need to develop renewable sources of energy in order to replace declining sources of non-renewable energy, to guarantee the UK's energy security and to combat potentially drastic increases in energy prices;
- The urgent need to use less energy and to use it more efficiently, since the development of new sources of energy in sufficient quantities (including nuclear) is likely to take decades rather than years;
- The global response to climate change and the mechanisms (such as the UK's new statutory carbon budgets, emissions trading schemes, strengthened regulation of products, buildings, etc) introduced in order to cut greenhouse gas and carbon emissions.

These are major challenges. The move to a low carbon economy will profoundly affect the way Hertfordshire functions, the way its public sector bodies invest, and the way its businesses operate. Ultimately, the low carbon economy agenda is about resilience – resilience in the face of one of the greatest challenges facing entrepreneurs since the beginnings of the industrial revolution. This generation's entrepreneurs will need to find ways to harness renewable sources of energy in a sustainable way. This is a paradigm shift – its implications are profound – and Hertfordshire's businesses will need to be resilient to its implications if they are to remain competitive.

Developing a strategic imperative

Within Hertfordshire, there are of course many businesses who are already responding to the low carbon economy agenda by reviewing their energy consumption and investing in the energy efficiency of their buildings and vehicles (this is illustrated by the take-up of Green Potential business support and by the attendance of 200 local businesses at the energy efficiency conference organised by the Hertfordshire Chamber of Commerce in 2008). There are many Hertfordshire households investing in the energy efficiency of their homes, taking advantage of Energy Saving Trust advice, free/subsidised energy efficiency measures under energy supplier schemes such as the UK Government's Carbon Emissions Reduction Target (CERT), and local domestic energy efficiency schemes such as the Hertfordshire & Essex Energy Partnership (HEEP). Hertfordshire also has a nascent cluster of organisations/businesses who are actively exploiting the opportunities inherent in the transition to a low carbon economy – these include the University of Hertfordshire, BRE, the Centre for Business and Sustainability, RES and Green Energy Ltd.

But this activity, whilst promising, is generally ad hoc, and more will be needed if Hertfordshire's vision of a 'resilient and low carbon economy' is to be achieved over the coming years. This will mean taking a more pro-active and co-ordinated approach to decarbonising all existing industries whilst – at the same time – supporting the growth of businesses who are actively engaged in the design, manufacture, distribution, installation and maintenance of low carbon goods and services. In summary: all businesses will need to be energy **efficient**, all businesses will need to be **resilient** to low-carbon constraints; and many businesses will want to exploit the commercial **opportunities** of the low carbon economy (which will include the opportunities generated by the decarbonisation of Hertfordshire's buildings, public sector activities, transport infrastructure and energy sources). In fact, these are solid principles for the low carbon strand of Hertfordshire's economic strategy:

- **Efficiency:** Will our investment/activity make Hertfordshire's economy more efficient, particularly in its use of energy?
- **Resilience:** Will our investment/activity make Hertfordshire's economy more resilient to the impacts – tighter regulation, changing markets – of the transition to a low carbon economy?
- **Opportunity:** Will our investment/activity enable Hertfordshire's economy to exploit the opportunities – enhanced competitiveness, new markets – generated by the transition to a low carbon economy?

These principles are particularly important for Hertfordshire County Council and partners in the context of the current recession and the increasing pressures on public sector budgets. Achieving greater efficiencies is essential in order to cut costs including energy bills, to respond to the UK's CRC Energy Efficiency Scheme and to deliver 'more for less'. Delivering these efficiencies will make Hertfordshire a more resilient county, and will generate opportunities for local businesses and entrepreneurs in the design, manufacture, distribution, installation and maintenance of low carbon goods and services. It is in the context of the above that the following recommendations have been developed.

Progressing the agenda locally

The low carbon economy agenda will quickly extend its influence over the next decade, as the drivers outlined above gain momentum. Already, a number of areas in the UK and further afield are establishing the agenda as a central organising principle for their future prosperity. The delivery of

sustainable, low-carbon economic development has implications for all of the county council's departments as well as the council's partners across Hertfordshire. The low carbon economy agenda is manifestly cross-cutting. In the future, it will need to be aligned with corporate planning, investment decision-making and specific documents such as the Sustainable Community Strategy, the Local Area Agreement, any Multi-Area Agreements and Local Development Frameworks.

Hertfordshire Works' draft economic strategy (2009-2021) outlines the county's ambition to 'create a vibrant (diverse) low carbon economy'. At minimum, this will be required if the county's economy is to be resilient over the next decade. But with the cluster of low carbon economy organisations and businesses already active in the county, the opportunity is there for the agenda to really drive Hertfordshire's prosperity from 2009. This will require a pro-active approach by, and dedicated resource from, the county council and its Hertfordshire Works partners – at a time when resources are scarce and partners are focused on other issues such as the recession. It is our firm belief, as set out in this report, that through leadership and co-ordination, the low carbon economy agenda can support both the efficiency agenda and the recovery from the recession.

Our recommendations

In conclusion, we suggest that Hertfordshire should consider the following strands of activity in pursuance of its low carbon economy ambitions:

- *Establish Hertfordshire Works as the county's owner of the low carbon economy agenda, and take a pro-active approach to identifying low carbon investment/funding opportunities;*
- *Incorporate the low carbon economy agenda into investment decision-making;*
- *Exploit the county's existing low carbon expertise, particularly the BRE innovation park presence;*
- *Ensure that the county's business support (Exemplas, Green Potential, etc) is geared up for the opportunities, and co-ordinated;*
- *Ensure the FE/HE sector is engaged to ensure the right skills are available, and that entrepreneurs and ideas are supported and commercialised, i.e. linked to the business support mentioned above;*
- *Align planning policy with the low carbon economy agenda, developing the work of the Building Futures initiative to create a joined-up approach across the eleven local authorities;*
- *Work with regional partners to leverage funding streams and develop broader low carbon economy opportunities;*
- *Explore the potential for a Hertfordshire low carbon technology cluster and related support package;*
- *Create a sustainable transport and communications infrastructure to reduce local vehicle-dependence and green the local distribution sector;*
- *Empower low carbon communities and stimulate enterprise at the very local level to deliver services.*

Full details of each of these ten suggested strands of low carbon economic activity are provided in the final chapter of the report.

1 Introduction

1.1 The objectives of this project

Oxford Economics was commissioned by Hertfordshire County Council in August 2009 to produce a report aiming to define the low carbon economy and set out its practical implications for Hertfordshire. Specifically, its objectives were:

- To understand what a low carbon economy is;
- To understand what a low carbon economy may mean for Hertfordshire;
- To understand how a coherent, strategic approach to a low carbon economy can be developed in Hertfordshire.

This report will inform and contribute to the development of a number of local agendas, including the new revised economic development strategy for the county and the activities of both Hertfordshire Works, the local economic partnership, and the Hertfordshire Climate Change Partnership.

1.2 What we have done

The research for this report involved:

- A thorough review of national, regional and local literature on the low carbon economy and plans to make it a reality;
- Economic analysis of the Hertfordshire economy and its employment sectors, skills base and research strengths;
- Consultations with a wide range of key economic, social and environmental stakeholders in Hertfordshire (the full list of 20 is in Appendix B);
- Modelling of current and projected future employment and carbon emissions in Hertfordshire.

1.3 About this report

This report summarises the findings of our research and our recommendations for partners to consider to help bring about an effective transition to a low carbon economy in Hertfordshire. We firstly assess the key characteristics of a low carbon economy (Chapter 2) and review the key features of the Hertfordshire economy to identify the most relevant low carbon opportunities and threats (Chapter 3); we follow this up by discussing policy options to help catalyse the low carbon transition and maximise the associated economic benefits (Chapter 4) and finally list a series of specific recommendations for partners in the county to consider taking forward (Chapter 5).

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2 A Framework for Action: Understanding the Low Carbon Economy

The low carbon economy can be, and has been, defined in various ways, perhaps most frequently in fairly intangible terms based around the loose and all-encompassing strategic 'mega-concept'. Our view is that while such high-level definitions are important to allow green marketers the creative license they need to generate media interest and public buy-in, it is more helpful to inform the work of economic development practitioners by identifying the practical implications of any fundamental market transition instead of merely setting out theoretical and conceptual models. This philosophy underpins this piece of work.

2.1 Defining a low carbon economy

In simple terms, a low carbon economy is one in which the use of carbon has been constrained, either voluntarily or by obligation¹. The Oxford Economics Low Carbon Economy Programme defines a *successful* low carbon economy as:

- *An economy which prospers with minimal use of carbon, having successfully adapted to the challenges of a changing climate and taken full advantage of the economic opportunities generated by the transition to a low carbon society.*²

Other definitions adopted by regional and local economic policymakers are generally similar in nature, and often include a clear reference, whether direct or implied, to economic growth and a 'net positive' outcome for the economy in question. The regional development agency Advantage West Midlands, for example, in what was claimed to be the UK's first low carbon regional economic strategy, used the following definition:

- *An economy that produces goods and services at increasing value while reducing the associated greenhouse gases in their production, use and disposal.*³

The two common features of most definitions are generally improving economic performance (or at least improving quality of life and positive social outcomes) and reduced use of carbon and greenhouse gases. But can economic growth really continue, and indeed be accelerated, under such a 'constraint'? According to the Carbon Trust, there is likely to be 'a negligible impact on long-term GDP growth', and the benefits of the low carbon transition 'will more than offset the impact on the limited number of disadvantaged industrial sectors'.⁴ In reality, the ultimate net impacts of a shift to a low carbon economy are unknown, and remain highly dependent on unpredictable rates of technological progress. It is true that in theory, certain carbon-intensive industries, such as car manufacturing and power generation, would be forced to re-invent their entire business models to remain viable. But there will certainly be opportunities for many businesses, households and public sector organisations to secure so-called 'double dividends', whereby financial or quality of life rewards are directly associated with the use of less carbon.

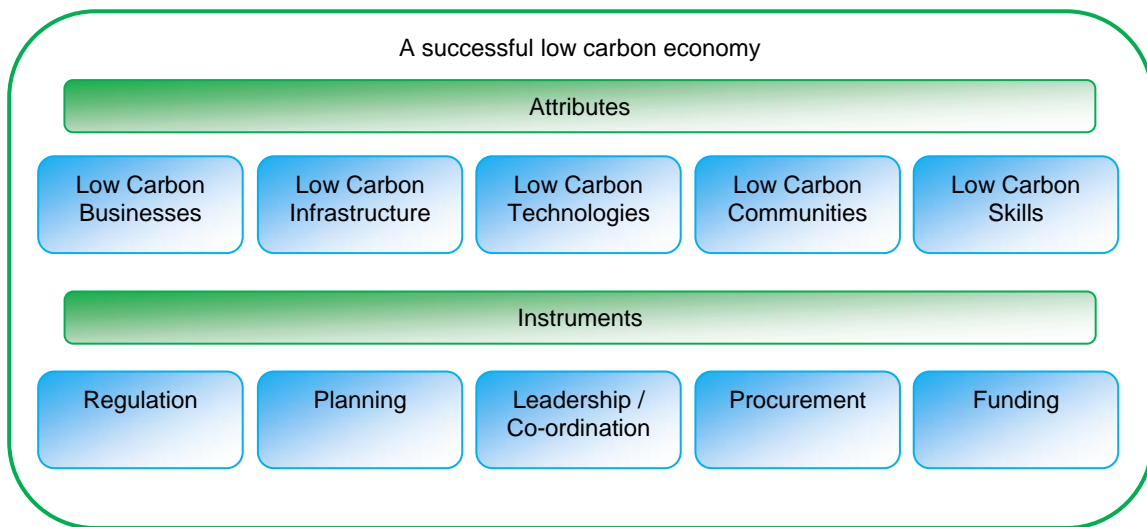
¹ *Making Sense of the Low Carbon Economy*, Forum for the Future, 2007

² *The Oxford Economics Low Carbon Economy Programme*, Tim Sydenham, 2009.

³ *Evidence of Success: Developing the UK's First Low Carbon Regional Economic Strategy*, Advantage West Midlands, 2007.

⁴ *The Low Carbon Economy*, Carbon Trust website article, 2009

What is most certain is that a low carbon economy will have a range of key *attributes* which will need to be developed using a range of policy *instruments*, as set out in the diagram below:



2.2 Attributes of a low carbon economy

The key attributes of a low carbon economy, and their practical implications for businesses and households, are as follows:

1. Low carbon businesses

Businesses make up the vast majority of the economy, providing jobs and income, producing goods and services for consumption, and generating wealth. The most notable feature of a low carbon economy will be low carbon businesses who have either adapted their energy consumption to enhance their competitiveness (through efficiency measures and renewable technologies) or are actively engaged in the design, manufacture, distribution, installation and maintenance of low carbon goods and services.

Firstly, there will be many new opportunities for businesses to expand or diversify into, or even entirely re-position upon. The UK Government has identified a number of key target growth sectors to underpin the low carbon economy, including:

- Carbon capture and storage;
- Low carbon aerospace;
- Chemicals and industrial biotechnology;
- Ultra-low carbon vehicles;
- Low carbon electronics and ICTs;
- Low carbon buildings and construction;
- Business and financial services;

- Renewable energy technologies, including offshore wind energy, wave and tidal power and civil nuclear energy⁵.

It is notable that several of these sectors build on existing strengths within the UK economy, and though transformative change will certainly be required within many existing industries, this can be evolutionary in many cases and will not necessarily require large-scale workforce restructuring. Many firms, from heavy manufacturers to office-based consultancies, will be presented with new business opportunities demanding a moderate shift in organisational strategy, in many ways little different to that demanded by rapid technological change since the 1990s in that those responding the quickest will enjoy the greatest rewards. The UK Government estimates that 880,000 people already work within the 'low carbon and environmental sector', a figure that could rise to more than a million by 2020 as the UK looks to increase its current 4% share of the £3 trillion global market⁶.

Secondly, businesses across the entire economy will need to reduce their use of carbon throughout the production and distribution of their goods and services in order to remain competitive. This is primarily because of a legislative and regulatory drive on the part of government – itself driven by international obligations – to 'squeeze' carbon from the economy, but also in part due to changing consumer demands. At a simple level, this will mean regulation and taxes discouraging carbon-intensive production methods, and consumer awareness and incentives, combined with obligatory carbon footprint labelling on end products, shrinking market size for high carbon producers. More radically, it is also likely, eventually, to mean transformed business models in high carbon sectors – for example car companies seeing vehicles and gallons as a source of cost rather than profit as they are rewarded for providing transportation and mobility to consumers; and power companies viewing kilowatt hours in the same way as they turn to selling guaranteed 'comfort' to householders instead of units of energy⁷.

Energy prices will also markedly increase over the next few decades as the dwindling supply of traditional sources (as we move beyond peak oil and peak gas reserves) is compounded by increasing demand for energy by emerging economies such as India and China. Improving energy efficiency therefore has a direct and growing financial incentive attached for most companies – if not currently sufficient to inspire behavioural changes, then likely to do so in the medium-term future.

"In the long run, companies should expect to source all their energy needs from low, or zero carbon sources, and to sell products and services with little or no climate impact. But for many businesses, both large and small, energy efficiency remains the best, and most cost-effective method of reducing carbon emissions..."

Making Sense of the Low Carbon Economy, Forum for the Future, 2007

2. Low carbon infrastructure

Equally critical to a low carbon economy, and arguably an area where public sector intervention can play a crucial role – referred to as 'laying the foundations for growth' in economic development theory – is developing a low carbon infrastructure. This will include:

⁵ UK Low Carbon Industrial Strategy, HM Government, 2009.

⁶ UK Low Carbon Transition Plan, HM Government, 2009

⁷ Making Sense of the Low Carbon Economy, Forum for the Future, 2007

- An efficient, low carbon *energy* infrastructure which takes advantage of smart technologies and renewable sources;
- An efficient, low carbon *transport* infrastructure to facilitate the necessary movement of people and goods; and
- A planning system which enables the economically and socially optimal delivery of both.

Three quarters of the UK's electricity is currently supplied by coal and gas. A move to a low carbon economy will involve a much higher proportion of electricity generated from renewable sources – the national target is currently 40% by 2020. The new infrastructure will have several components, including a larger role for wind, wave and tidal power sources, a partial reliance upon nuclear energy, and remaining fossil fuel power plants employing carbon capture and storage technology. The electricity grid will also be 'smarter', specifically with improved information for consumers through smart meters to monitor and manage usage, automated demand management technology to minimise wasted energy, and tradable allowances for business and households.

The transition will be driven primarily by legislative and regulatory means, most notably:

- Emissions trading systems (such as the European ETS, and the UK's CRC Energy Efficiency Scheme⁸) which place a cap on total emissions and allow trading of individual allowances to create a carbon 'price';
- Requirements for electricity suppliers to source a proportion of their saleable output from renewable sources (such as the UK Renewables Obligation, which create a clear financial incentive to comply by distributing non-compliance penalties to competing firms); and
- Statutory planning guidance such as the new National Policy Statements on infrastructure development, and new bodies such as the Infrastructure Planning Commission.

A number of uncertainties and controversies remain, particularly the intermittency of some forms of renewable energy generation, such as wind power, and safety and security concerns over the use of nuclear energy. Both create challenges for policymakers and potential threats to a stable and efficient energy supply, though firm strategic commitments to developing them have been made – most notably, at UK level, in the form of the Low Carbon Industrial Strategy⁹.

"Market forces on their own will not achieve the necessary change towards a low carbon energy mix sufficiently quickly and radically. The core of our strategy to overcome these market failures involves putting a price on carbon emissions through the EU Emissions Trading Scheme. But as the Stern Review emphasised, carbon pricing alone will not be sufficient ... and more support is needed for renewable and innovative low carbon technologies."

UK Renewable Energy Strategy, HM Government, 2009

On transport, a move to a low carbon economy will involve improving the efficiency of conventional vehicles, developing and adopting new vehicle and fuel technologies, and changing common patterns of travel through a combination of consumer information and active policy intervention. Firstly,

⁸ Formerly known as the Carbon Reduction Commitment (CRC)

⁹ They are also referenced in the Government's 2009 'New Industry, New Jobs' strategy

advances in engineering technology are thought likely to make the ‘de-carbonisation’ of road and rail transport a realistic goal by 2050; shipping and aviation are more challenging, but similar engineering advances coupled with international emissions caps and associated ‘trading’ mechanisms offer the potential to constrain and regulate emissions¹⁰. Secondly, the development of new technologies, such as ultra-low carbon (or so-called ‘hybrid’) vehicles and cleaner fuels, is a fundamental part of the UK’s low carbon transport strategy, and has already been promoted by around £400m of public investment to promote research and development in the field¹¹. Thirdly, and perhaps most importantly of all, there will need to be a major shift in travel behaviour, achieved by reducing the need for travel *per se* – via the use of technology or spatial planning policies – and by changing business and consumer behaviour through financial incentives and regulation.

3. Low carbon technologies

As previously discussed, technology will be a central pillar of the low carbon economy. A successful economy will be one which takes advantage of the latest low carbon technologies and which – through collaboration between HEIs, local businesses, inward investors and the public sector – is actively involved in the development and commercialisation of these technologies. The opportunity is twofold: to reduce the carbon consumption taking place locally and to generate jobs, income and low carbon goods and services from new forms of industry. There are myriad forms of new technology likely to support the transition, from ultra-low carbon vehicles and associated engine, fuel and battery technology to the efficient generation of power from renewable energy sources and biomass.

The challenges and time lags involved with technological development are notorious, and despite the growing market size for low carbon technologies, some form of government stimulus will be required to catalyse the private sector’s capacity to lead the transition. Around £400m was assigned at Budget 2009 to support UK businesses developing low carbon technologies, plus start-up finance and innovation support via the Technology Strategy Board. Interaction between local universities and the private sector – whether on a commercial consultancy basis or part-subsidised by public funds – will also be an important lever to provide innovating firms with the facilities and expertise they need to undertake R&D, prototyping, testing, manufacturing and marketing of new products.

4. Low carbon communities

Government has an important role to play in promoting low carbon communities in which:

- Public buildings and estates (schools, hospitals, industrial estates) and homes are energy efficient and powered by renewable sources;
- The public sector uses its significant purchasing power to stimulate the demand for low carbon goods and services; and
- Local communities and social enterprises are empowered to develop their own renewable energy schemes.

New legislation means that from 2016, all new homes built in the UK must be ‘zero carbon’ or better (defined in terms of net emissions over a year). In the meantime, low carbon households are being promoted by the introduction of smart-meters to monitor and manage energy usage and costs, financial rewards for small-scale electricity generation through so-called ‘feed-in tariffs’ (from 2010) and ‘renewable heat incentives’ (from 2011), and further raising of awareness on home energy

¹⁰ *Low Carbon Transport: A Greener Future*, Department for Transport, 2009.

¹¹ *UK Low Carbon Transition Plan*, HM Government, 2009

efficiency ratings. Low carbon communities can also be promoted by local government using its significant procurement power to stimulate ‘supply chain greening’ through sustainable procurement policies, while innovative community-wide power generation projects offer a clear opportunity for the formation of social enterprises and partnership organisations such as Energy Service Companies (ESCOs).

What is an ESCo?

An ESCo (Energy Service Company) is a public, private or public-private partnership organisation set up to manage, finance or deliver objectives such as carbon reduction, energy efficiency or renewable energy projects in a local area. They serve to tackle market failure by providing low carbon goods and services to households and businesses where commercial providers in the private sector do not have sufficient financial incentive to do so.

As a simple example, Southampton city council entered into a partnership with a private energy management firm to build a geothermal well and combined heat and power generator providing energy to local residents and businesses (saving 11,000 tonnes of carbon per year). To minimise risk for the council, the ESCo was solely owned by the private energy firm, which signed a co-operation agreement to share a portion of its profits. The council provided city centre land and equipment, planning assistance, licenses for laying distribution mains and internal staff resource to lead bids for European funding.



Source: ESCo definition by Oxford Economics, example and diagram from *The Low Carbon Economy: A Delivery Framework for Local Authorities*, Yorkshire and Humber Sustainable Futures Company, 2009.

5. Low carbon skills

Skills have rightly become a primary focus of economic development policy, as an acknowledged driver of productivity and competitive advantage. The low carbon economy will demand a modified set of skills in line with the new demands of low carbon businesses: this ranges from specialist construction skills, for example in the installation of small-scale renewable energy technologies or energy efficiency measures, to higher end design skills for carbon storage technologies, renewable energy mechanisms or low-carbon vehicles. It also encompasses more general educational skills, particularly in the STEM subjects (science, technology, engineering and mathematics) which will

become even more important in a technology-intensive economy, and in business and marketing, since the commercialisation of new technologies will remain as important as ever if the economic opportunities of the transition are to be harnessed.

To deliver these low carbon skills, an efficient and responsive education and training infrastructure is required. There will be a role for specialist sector bodies – both in key growth areas such as renewable energy and mainstream industries such as construction – to identify and fill relevant gaps, and also a need for local providers of further and higher education to work with employers to refine their offer in light of changing demands. Over and above the sophisticated technical and commercial skills required to drive innovation in low carbon sectors, there will be a demand for more general workplace training on the numerous environmental management standards such as ISO14001 (international), BS8555 (UK) and EMAS (European) which can be used to reduce environmental impacts and demonstrate compliance with legislation and corporate social responsibilities¹², and industry-specific legislative requirements such as the BREEAM assessment method in new building construction.

The failure of an economy to invest in and develop a low carbon skills base will have two main implications, both of which are negative. Firstly, the lack of low carbon skills in the economy may impede the economy's transition to low carbon status. Secondly, the lack of skills will make the economy dependent on non-local businesses and agencies – this will mean that the economic opportunities presented by the transition to a low carbon economy will leak outside. The local economy may still secure some of the environmental benefits of the low carbon agenda, but the economic benefits in the form of jobs for local people and contracts for local businesses, will be lost. This will be further compounded by the inability to export low carbon skills in the form of products and services to other parts of the country/globe. Low carbon skills are therefore fundamental to a *successful* low carbon economy.

2.3 Instruments of low carbon economy

In order to develop such a low carbon economy, there are five broad instruments available to the public sector:

1. Regulation

In the short-term at least, the most effective tool available to policymakers to realise a low carbon economy is regulation, changing the behaviour of firms and households through requirements for legislative compliance. Most regulation is developed at the national, European or international level. The most notable examples of regulation are carbon trading initiatives, such as the EU Emissions Trading Scheme, a 'cap and trade' policy whereby a ceiling for total emissions is agreed between countries and then individual firms and organisations (currently the largest firms only) can buy or sell allowances depending on the extent of their emissions. This offers a financial incentive to the largest polluters to cut their emissions, though it is challenging to find an optimal level for the cap so that firms are compelled to act without causing excessive short-term damage to economic output.

The UK's own initiative, the CRC Energy Efficiency Scheme, will trial in 2010 with a view to full capping of large private and public sector organisations' emissions by 2013. This new emissions trading scheme can be considered as a legislative driver of almost equal importance to the EU ETS, given that it includes the previously untargeted service sector, public sector (including local authorities), and other forms of 'mid-range' energy-intensive industry. The CRC is mandatory for

¹² *Environmental Management Systems*, Defra, 2009.

organisations with a yearly electricity bill of more than £500,000 and targets emissions not currently included in the ETS, aiming to reduce emissions across some of the UK's largest organisations by 1.2 million tonnes per year by 2020. At the end of each year, company/organisational performance, mainly based on absolute carbon reductions since the start of the scheme, will be summarised in league tables outlining the best and worse performers in terms of carbon emissions and reduction. The scheme will strengthen many companies' Corporate Social Responsibility (CSR) motives to reduce carbon emissions and improve transparency of company performance. It will also put pressure on energy providers to assist with improved metering of energy consumption.

Below the CRC Scheme sit a full raft of industry regulations, introduced over a number of years to assist the transition to a low carbon economy by directly influencing behaviour and reducing carbon emissions. These include:

- The Renewables Obligation on energy and fuel suppliers, demanding an ever-increasing proportion of output is sourced from the renewable sector;
- The Climate Change Levy (CCL), a tax on business and public sector energy use introduced in 2001;
- Zero Carbon Buildings legislation, applicable to all new homes and commercial buildings to be constructed;
- The Renewable Transport Fuel Obligation, demanding road fuel suppliers ensure a proportion of their sales are in biofuels;
- Car emissions legislation, primarily driven by the EU and applicable to all manufacturers, with increasing stringency to 2020.

2. Planning

One of the most effective long-term ways of reducing carbon emissions in the economy, particularly with regard to transport emissions, is to site homes, workplaces, retail and leisure amenities in close proximity – close enough to facilitate walking, cycling or at least use of public transport at the expense of car journeys. Most key spatial planning documents, including the UK Government's Planning Policy Statements (PPS), are now underpinned by a recognition of the need to move towards a low carbon economy and this is reflected in the guidance they offer. In 2007, for example, PPS1 was extended to make the support of sustainable travel options and reduction of the need for car travel key planning objectives¹³. In 2009, additional supplementary guidance to PPS1 was published regarding the government's flagship 'eco-towns' plan, setting out how the proposed new settlements – four of which have now been approved – should minimise "unsustainable commuter trips", centre on sites "able to make provision for a minimum 5,000 [zero-carbon] homes", have "the critical mass necessary to be capable of self-containment" and "reduce residents' reliance on private cars"¹⁴. Currently, no eco-towns are proposed for Hertfordshire, though sites have been earmarked in nearby Bedfordshire and Essex.

A new series of National Policy Statements (NPS) also guide infrastructure development by setting out the national need for energy infrastructure, and these are now expected to shape the decisions of local planning authorities (and their Local Development Frameworks), the integrated economic and spatial

¹³ *Planning and Climate Change: Supplement to Planning Policy Statement 1*, Communities and Local Government, 2007

¹⁴ *Eco-Towns: Supplement to Planning Policy Statement 1*, Communities and Local Government, 2009

strategies of regional government, and the verdicts of the independent Infrastructure Planning Commission – set up under the Planning Act 2008 – on nationally significant energy projects from 2010.

“The pattern of transport demand is heavily affected by the way we use land. For example, spreading workplaces, retail developments and homes over a wide area requires people to travel further and makes it much more difficult and expensive to plan efficient public transport services.”

“This summer we will finalise guidance for local authorities on the development of Local Transport Plans. And...we would like to see action to reduce carbon emissions being further prioritised in the next round of Local Area Agreements, expected to be in place by April 2011”.

Low Carbon Transport: A Greener Future, Department for Transport, 2009

3. Leadership / Co-ordination

The public sector has an important leadership and co-ordination role to play in furthering the low carbon economy agenda. This is due to:

- The high barriers to entry in many low carbon markets, where low carbon technologies are often unproven and usually costly;
- The imperfect knowledge of both households/consumers and businesses who are understandably unaware of both the challenges and opportunities of the agenda and the advice and support that is available to them; and
- Its manifestly cross-cutting nature which means that the development of a low carbon economy – and the delivery of its environmental, social and economic benefits – requires cross-departmental working and the strategic co-ordination of partner activity.

At the national level, the UK Government is creating a number of designated Low Carbon Economic Areas, including low carbon vehicles in the North East and marine energy in the South West, to build on existing industrial and research strengths and bring together partners from the public sector and the education, research, and business communities. At the same time, the Carbon Trust is tasked with providing advice and support to businesses and public sector organisations who are engaged in cutting their carbon emissions, supported by interest free loans. Similarly, the Energy Saving Trust is tasked with providing similar advice and support to households – this includes both signposting to available support (for instance, in improving the energy efficiency of homes) and advice on behaviour (for instance, ways in which households can reduce their energy consumption and therefore their energy bills).

In addition to advice and support, the public sector has an important role to play in delivering visible actions including flagship, pilot and demonstration projects. This helps to reduce the formidable costs and risks for businesses, and there are a number of examples of such projects across the UK (for instance, passive houses, low carbon buildings, the forthcoming carbon capture and storage pilots, etc) often funded by UK Government, by RDAs, by European funds or by the Technology Strategy Board, often in partnership with universities and research centres. Organisations such as the Building Research Establishment (BRE) – located in Hertfordshire – tend to be at the forefront of such projects, especially when linked to the sustainable, low-carbon buildings agenda.

Finally, the public sector is essential in co-ordinating activity – particularly R&D, business support and skills and training provision – across areas to ensure that policies, programmes, investment and funding are fully aligned.

4. Procurement

As well as being major employers in their own right, public authorities are often key buyers of goods and services in their local economies, with their supply chains extending across many sectors and supporting local jobs and income through widespread ‘trickle-down’ effects. Using their significant purchasing power, particularly capital budgets, they are potentially able to stimulate local demand for low carbon goods and services and to help create a critical mass of low carbon economic activity by catalysing the development of local supply chains.

This occurs on two levels:

- Firstly, through the re-evaluation of sourcing for existing purchases, guided by a sustainable procurement policy, and
- Secondly, through either the market stimulus or active demonstration of specific low carbon technologies.

An example of both has been provided by the purchase of low carbon vehicles for the use of central government employees in London – demonstrating the technology and gaining valuable media coverage, while stimulating the market through a relatively large-scale purchase. At the local authority level, further opportunities could include small-scale renewable energy technologies, such as solar roof panelling, potentially linked to national feed-in tariffs to demonstrate to homeowners the opportunity to reduce energy bills. Fundamental to ensuring that the economic benefits of sustainable procurement are secured alongside environmental and social benefits is helping to ensure that local businesses and workers are involved (e.g. developing a demand for low carbon technologies in domestic households needs to be met by local businesses within the area).

5. Funding

If targeted effectively, the direct funding of information, research or routes to market can have a significant positive impact on consumer behaviour and the frequency and scale of innovation. Policymakers should have the following goals:

- Effectively targeting funding at low carbon economy priorities;
- Ensuring that households and businesses take advantage of grants and loans available through the Energy Savings Trust, the Carbon Trust and others;
- Taking a joined-up, pan-geography approach to securing additional funding from sources such as regional development agencies (like EEDA), the Technology Strategy Board, the energy supplier obligations and the Low Carbon Buildings Programme.

The UK Government has already deployed significant funding to the promotion of the low carbon economy. We have already described the £400m committed at Budget 2009 to support the development of low carbon technologies, and to this can be added around £3bn to promote domestic energy efficiency before 2011 (largely through energy supplier obligations and information provision, though also through the introduction of smart-meters and carbon labelling), £120m to support innovating firms in the offshore wind sector and £60m to reinforce the UK’s leading role in marine

energy.¹⁵ The most effective type of public funding is a much-debated topic, though activities supported will include general information provision, seed capital (finance for start-up businesses), collaboration on new product development between businesses and HEIs, and demonstrator projects for products such as ultra-low carbon vehicles. In terms of delivery mechanisms for these various types of funding, specific arrangements in the medium and longer term remain uncertain, not least because of current political uncertainties and the associated potential tension between regional and local economic policy; greater clarity is likely by the end of 2010.

2.4 Strategic context: drivers of a low carbon economy

National

Interest in the concept and reality of a low carbon economy grew quickly after the publication of the Stern Review of the Economics of Climate Change in 2006. Prior to the Stern Review, there was already recognition that creating a low carbon economy was an *environmental* imperative. But the Stern Review changed the nature of the debate, demonstrating that – given the scale of the costs involved in not acting quickly to tackle climate change – creating a low carbon economy was also an *economic* imperative. The Review estimate from using formal economic models is that with no action, the overall economic costs of climate change will amount to 5% of global GDP each and every year. This cost could increase to 20% of GDP or more if a wider range of impacts/risks is taken into account.¹⁶

The recession has moved the debate yet further. Creating a low carbon economy is now viewed – by policymakers in the UK and across the globe, most notably the Obama Administration as illustrated by its multi-billion dollar ‘green stimulus package’ – as a major opportunity to reverse the global economic slowdown and lay the basis for future economic growth. In Stern’s own recent report to the G20 Summit, ‘Towards a Global Green Recovery’, he declared that a low carbon economy would generate both economic and environmental dividends in the future, ensuring that any short-term investment and/or demand stimulus will bring both short-term and long-term benefits: “a global green recovery can deliver immediate and long term economic benefits, cut the risk of dangerous climate change and reduce energy costs and insecurity.”¹⁷

But the transition to a low carbon economy has implications for the ways in which economies develop on a scale comparable to the industrial and technological revolutions. There will need to be a radical change in energy production and consumption if the UK is to reduce its carbon emissions by at least 80% by 2050, the legally binding target set out in the Climate Change Act of 2008. And if this target is to be achieved by 2050, current action levels need to increase.

The UK Government has published a range of documents over the past six months which set out how it plans to guide the transition to a low carbon economy.¹⁸ At the heart of these documents is the recognition that:

- The transition to a low carbon economy poses both challenges and opportunities;

¹⁵ *UK Low Carbon Transition Plan*, HM Government, 2009

¹⁶ *The Economics of Climate Change*, Lord Stern / HM Treasury, 2006

¹⁷ *Towards a Global Green Recovery*, Lord Stern / PIK, 2009.

¹⁸ *Low Carbon Industrial Strategy and New Industry New Jobs*, BERR/BIS, 2009.

- Achieving a successful low carbon economy will require cross-departmental working supported by a wide range of instruments and partners; and
- The low carbon economy is not a single, exclusive entity, and must be considered holistically across all forms of social and economic policymaking.

The low carbon economy agenda is indisputably here to stay regardless of who wins the next General Election. In the Conservatives' recent green paper, 'Our Plan for a Low Carbon Economy', the party set out their own range of ideas intended to 'strengthen our economy, help guarantee energy security and protect our environment for future generations.'¹⁹ Although parties differ in exactly how best to develop a low carbon economy, there is now broad agreement across the mainstream political spectrum that doing so is essential.

There is increasing legislation pushing a low-carbon agenda, with the EU Emissions Trading Scheme, and the national CRC Energy Efficiency Scheme at the forefront of this. The ETS programme effectively creates a 'market' for emissions and a 'price' for each unit of pollution, which is the first step towards getting firms to take full responsibility for the negative externalities associated with polluting. Currently, only the very largest firms are involved in the ETS (including some in Hertfordshire). Public sector organisations and other large firms will become involved in emissions trading in 2010, when the UK's CRC Scheme comes into force (see box below). Other key national regulatory drivers include the Climate Change Levy, an energy tax encouraging firms to reduce their use of power, and the Zero Carbon Homes policy, demanding that all newly-built houses are carbon neutral by 2016.

The UK's CRC Energy Efficiency Scheme (formerly the Carbon Reduction Commitment)

From April 2010, large, 'non-energy-intensive' organisations in both the private and public sectors will be forced to comply with a new 'cap and trade' policy on carbon emissions. The scheme is targeted at the 'second tier' of UK energy users, behind the largest and most energy-intensive firms who are already bound into commitments under the EU ETS. All organisations in the UK consuming more than 6 million kWh of half-hourly-metered electricity during 2008 (excluding those already involved in the ETS) are obliged to participate in the scheme – this is estimated to be around 5,000 organisations between them accounting for a quarter of total UK business sector emissions.

Amongst the key aims of the CRC are:

- To put carbon and energy efficiency on the senior management agenda in large organisations
- To improve the transparency of carbon consumption and put pressure on energy providers to improve metering
- To create a clear financial incentive to cut carbon emissions.

The scheme works by selling emissions credits (effectively 'permits to pollute'), firstly at a fixed price and then – by 2013 – through an auction with a diminishing number of total credits available from one year to the next. In this way, assuming organisations do not consume energy beyond the level to which they are entitled by their purchased credits (for which they would be penalised financially), total carbon emissions across all participants will be reduced each year. Furthermore, all organisations involved will have their carbon footprint 'benchmarked' during the year 2010/11, and will then be additionally rewarded (or penalised) financially for the amount by which they succeed in reducing it in

¹⁹ *Our Plan for a Low Carbon Economy*, Conservative Party, 2009.

subsequent years. Critically, this will be judged *in relation to other participating organisations*, via publication of a league table ranking participants by the level of their annual improvement. From government's perspective the overall scheme is revenue neutral, as payments for carbon permits are recycled to participants following adjustment for relevant penalties or rewards.

As well as large office-based companies, supermarket chains and hotels, the CRC will demand participation from many public sector organisations, including central government departments and large local authorities. Since the knock-on budgetary implications of financial penalties totalling hundreds of thousands of pounds would be potentially severe, local authorities in particular have a clear and immediate financial incentive to improve their carbon efficiency. Despite initial qualification for the CRC being based around electricity usage alone, all types of non-transport energy consumption (also including gas, fuel and oil) will be included in ongoing performance monitoring, and this means comprehensive action plans reviewing operations across the entire local authority estate will be demanded.

Amongst the advice given to participating local authorities has been to adopt a strategic, holistic approach involving sustainability, procurement and finance teams; consider how to 're-charge' or procure energy for schools, the fastest-growing component of emissions across LA estates; and to recognise and budget for the significant cashflow implications of taking part.

Sources: Carbon Trust, Defra, London Energy Project

Regional

Regional development agencies have furthered the low carbon agenda by producing a range of overarching strategy documents and setting carbon and energy targets that reflect region-specific industrial structures. For example:

- The EEDA Regional Economic Strategy, covering the period 2008-2031, highlights the region's priorities and targets and sets out a plan to achieve them. One of the visions of the RES is for the East of England to be a leader in the low carbon economy, and it targets a reduction in end user carbon dioxide emissions to 60% below 1990 levels by 2031, as well as a 20% reduction in domestic water consumption per capita by 2030²⁰. The Regional Implementation Plan, published in 2009, sets out general principles for achieving these goals, alongside those in the core spatial planning document the East of England Plan.
- Advantage West Midlands produced the UK's first so-called 'low-carbon regional economic strategy' in late 2007. This included a list of new policy criteria which could be brought in to help decouple economic growth from increasing emissions, for example to support the introduction of energy efficient technologies into the building stock by encouraging both their supply and demand.²¹

Regional government offices have also driven the agenda through their overarching spatial planning documents, the regional spatial strategies. For example, in May 2008 the East of England Plan was published, highlighting amongst other things the UK Government target for Hertfordshire to have 83,200 new homes by 2021. This will clearly have critical implications for the county's transition to a low carbon economy and its transport strategy, and indeed was the subject of the 'charette' planning

²⁰ RES Summary, EEDA, 2008

²¹ Low Carbon Strategy Evidence of Success, Advantage West Midlands, 2007

seminar facilitated by the University of Hertfordshire in 2008 (discussed later). In fact, during 2009 Hertfordshire County Council made a successful legal challenge against the Government's strategic housing growth proposals for Hemel Hempstead and Hatfield/Welwyn Garden City in the High Court – on the basis that the Government had not properly considered reasonable alternative locations for such growth as required by European and national legislation – and by consequence the two districts within which these three settlements lie (Dacorum and Welwyn Hatfield) still had no agreed formal housing growth targets as the year drew to a close.

Pressures on both housing and employment growth are strong across the whole of the area described in the East of England's Regional Implementation Plan as the 'London Arc West', stretching across towns such as Stevenage, Hatfield, Hemel Hempstead and Watford; though this is driven and facilitated by government planning policy, it is also strongly demand-led given the proximity to London and recent economic success. The controversy over development proposals to facilitate this growth, as noted above with regard to housing, perfectly illustrate the tensions created by the need to balance economic and environmental interests in a low carbon economy.

Regional development agencies also undertake research to support the transition to a low carbon economy by improving understanding of relevant technologies and their applications. For instance, EEDA has commissioned a study to find solutions to reduce the region's transport-related carbon emissions; the East of England Transport Carbon Study (TraCS) should be published in early autumn of 2009, and the results should help regional partners (local authorities, the Highways Agency, transport operators etc) to manage the environmental and economic impacts of the ambitious growth planned in the region.

Local

At a local level, a number of key local government performance monitoring targets (driven of course from the national level) are linked to carbon emissions, including:

- NI 185, which monitors percentage carbon emissions reductions from buildings and transport related to local authority operations – including outsourced services (the first reporting year for this will be the financial year 2008/09; government does not require the setting of specific targets for this indicator);
- NI 186, which demands a reduction in per capita emissions across local authority areas (Hertfordshire's Local Strategic Partnership has committed to a 9.1% reduction in end user, per capita carbon emissions by 2010/11, from a 2005 baseline);
- NI 194, an indicator measuring air quality across individual local authority estates and operations.

In addition, target NI 188, though not focused directly on carbon emissions, is designed to measure progress in preparing for climate change, and how councils have embedded management of climate risks and opportunities into its services and plans. Hertfordshire has taken steps to assemble an evidence base on the relevant public commitments and impacts assessment (Level 1 of the indicator), and is currently developing an action plan to move towards levels 2 (comprehensive risk assessment), 3 (comprehensive action plan), and 4 (implementation, monitoring, and continuous review).

Local planning authorities (i.e. the ten districts in Hertfordshire) lead spatial planning work regarding land use and new building by preparing Local Development Frameworks based on the principles of the relevant regional spatial strategy (soon to be integrated regional strategy) for the area. LDFs will be a

key policy tool in driving the transition to a low carbon economy in local areas. Hertfordshire County Council, working alongside the ten districts, has developed an innovative county-wide initiative called Building Futures, which serves as a best practice ‘toolkit’ and reference guide in numerous sustainable building topics such as design, energy, landscape, air, water, noise and waste. Designed for use by planners, developers and the wider community, the intention is to create an overarching guide for sustainable building in the context of Hertfordshire’s specific environmental, social and economic needs.

3 What the Low Carbon Economy Means for Hertfordshire

The real questions for Hertfordshire are how a coherent, strategic approach to a low carbon economy can be developed in the county, how quickly can or should this be delivered, and who is responsible. This section draws out key features of the Hertfordshire economy and applies the lessons of the previous chapter to suggest answers.

3.1 The present-day Hertfordshire economy

Hertfordshire is a county of just over a million residents, based in the East of England government office region though sharing strong economic links with Greater London to its south and the wider Greater South East.

Sectors and key trends

The industrial sector breakdown in Table 3-1 below shows that Hertfordshire employs most people in the broad distribution, business services and public administration sectors, with over 20% of the county's workforce employed in each of these. Compared to the East of England, and England itself, the county is a relatively large employer of business services activities, with 23% of total employees in this sector (compared to only 18% for both England and the Eastern region). The large proportion of workers here suggests a relatively highly skilled workforce, although pockets of low skills are scattered across the county.

Table 3-1: Hertfordshire workforce by industrial sector

Industries	Number of Employees in each Sector*	% Employees in each Sector		
	Hertfordshire	Hertfordshire	East of England	England
Agriculture and Energy	2,700	0.5	2.0	1.4
Manufacturing	41,600	8.5	10.7	10.6
Construction	31,700	6.5	5.5	4.8
Distribution, Wholesale and Retail Trade	103,600	21.1	18.8	16.8
Hotels and Restaurants	28,000	5.7	5.9	6.6
Transport and Communications	27,900	5.7	6.1	6.0
Business Services	113,100	23.0	17.7	18.3
Financial Services	13,900	2.8	3.0	4.0
Public Admin, Education, Health	104,100	21.2	25.5	26.3
Other Services	24,900	5.1	4.8	5.2
All Industries	491,500	100.0	100.0	100.0

Source: 2007 Annual Business Inquiry, and Oxford Economics calculations

*Not including self-employment.

Hertfordshire has a slightly lower concentration of manufacturing activity than the Eastern region and England as a whole, with less than 9% of its workforce employed in the secondary sector. The county employs relatively few people in the agricultural sector (just 0.5% of employees), but has a comparatively large construction workforce due to recent strong growth in that industry.

As Table 3-2 suggests, Hertfordshire appears to have a strong comparative advantage in some highly skilled niche sectors. The county employs 1% of its workforce in the manufacture of pharmaceuticals,

whereas for Great Britain, that figure is only 0.2%, making for a relatively high location quotient²². Hertfordshire is a relatively large employer in natural sciences and engineering research, which is generally also a high skilled sector. GSK has its largest European R&D campus in Hertfordshire, located in Stevenage, employing over 1,300 research scientists. However, as highlighted later, the relatively modest skill levels of many Stevenage residents mean that local workers may not be accessing large numbers of these positions.

Wholesaling and distribution are important sectors for Hertfordshire, and ones whose transport-dependence present potential challenges for a low carbon transition. The county employs almost 9,000 people in the wholesale of machinery and equipment, and another 9,000 people in the wholesale of household goods – these also have fairly high location quotients of 2.1 and 1.7 respectively in relation to Great Britain. The county's strategically important location to the north of London, and its proximity to major north-south transport arteries, are influential drivers in this trend.

Table 3-2: Hertfordshire specific sector strengths

Industry (3-digit SIC code)	Number of employees in this industry	% of workforce employed in this industry	Location quotient		Major employers
			Herts vs EoE	Herts vs GB	
296: Manufacture of weapons and ammunition	1,700	0.3%	3.2	5.5	MBDA
244: Manufacture of pharmaceuticals etc	4,900	1.0%	3.2	4.5	GlaxoSmithKline, Roche
731: Research:natural sciences/engineering	6,600	1.4%	1.6	3.5	
642: Telecommunications	7,200	1.5%	1.8	1.9	T-Mobile (UK) Ltd, BT
452: Building of complete constructions etc	20,300	4.1%	1.3	1.6	
741: Accounting/book-keeping activities etc	26,300	5.3%	1.5	1.4	

Source: 2007 Annual Business Inquiry, and Oxford Economics calculations

There are a number of large employers in the county, including Hertfordshire County Council, the University of Hertfordshire, T-Mobile and Tesco. This is advantageous in some respects, but it also means the county is relatively dependant on a few large organisations, magnifying concerns over potential corporate restructuring (such as that expected within T-Mobile). Hertfordshire's physical location and socio-economic characteristics also make it a popular choice for locating corporate headquarters, such as those of DSG in Hemel Hempstead.

²² A location quotient is a measure of the relative percentage of workers employed in a certain sector. So a location quotient of 2 means that Area A employs a proportion of its workforce in that sector which is twice as large as the proportion of Area B's workforce in the same sector.

Infrastructure and settlements

With no settlements having a population of over 100,000 people, Hertfordshire does not possess one dominant centre of economic activity, rather an assortment of small to medium sized conurbations. This can be disadvantageous, as large firms often prefer to locate where there are the largest workforces, and where they can gain agglomeration benefits by being next to other large firms, as in nearby London. Nevertheless, the county's easy access to London and to various London airports serves to counterbalance these potential disadvantages. The county's only 'city', St. Albans, has a population of around 65,000, with Watford having the largest number of residents, estimated at 91,000. **Hertfordshire has a significant net outflow of commuters**, with 2001 Census data suggesting 157,200 people commuted out of Hertfordshire every day, and 120,100 commuted in; this would be an outflow of 37,100 people every day, equivalent to 8% of Hertfordshire's total employment base. Hertfordshire's current Local Transport Plan (2006/07 to 2010/11) states that 106,000 commute to Greater London everyday, while just 38,700 move the other way, an outflow to Greater London of 67,300. So while there are net commuter inflows from all other neighbouring counties, there is a large net commuting outflow to Greater London.

Comparatively speaking, St. Albans has a very highly skilled population, with over 50% of residents qualified to NVQ level 4 equivalent or higher (2007 Annual Population Survey data), 66% higher than the average of Great Britain as a whole. However it is unclear exactly how many of these work in Hertfordshire itself, given the strong transport links to Greater London from the city. In contrast, Stevenage has a relatively modest 22% of residents qualified to level 4 equivalent or higher, 40% lower than the average across Hertfordshire as a whole. This could present significant challenges if the town's lower-skilled manufacturing jobs continue to disappear and there is further growth in the higher-skilled jobs base which many of its residents are unable to access.

Employment rates across the county's ten districts are fairly similar. The districts of Broxbourne, Dacorum, East Hertfordshire and Stevenage all have a similar employment rate, at around the 81% mark (higher than the county average of 79%). North Hertfordshire (75%) and Welwyn Hatfield (74%) both lag slightly on employment rates relative to the county, but still fall in line with the Great Britain average. **There is much more sub-county variation in GVA per capita, reflecting important differences in industrial structure and population distribution.** Despite a low employment rate, Welwyn Hatfield has the highest GVA per capita in the county, at around £26,400 per year. This is 44% higher than the GB average and 52% higher than the East of England. Watford also has an impressive GVA per capita, at £25,600 a year. The districts of Three Rivers and Stevenage have above average GVA per capita levels, at 20% above GB figures, but Broxbourne (£16,400), East Hertfordshire (£17,700) and particularly North Hertfordshire (£15,200) all had significantly lower figures in the most recent 2006 data.

As a whole, Hertfordshire performs well on key measures of entrepreneurship, with 82 new business registrations per 10,000 residents (a common measure of the business start-up rate) in 2007. This is 30% higher than the East of England average, and 33% higher than Great Britain. Hertsmere (48% higher than the GB average), St. Albans (53% higher) and Watford (49% higher) see the highest levels of business start up, which is potentially encouraging if new low carbon businesses need to be created to help develop the low carbon economy in Hertfordshire. Some intriguing patterns are evident at a local level across the county: for example, while Stevenage had 70 new businesses registered per 10,000 residents in 2007 – which is still 14% higher than the GB average – its stock of VAT registered businesses is only 333 per 10,000 residents, nearly 20% lower than the GB average, and 37% less than the Hertfordshire average.

Key features of Hertfordshire districts

- Broxbourne – Low GVA per capita with not too many businesses, but has an above average employment rate
- Dacorum – Above average employment rate
- East Hertfordshire – Low GVA per capita but has an above average employment rate
- Hertsmere – Strong measures of entrepreneurship
- North Hertfordshire – Particularly low GVA per capita, and has a below average employment rate
- St. Albans – Entrepreneurial district with a very highly skilled workforce, but perhaps a lower than expected GVA per capita
- Stevenage – Relatively low-skilled workforce with poor performance on entrepreneurship, but an above average employment rate, and a relatively high GVA per capita
- Three Rivers – Above average GVA per capita
- Watford – Very high GVA per capita, with recent strong performance on entrepreneurship
- Welwyn Hatfield – A below average employment rate, and below average measures of entrepreneurship, but a strong GVA per capita

Source: Oxford Economics and Hertfordshire County Council research

Hertfordshire has identified and brought forward a number of key employment sites intended to deliver a long-term impact on the county's economy. For example:

- Maylands Business Park, already the East of England's largest business park, is sited on the edge of Hemel Hempstead, and houses over 700 companies, employing more than 20,000 people. The site has 250 hectares already developed and further earmarked for expansion, and includes a mix of business sectors, including high tech manufacturing, wholesale, retail and business services. Several corporate head offices are located on the site, such as Kodak, Toshiba, and 3Com.
- Hatfield Aerodrome is one of the largest key employment sites, located just off the A1(M): in 2000, a plan for redevelopment of the main part of the site (including the airfield) was accepted, for 2 million sq ft of further employment development, following on from the earlier redevelopment of Hatfield Business Park. The main site comprises a mix of office, industrial and warehouse land use, covering roughly 130 hectares, employing in the region of 10,000 people, and its primary users include the University of Hertfordshire (with its new campus and sports facilities), T-Mobile and Computacenter.
- Gunnels Wood in Stevenage is that district's main employment area, with an estimated 500 companies (including GSK and EADS), employing up to 18,000 staff.

Other key sites across Hertfordshire include the 116 ha Leavesden Park situated just north of Watford, the 30 ha Spencer Park in Hemel Hempstead, designated for 'specialised technological activities', Park Plaza (28 ha) and Essex Road (30ha) in Broxbourne, both of which are currently being developed, and the 27 ha Centennial Park at Elstree.

In terms of transport infrastructure, Hertfordshire has two international airports just outside its borders: London Stansted is just to the east of Bishop's Stortford, in Essex, while London Luton is in Bedfordshire, northwest of the county, and twenty minutes from St. Albans by car. Heathrow is only marginally further away, taking 45 minutes to reach by car from St. Albans compared to 40 minutes to Stansted, and this proximity to a truly international airport is important for many of the county's businesses trading internationally. The county has good road and rail links to London, with the M1, A1 and M25 all passing through its borders, and the M11 just outside. With trains taking a mere twenty minutes from both Watford and St. Albans into central London, and the high levels of car ownership in the county, it is clear to see how Hertfordshire sees a net deficit of commuters, many of whom are tapping into the capital's pool of higher paid jobs.

A resultant characteristic of Hertfordshire's concentration of high earners is high local house prices. Data from the Land Registry for the 3rd quarter of 2008 shows that the average price of a detached house in Hertfordshire was £543,000, a full 57% higher than the cost in the East of England as a whole (£346,300) and also 16% higher than the South East average of £467,300. A semi-detached property costs on average £311,800, 46% higher than an equivalent property in the East of England (£214,000), and 26% higher than in the South East (£248,200). Terraced housing is also more expensive in Hertfordshire, the average property costing £232,400, 29% more than the average in the East of England (£180,400) and 13% higher than the South East (£205,200). Though price levels have fallen considerably in many parts of the UK during the recession, the differential between Hertfordshire and regional averages has generally been preserved.

Skills and occupations

Despite pockets of poor performance, Hertfordshire in general has a positive and advantageous skills profile, with 32% of the working age population having qualifications equivalent to at least NVQ level 4 (bachelor's degree level). This compares favourably to the English average of 29%, and is significantly higher than the East of England as a whole, where only 26% of the economically active have NVQ level 4 or higher. In addition, just 9% of Hertfordshire's working-age population have no qualifications, as opposed to 12% of those in England.

Figure 3-1: The 'skills escalator' – skill levels by qualification

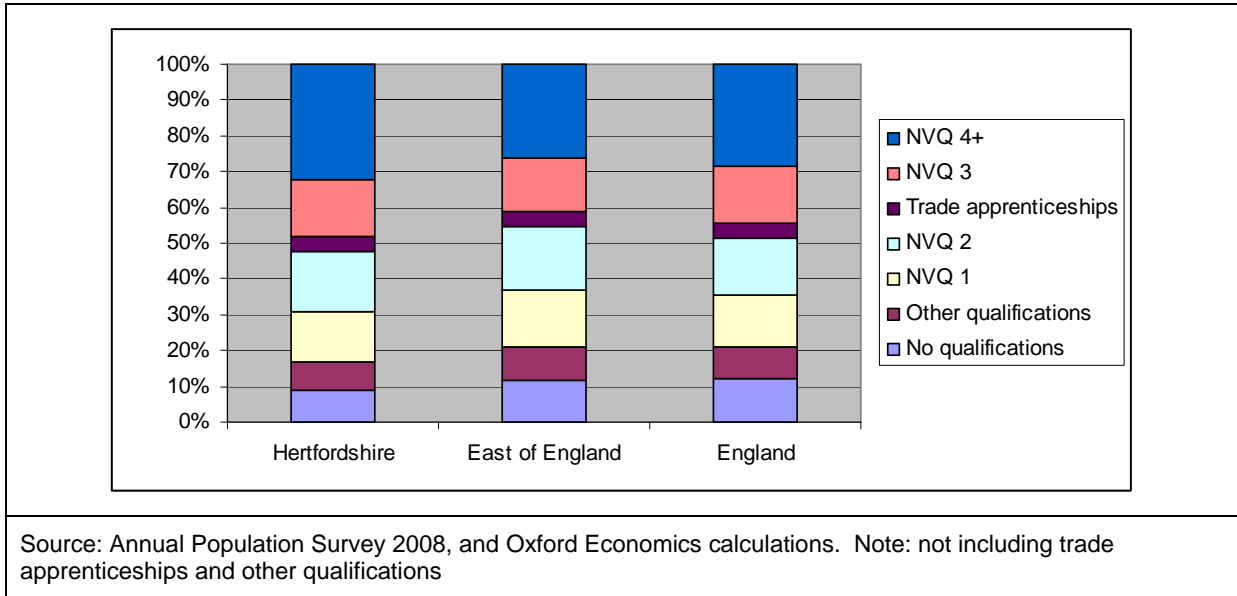
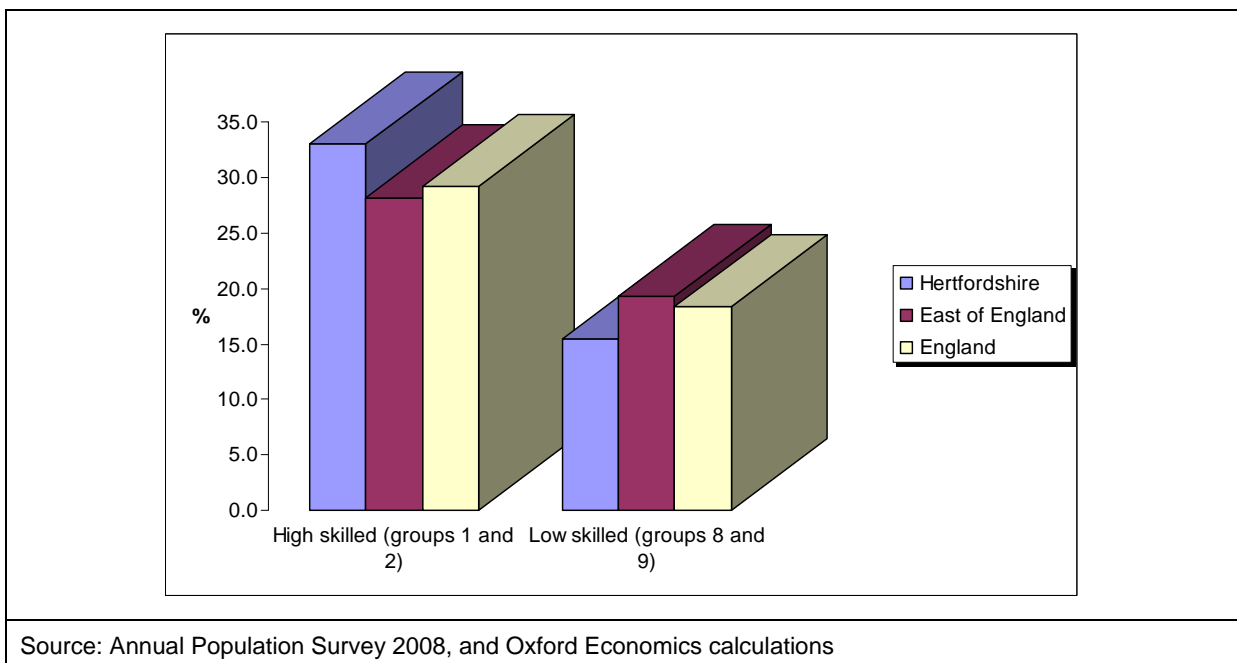


Figure 3-2 below shows what percentages of those who are in employment make up high-skilled and low-skilled occupations. High-skilled occupations include managers, senior officials and professional occupations, while low-skilled occupations contain process, plant and machine operatives and elementary occupations. The chart doesn't include all occupations in between, as their proportionate share is almost exactly equal across the three areas. Hertfordshire again demonstrates a relatively skilled workforce, with 33% of those in employment working in high-skilled managerial and professional roles, compared with 28% in the East of England, and 29% in England as a whole. Furthermore, the county has a lower percentage of its workers in the lower-skilled professions – just 16% of the Hertfordshire workforce occupies these jobs, compared to 18% in England and 19% for the Eastern region.

Figure 3-2: Skill level by occupation



Education infrastructure in the county is spearheaded by the University of Hertfordshire, a leading business-facing university which also takes an active role in supporting the local county economy. It offers several environmental courses including Environmental Management for Business; Law and Environmental Studies; and Environmental Studies and Financial Mathematics. As a sector leader in environmental management, the university has been awarded funding to incorporate green technologies into the 2009 refurbishment of the £120 million de Havilland Campus. Hertfordshire's FE infrastructure features North Hertfordshire College whose specialism in construction and engineering offers an obvious source of low carbon skills development in the skilled trades, and whose new Stevenage Skills Centre creates a direct presence in one of the county's most under-skilled areas.

Business support

The East of England Business Link contract is held by Exemplas (itself almost wholly owned by the University of Hertfordshire). Exemplas delivers a low carbon business support offer by way of its Green Potential programme (which also involves academics and other permanent staff members from the university). Companies increasingly need to become greener, because of tighter regulations, potential competitive advantage as customers/contractors move towards favouring firms with greener credentials, and energy efficiency gains. The Green Potential initiative offers companies £1,000, roughly a 60% discount, off the cost of an Environmental Impact Survey (EIS), which helps suppliers achieve an environmental standard many buyers now look for or even require as a minimum. Training by way of various courses in environmental practices and management is also offered, as is free advice to help organisations reduce their carbon emissions. More recently, the EASIER project (Environmental Advice for SMEs in the Eastern Region) has launched to help firms benchmark and reduce their carbon footprint through up to 14 days of ERDF-subsidised environmental consultancy.

The University of Hertfordshire itself also has a number of low carbon business support and research initiatives. Some of these are small-scale, for example the SPRING (Sustainable Business Practices Research Interest Group) project which offers consultancy services, others more ambitious, such as the newly-founded Centre for Sustainable Communities which aims to become a centre of excellence for HE-industry engagement. The university has also worked together with the Letchworth Garden City Heritage Foundation to secure funding in a 'green' business initiative, where a university graduate would help develop plans to ensure the Foundation meets its sustainability objectives. This initiative could support the wider sustainability agenda in the Garden City.

As well as overseeing the region's business support programme (including Business Link, and specialist sector support), EEDA offers a range of loans and grants to businesses. For example, Small Loans for Business are available up to the value of £50,000, mainly focusing on business start-ups, SMEs, and social enterprises. They also offer Grants for Research and Development (GRAD), up to the value of £250,000 to help with R&D on technologically innovative products or processes.

3.2 Future economic prospects in Hertfordshire

Using the Oxford Economics local economic forecasting model, we have assessed some of the changes likely to take place in Hertfordshire as it feels the effects of the recession (2008-2010), as it recovers (2010-2015), and finally as it returns to longer term trends (2015-2020). As shown in Table 3-3, total employment in Hertfordshire is forecast to fall by around 36,500 between 2008 and 2010, a decrease of 6%. Our current forecast shows a rise of around 41,000 jobs in the period 2010-2015, and a more modest 27,700 in the subsequent five-year period to 2020. Overall, we expect Hertfordshire to see employment around 32,300 higher than 2008 levels by 2020, a net rise of 6%.

It is noticeable that while all sectors bar the public sector are forecast to decline in terms of total employment between 2008 and 2010 (the public sector is also now forecast to lose jobs in 2010, but net growth is still expected over this two-year period), the manufacturing sector is the only one forecast to continue losing jobs thereafter – in line with the national trend of ongoing secondary sector decline in the face of low-cost overseas competition. By 2020 we expect manufacturing to have shed 12,400 jobs, almost a third of its 2008 total across the county. Replacing the chiefly lower-value jobs shed with higher-value, more technology-intensive positions in research and development or low carbon sectors – and helping its residents develop the skills required to access them – will be a crucial determinant of Hertfordshire's future economic success. A successful R&D commercialisation strategy in low carbon technologies, for example, may also help the county reverse the national trend in manufacturing.

We forecast population trends to remain consistent with those seen in the recent past, increasing by a total of 9% between 2008 and 2020 and giving Hertfordshire a population increase of almost 100,000 people. Hertfordshire's total GVA is forecast to fall around 4% in the period 2008-2010, but we expect this to increase by 20% between 2010 and 2015, and a further 17% by 2020, for a net increase of around 35% between 2008 and 2020. Our forecasts suggest that GVA per capita will decrease by roughly 5% between 2008 and 2010 but we expect it to recover strongly, yielding a net increase of some 24% over the period 2008-2020. This is an expected increase of nearly £5,000 GVA per capita in Hertfordshire, as productivity is driven upwards by improved skill levels and increasing use of technology.

Table 3-3: Hertfordshire economic prospects 2008-2020

Summary table for Hertfordshire total								
	Change 2008 - 2010		Change 2010 - 2015		Change 2015 - 2020		Change 2008 - 2020	
	Number	%	Number	%	Number	%	Number	%
Total Employment in: (000s)								
Primary industry	0.0	-0.2	0.1	2.3	0.1	1.6	0.2	3.8
Manufacturing	-5.3	-12.0	-3.8	-9.8	-3.3	-9.3	-12.4	-27.9
Construction	-5.1	-9.6	5.7	12.0	3.5	6.6	4.2	7.9
Distribution	-5.8	-5.1	5.3	5.0	5.3	4.7	4.8	4.3
Hotels and catering	-2.0	-6.4	2.5	8.5	1.5	4.7	2.0	6.4
Transport and communications	-1.1	-3.6	1.6	5.3	0.7	2.2	1.2	3.8
Financial	-1.6	-10.8	0.9	7.0	1.1	7.5	0.4	2.6
Business	-16.0	-11.9	19.1	16.2	8.2	6.0	11.3	8.4
Public services	0.6	0.5	5.5	4.9	7.7	6.4	13.7	12.1
Other services	-0.2	-0.5	4.0	11.3	3.0	7.5	6.8	19.1
Total	-36.5	-6.3	41.0	7.6	27.7	4.8	32.3	5.6
Population (000s)	13.4	1.2	35.6	3.3	47.0	4.2	95.9	8.9
GVA (£m, 2003 prices)	-823.7	-3.8	4114.9	19.7	4333.6	17.4	7624.9	35.2
GVA per capita (£000s, 2003 prices)	-1005.5	-5.0	3057.3	15.9	2811.9	12.6	4863.7	24.1

Source: Oxford Economics Forecasts

3.3 How a Hertfordshire low carbon economy might look

Sectors at risk

The two tables below suggest the extent to which any movement to a low carbon economy might impact on Hertfordshire's employment sectors. To construct them, we have separated industries by location quotient in relation to England as a whole (note there is no unequivocal link between a high location quotient and a high total GVA) and the extent of potential carbon constraints on both the sector's own *operations* (Table 3-4) and the products and services it *produces* (Table 3-5). Sectors in the high carbon constraints box clearly face more significant challenges in demonstrating compliance with incoming legislation and converting to a low carbon intensity.

In Hertfordshire, sectors highlighted in terms of operations include chemicals manufacture, which is a relatively large employer in the county and has significant levels of carbon emissions associated with production, although these levels may be tempered slightly by the fact that within this sector, Hertfordshire has a sizeable pharmaceuticals sub-sector, which is generally less carbon intensive than other chemical manufacturing processes. With the twin instruments of the EU Emissions Trading Scheme and CRC Energy Efficiency Scheme committed to cutting these levels, significant operational changes may well be demanded. In addition, though its likely carbon constraint will be slightly lower, the county's important retail, wholesale and distribution industries will need to demonstrate their ability to reduce carbon intensity and embrace technology-driven reform (the use of low carbon HGVs and storage methods, for example) if significant job losses are to be avoided. In terms of the products and services being produced (namely buildings), Hertfordshire's large construction sector will also need to accommodate a fundamental shift in the nature of demand for its services in the form of low carbon, energy efficient installations.

Tables 3-4 and 3-5: Impact of carbon constraints on Hertfordshire employment sectors

		A. Carbon constraints on <i>operations</i>		
		High (EU ETS, Renewable Fuel Transport Obligation)	Medium (Carbon Reduction Commitment, Carbon Neutral Government, etc.)	Low
Hertfordshire Location Quotient (vs England)	High (> 1.1)	Chemicals manufacture (1.9)	Retail and distribution (1.3)	Construction (1.3) Financial and business services (1.2)
	Medium (0.8 – 1.1)	Transport & communication (1) Health & social work (0.8) Electricity, gas & water supply (0.8)	Hotels and restaurants (0.9) Other manufacturing sectors (0.9) Public administration and defence (0.8)	
	Low (< 0.8)	Transport equipment manufacture (0.5) Food & drink manufacture (0.4) Mineral products manufacture (0.3)		Agriculture (0.3)
Source: 2007 Annual Business Inquiry, and Oxford Economics calculations – based on the carbon constraints tables (Figures 4 and 5) in Low Carbon Strategy Evidence of Success, Advantage West Midlands, 2007				

		B. Carbon constraints on <i>products and services</i>		
		High (EU car fuel efficiency, Building Regulations, Zero Carbon Homes, Code for Sustainable Homes)	Medium (Energy Efficient Products)	Low
Hertfordshire Location Quotient (vs England)	High (> 1.1)	Construction (1.3)		Retail and distribution (1.3) Financial and business services (1.2)
	Medium (0.8 – 1.1)		Manufacture of electrical equipment (1)	Transport and communication (1) Hotels and restaurants (0.9) Other manufacturing sectors (0.9) Public administration and defence (0.8) Electricity, gas & water supply (0.8) Health and social work (0.8)
	Low (< 0.8)	Transport equipment manufacture (0.5)		Agriculture (0.3)
Source: 2007 Annual Business Inquiry, and Oxford Economics calculations – based on the carbon constraints tables (Figures 4 and 5) in Low Carbon Strategy Evidence of Success, Advantage West Midlands, 2007				

By contrast, it is shown that Hertfordshire’s relatively important financial and business services sector has a fairly low carbon constraint associated with both its own operations and its products and services. Opportunities to move into low carbon financial products, however, represent a potential demand-led change to operations.

3.4 Carbon modelling: plotting a path to the future

According to the Defra-sponsored estimates upon which local government target NI 186 is based, combined carbon emissions across industry, domestic households and road transport totalled 8,014 kilotonnes (kT) in 2007. A breakdown by district is shown in Table 3-6.

Table 3-6: Carbon emissions in Hertfordshire districts, 2007

		Carbon dioxide emissions, 2007 (kT)				
		Industry and commercial	Domestic	Road transport	Total	% total
1	St. Albans	245	340	543	1,130	14%
2	East Hertfordshire	333	335	331	994	12%
3	North Hertfordshire	291	299	336	926	12%
4	Hertsmere	250	246	397	895	11%
5	Dacorum	242	342	305	894	11%
6	Welwyn Hatfield	323	246	306	872	11%
7	Three Rivers	148	224	345	718	9%
8	Stevenage	259	168	139	566	7%
9	Watford	214	189	110	514	6%
10	Broxbourne	170	206	132	506	6%
	Hertfordshire	2,474	2,596	2,944	8,014	100%
	East of England	15,782	13,250	14,439	44,106	-

Source: Local and Regional CO2 emissions estimates 2007, produced for Defra by AEA Technologies

More useful in comparing local rates of energy consumption is the *per capita* breakdown of industrial, domestic and road transport emissions across Hertfordshire districts in Figure 3-3. This shows that industrial emissions are highest, in relative terms, in Stevenage and Welwyn Hatfield, a reflection of the heavy industry base in those areas (which no doubt also contributes to the county-wide per capita average being higher than that for the East of England). Average domestic emissions are broadly equal across all districts, as might be expected, while average road transport emissions – calculated on a bottom-up basis using actual recorded data on vehicle kilometres travelled – are claimed to be significantly higher in Hertsmere, St. Albans, and Three Rivers²³.

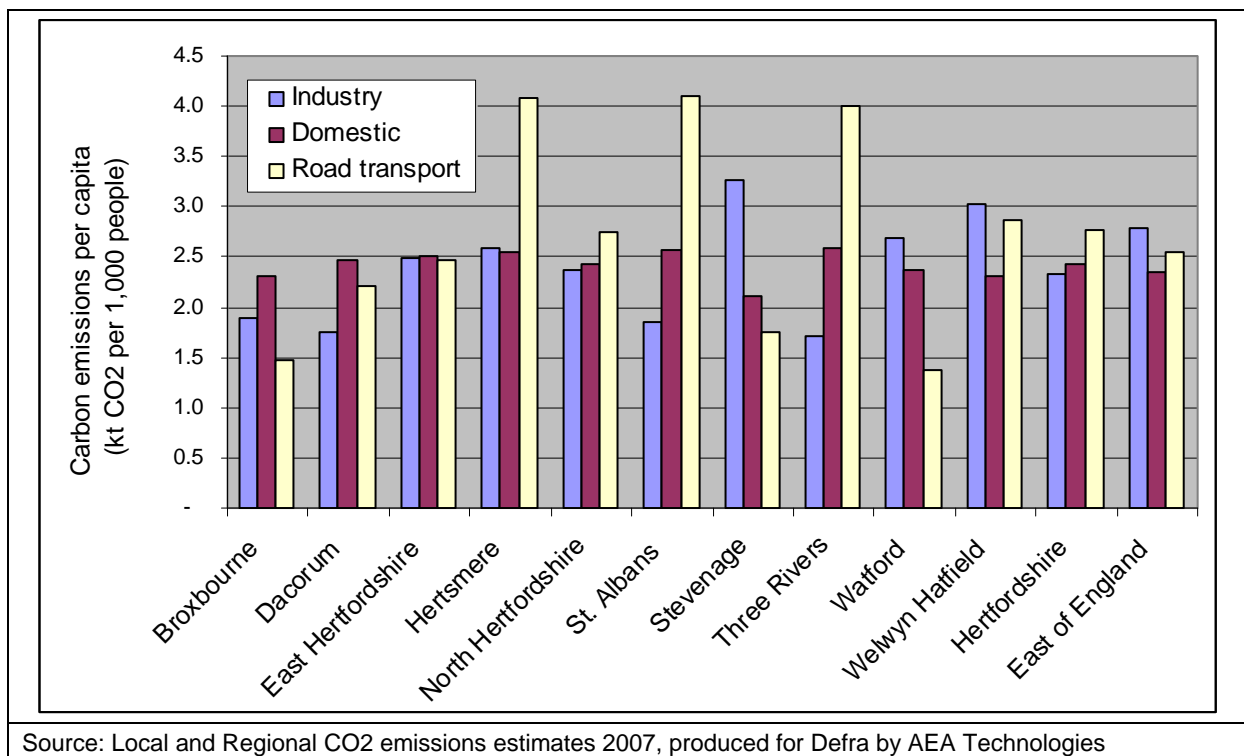
As part of this study, Oxford Economics has developed a Carbon Emissions Model (CEM) to help us benchmark Hertfordshire's current position, assess its likely carbon trajectory to 2020 and identify the districts and sectors likely to drive the key trends. A full write-up and explanation of the CEM is provided in Appendix C of this document. In summary, the model – which forecasts industrial and commercial, domestic, transport and land use-related emissions – shows that:

- Overall, Hertfordshire's carbon dioxide emissions are predicted to fall 8% between 2005 and 2020, slightly less than the UK average given the likely growth pressures on employment and the number of households;
- At a district level, Dacorum is forecast to see the largest reduction in emissions (largely a result of employment forecasts showing a decline in its heavy industry base), with Stevenage and particularly Hertsmere likely to see pressure in the opposite direction, particularly from transport;
- Sectorally, the energy sector is likely to see both its level and share of industrial and commercial emissions in Hertfordshire rise over the period to 2020, while chemicals and engineering, with employment falling, is likely to see its share decline.

²³ Road transport emissions are extremely difficult to measure, and are heavily caveated in Defra's methodology statement for its carbon emissions modelling. The road transport emissions estimates for individual districts have undergone significant revisions in the past year as the methodology has changed.

It is important to assess these carbon emissions forecasts in context. They do not represent ‘policy-off’ or ‘business-as-usual’ scenarios, and the 8% overall reduction, for example, will not be achieved if no action is taken to cut carbon emissions, for example through incoming legislation which is indirectly embedded into the employment forecasts upon which the carbon estimates are partially based. However, conversely, the projections would not consider the full extent of growth potential in low carbon sectors, so neither must they be considered an ‘upper limit’ as to what is achievable. In pinpointing Dacorum, Stevenage and Hertsmere, they are perhaps most useful in identifying specific areas of opportunity and challenge for the county – perhaps these could be termed the ‘strategic battlefields’ of Hertfordshire’s plans to realise a low carbon economy.

Figure 3-3: Per capita carbon emissions in Hertfordshire districts, 2007



3.5 A low carbon cluster for Hertfordshire?

One of the ambitions in Hertfordshire’s new economic development strategy (launched in November 2009, and covering the period up to 2021), besides preparing the economy as a whole for the low carbon transition, is to develop the potential for a specific low carbon technology cluster in the county across what are commonly referred to as the ‘energy and environmental goods and services’ (EEGS) sectors. It is certainly true that Hertfordshire has a base of useful ‘low carbon assets’ within its economy, including:

- The HQ of a leading global renewable energy developer, RES, in Kings Langley – itself an exemplar low-carbon site (www.beaufortcourt.com) used as a demonstrator for sustainable building technologies;
- The innovation campus and headquarters of BRE, in Watford – the sustainable built environment research, consultancy and training centre that provides advice to government and business on low carbon construction techniques;

- The University of Hertfordshire, billed as ‘the UK’s leading business-facing university’, and its new Centre for Sustainable Communities, which aims to become a centre of excellence for engagement between higher education and industry on low carbon research and technology commercialisation;
- The Centre for Business and Sustainability at Ashridge School of Management, home to an MBA programme ranked 14th in Europe overall and number one globally for the salary increase of alumni (The Economist MBA Rankings, 2009);
- The HQ of Green Energy Ltd (in Ware), a national supplier of renewable energy-derived electricity to business and households;
- A number of notable EEGS sector firms, such as the global environmental consultancy RSK Group (UK offices in Hemel Hempstead), which offers services from laboratory testing to corporate environmental management support; Kane International (HQ in Welwyn), the manufacturer of energy and emissions monitoring systems; and Onsite Renewables (UK office in Bovingdon), offering project management and technical consultancy for renewable energy developments.

Allied to the generally high skill levels of local residents and the presence of R&D-intensive large corporates such as GSK and EADS Astrium, there is certainly a ‘critical mass’ of EEGS sector potential within Hertfordshire that, if harnessed and co-ordinated effectively, could probably deliver and sustain both GVA and employment for the county in what is evidently a key global growth sector. Whether the county has a sufficient ‘standout’ capability in a particular technological sub-sector to warrant designation as, for example, a national Low Carbon Economic Area, is perhaps less certain. Evaluating with a critical eye, it is possibly only BRE’s innovation park and the embryonic potential of the University of Hertfordshire’s Centre for Sustainable Communities that represent sources of nationally significant competitive economic advantage – the credentials of Ashridge, for example, though undoubtedly impressive and full of opportunity, are probably matched by other leading centres of executive education, not least the even higher-ranked Cranfield School of Management in neighbouring Bedfordshire.

3.6 Delivering a step-change: challenges and opportunities

As a result of the characteristics of both the low carbon economy and the current Hertfordshire industrial structure and employment base, the following key issues – which can in many cases be viewed as both challenges and opportunities – are likely to find themselves towards the forefront of the low carbon debate and the policy agenda within the county:

- Specific challenges to important Hertfordshire industries from legislation-driven low carbon constraints, such as chemicals manufacture (operations), construction (products and services) and wholesale and distribution (operations);
- Ways of cutting high per capita vehicle emissions from rural areas (e.g. East Herts), where car travel is culturally embedded, and cutting vehicle emissions *per se* given the high commuting-dependence across many parts of the county;
- The relative importance of large organisations within Hertfordshire, their ability to set and drive the low carbon agenda through their strategic and operational behaviour and the ability of the public sector to engage and influence this;

- Relatively low average skill levels amongst many residents in areas such as Stevenage, making it even harder for them to access the potential high value, technology-intensive low carbon jobs of their major employers, and the opportunities afforded in remedying this through the education and training offer from both FE providers and the University of Hertfordshire linked to (for example) vocational employment opportunities stimulated by the “greening” of the county’s homes and public sector estates;
- The role of the University of Hertfordshire and its research base – which is exceptionally well aligned to local technology-intensive industries such as aerospace engineering – in developing both productive R&D partnerships and the local SME supply chain through a joined-up approach engaging major local employers;
- Specific technology-intensive, research-driven sectors with a strong local presence (such as those in engineering and the natural sciences) whose underlying competitiveness offers the chance both to support the low carbon transition and to commercially exploit it;
- The potential to become an exemplar location for smart commuting initiatives given the county’s large commuting flows, perhaps harnessing the local technological expertise of employers such as T-Mobile to develop and deploy high quality remote working initiatives;
- The potential to become an exemplar location for low carbon HGVs, given the importance of the wholesale and distribution industries and the local presence of corporate decision-makers whose organisations (e.g. Tesco) who have capacity, commercial interest and stated public commitment to action the low carbon agenda;
- Opportunities to build a prosperous and synergous low carbon technology cluster in Hertfordshire, in line with ambitions in the county’s economic development strategy, balanced against the obvious difficulties of maximising the local economic benefits of organisations marketing and trading nationally and internationally.

All of this is couched within the context of a rapidly changing external economic environment, and the twin needs of supporting those affected by the recession and retaining a focus on exploiting early-mover advantage from the imminent economic recovery and the growth of new low carbon markets. Balancing the two will be a key challenge, and there is also of course the third dimension of the so-called ‘localism’ agenda, which rightly identifies the need for transformative economic change if local economies are to shorten lengthy supply chains and commuting distances while retaining their ability to benefit from external trade and compete internationally.

4 Delivering the Low Carbon Economy: Policy Options

4.1 Policymaking in a low carbon economy

With emissions being a problem that transcends borders (local as well as national), it is to be expected that many of the instruments are in the hands of international and national bodies. Indeed, most regulation is developed at either a national (Carbon Reduction Commitment), European (EU ETS) or international (Kyoto Protocol) level. The input of county councils into planning decisions varies, though it is often – as in Hertfordshire – limited to general advice and co-ordination, with policy set out in national or regional spatial/economic strategies implemented through lower-tier local authorities (in Hertfordshire’s case, the districts). County councils do, however, have a range of powers that are directly relevant to the opportunities and challenges presented by the low carbon transition, for example related to public transport, waste and recycling, procurement decisions and of course the operation of their large land and property estates. The sub-national review (SNR) places a statutory duty for economic development on county councils.

Most general strategic leadership on low carbon issues is provided at the national level, with UK Government specifying, for example, certain Low Carbon Economic Areas, such as that for low carbon vehicles in the North East. Regional guidance is provided by RDAs through regional economic strategies – for instance that of the East of England which has a strong low carbon meta-theme – and while funding is ultimately decided at a European/national level, it is often regions who allocate it specifically. For example, EEDA offers a wide range of grants and loans for new businesses, and firms who show a willingness to develop or implement new (potentially low carbon) technologies. The East of England Competitiveness Programme 2007-2013, worth around €110m, also focuses heavily on promoting the low carbon economy and builds in sustainability as a key decision criterion in approving applications. The procurement instrument is used by local authorities, who can demonstrate, integrate and stimulate the local market for small scale renewable energy technologies, for example.

Spatial concerns

The five policymaking instruments set out in the previous chapters are owned by organisations at a range of spatial and departmental/agency levels – for instance, whereas Hertfordshire County Council has control of its own procurement strategy, other instruments such as land-use planning and development control are undertaken at the county and a range of other spatial levels (with the county’s district councils developing their own LDFs). Similarly, regulation is often in the hands of central government/agencies or even the European Union; leadership and co-ordination needs to be undertaken through the county-wide partnerships including Hertfordshire Forward, Hertfordshire Works and the Climate Change Partnership; and additional funds need to be secured from a range of different sources.

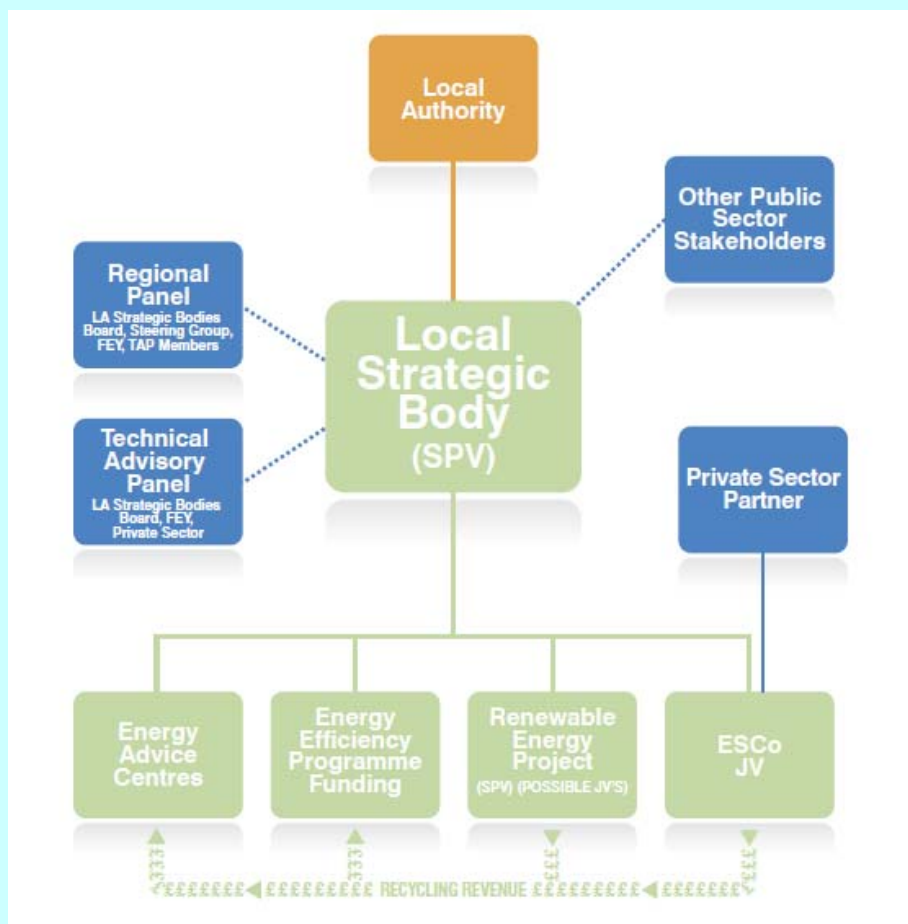
Joined-up working

The low carbon economy agenda is manifestly cross-cutting. The development of a low carbon economy in Hertfordshire – and the delivery of its environmental, social and economic benefits – will require county council departments to work together with each other and with the council’s partners across Hertfordshire and the wider East of England region. Hertfordshire’s economic development and climate change partnerships may be the mechanisms through which the low carbon economy agenda is delivered, but the agenda will need to be fully aligned with Hertfordshire’s county-wide aspirations as

set out in its Sustainable Community Strategy, Local Area Agreement and Comprehensive Area Agreement targets.

A number of delivery vehicles have been suggested as a means for local authorities to promote and deliver the low carbon agenda in their economies and communities. One of the most recommended is the so-called 'Special Purpose Vehicle' (SPV), a local strategic body that serves as a separate entity bringing together input from the local authority, regional partners and technical advisors from both the public and private sector. This approach, under which the SPV leads in the delivery of energy advice centres, energy efficiency programme funding, renewable energy projects and further joint ventures (for example ESCOs, as discussed in the previous chapter) is illustrated diagrammatically below:

Suggested Low Carbon Economy Delivery Structure for Local Authorities:



Source: *The Low Carbon Economy: A Delivery Framework for Local Authorities*, Yorkshire and Humber Sustainable Futures Company, 2009.

4.2 Implications for activity underway in Hertfordshire

A suite of public sector-led activity is already underway in Hertfordshire to prepare for the transition to a low carbon economy – part instigated by legislative requirement, part by strategic imperative. The Hertfordshire Climate Change Partnership (CCP) is a working group of public sector organisations – comprising the county and ten district councils, primary care trust, constabulary and some third sector

representatives – charged with delivering Hertfordshire’s obligations under NI 186 and developing a climate change strategy for the county. The CCP sits as a sub-group of Hertfordshire Forward, the county’s Local Strategic Partnership (LSP). Its ‘strategic framework’ for climate change preparation in Hertfordshire is currently out for consultation.

Goal: Working towards a low carbon economy that is resilient to the impacts of, and maximises the opportunities to, climate change

- We will identify and promote opportunities for low carbon economic growth
- We will investigate and exploit the potential opportunities from renewable energy and climate change
- We will work with partners to improve support available for business to reduce their carbon footprint
- We will work with partners to promote economic resilience to the likely impacts of climate change
- We will improve the skills development and training required for low carbon jobs

A Climate Change Strategic Framework for Hertfordshire, Hertfordshire Climate Change Partnership, 2008

Internally, Hertfordshire County Council has undertaken significant preparatory work on the low carbon economy and wider climate change and resource efficiency agendas, including:

- Collaboration with the ten district councils to deliver obligations under NI 185;
- Work towards the achievement of an internal target of cutting the carbon emissions from its own estate by 25% by 2013, from a 2006 baseline, most notably through its Carbon Management Plan;
- Development of a sustainable procurement policy, which is currently in draft format;
- Preparation for the demands of the CRC Energy Efficiency Scheme, to be introduced in trial form in 2010. HCC has enrolled on the LGiU’s Trading Council’s programme (a simulation of a cap-and-trade scheme) for the 2009-10 financial year to gain experience of carbon trading;
- Development of the Building Futures good practice guide in partnership with the ten district councils, to incorporate the climate change agenda into local planning and development in an integrated way;
- Work on the Pathfinder project, under which Hertfordshire’s district and county councils, as part of a central government pilot in selected two-tier local authority areas, are exploring ways of making efficiency and resource savings through better collaborative working;
- Research on the infrastructure and investment demands of the future economy through the Hertfordshire Infrastructure and Investment Strategy (HIIS), currently being finalised.

The HIIS, prepared by consultants Atkins and Roger Tym and Partners, is a particularly significant piece of forward planning intelligence. It recognises, for example, the likely need to invest more in passenger transport and east-west links to reduce transport-related carbon emissions, possibly through major projects such as the Central Herts Passenger Transport System. The study calculates a

£1.1bn funding residual to bring forward all required transport infrastructure projects in the county, after centrally-funded projects (of national significance) are discounted.

"Local authorities and regions have considerable influence over the way we travel, through direct delivery of transport services as well as through their decisions on strategic planning, or on the location of business and homes. And as large employers, both national and local government can take the lead in reducing emissions from their own estates and operations."

Low Carbon Transport: A Greener Future, Department for Transport, 2009

Hertfordshire Works, the county's public-private economic partnership, has led development of a new economic development strategy that contains strong up-front commitment to the low carbon agenda, and that makes "creating a vibrant and diverse low carbon economy" the first of four thematic priorities underpinning the whole document. The organisation, during the process of finalising the strategy in 2009, will agree arrangements for individual roles and responsibilities in taking forward the relevant low carbon actions (assisted in part by the findings of this study).

Perhaps the most notable contribution to the debate from other stakeholders in the county has been the Hertfordshire Charette, a 2008 planning seminar (based on an approach to community-wide engagement in spatial planning from the United States) which spawned the report '*Hertfordshire 2021 – How Should the County Grow?*', published by the consultants Duany Plater-Zyberk and Company. Facilitated by the University of Hertfordshire, this process developed a number of scenarios for making the transition to a low carbon environment while meeting the county's demanding new housing targets to 2020, advocating 'transport-oriented development' whereby homes are sited in proximity to transport interchanges, and so-called 'urban villages' with a high quality public realm and improved pedestrian access to reduce car use and promote a sense of community. Planning officers from the Hertfordshire district councils attended the Charette sessions, though their strategic buy-in to the process is unclear, and the event's legacy, in terms of actioning elements of the proposed low carbon developments through LDFs, is unclear.

The challenge now facing partners in Hertfordshire relates to how, in the face of a complex hierarchy of policymaking responsibilities and strategic roles, ever more demanding legislative requirements and growing post-recession opportunity to develop new sectors, and significant political uncertainty likely to linger throughout 2010, they can develop efficient, effective and future-proof mechanisms for delivering the co-ordinated support required to catalyse a prosperous and sustainable economic transition across the county. The successful approach will utilise those instruments and target those groups where individual organisations, led by the county council, can make the greatest positive economic impacts without confusing or (worse) crowding out the private sector's own development and innovation.

5 Next Steps: Recommendations for Partners

5.1 Context

A low carbon economy is not an industry which Hertfordshire can choose whether or not to support, safe in the knowledge that the county has other industries which can grow whilst businesses in other parts of the country pursue the low carbon market. A low carbon economy is not an industry, it is a constraint – and it is a constraint on all industries within an economy. And as with all constraints, it will be the most entrepreneurial of businesses who adapt most quickly and most smartly, who maintain their competitiveness and who exploit the challenges it poses for commercial purposes.

5.2 Key economic drivers of action

The imperatives to develop a low carbon economy are manifold, as summarised in this report:

- The urgent need to develop renewable sources of energy in order to replace declining sources of non-renewable energy, to guarantee the UK's energy security and to combat potentially drastic increases in energy prices (as demand for energy, exacerbated by the emergence from the global recession and by emerging economies such as China and India, quickly outstrips supply);
- The urgent need to use less energy and to use it more efficiently, since the development of new sources of energy in sufficient quantities (including nuclear) is likely to take decades rather than years;
- The global response to climate change and the mechanisms (such as the UK's new statutory carbon budgets, emissions trading schemes, strengthened regulation of products, buildings, etc) introduced in order to cut greenhouse gas / carbon emissions.

These are major challenges. The move to a low carbon economy will profoundly affect the way Hertfordshire functions, the way its public sector bodies invest, the way its businesses operate. Ultimately, the low carbon economy agenda is about resilience – resilience in the face of one of the greatest challenges facing entrepreneurs since the beginnings of the industrial revolution, a revolution which was largely founded on the ingenuity of enterprising people who discovered ways to exploit the earth's finite energy sources, albeit in an unsustainable way. This generation's entrepreneurs will need to find ways to harness renewable sources of energy in a sustainable way. This is a paradigm shift – its implications are profound – and Hertfordshire's businesses will need to be resilient to its implications if they are to remain competitive.

Within Hertfordshire, there are of course many businesses who are already responding to the low carbon economy agenda by reviewing their energy consumption and investing in the energy efficiency of their buildings and vehicles (this is illustrated by the take-up of Green Potential business support and by the attendance of 200 local businesses at the energy efficiency conference organised by the Hertfordshire Chamber of Commerce in 2008). There are many Hertfordshire households investing in the energy efficiency of their homes, taking advantage of Energy Saving Trust advice, free/subsidised energy efficiency measures under energy supplier schemes such as the UK Government's Carbon Emissions Reduction Target (CERT) and local domestic energy efficiency schemes such as the Hertfordshire & Essex Energy Partnership (HEEP). Hertfordshire also has a nascent cluster of organisations/businesses who are actively exploiting the opportunities inherent in the transition to a

low carbon economy – these include the University of Hertfordshire, BRE, the Centre for Business & Sustainability, RES and Green Energy Ltd.

But this activity whilst promising is generally ad hoc, and more will be needed if Hertfordshire's vision of a 'resilient and low carbon economy' is to be achieved over the coming years. This will mean taking a more pro-active and coordinated approach to decarbonising all existing industries whilst – at the same time – supporting the growth of businesses who are actively engaged in the design, manufacture, distribution, installation and maintenance of low carbon goods and services. In summary: all businesses will need to be energy **efficient**, all businesses will need to be **resilient** to low-carbon constraints; and many businesses will want to exploit the commercial **opportunities** of the low carbon economy (which will include the opportunities generated by the decarbonisation of Hertfordshire's buildings, public sector activities, transport infrastructure and energy sources). In fact, these are solid principles for the low carbon strand of Hertfordshire's economic strategy:

- **Efficiency:** Will our investment/activity make Hertfordshire's economy more efficient, particularly in its use of energy?
- **Resilience:** Will our investment/activity make Hertfordshire's economy more resilient to the impacts – tighter regulation, changing markets – of the transition to a low carbon economy?
- **Opportunity:** Will our investment/activity enable Hertfordshire's economy to exploit the opportunities – enhanced competitiveness, new markets – generated by the transition to a low carbon economy?

These principles are particularly important for Hertfordshire County Council and partners in the context of the current recession and the increasing pressures on public sector budgets. Achieving greater efficiencies is essential in order to cut costs including energy bills, to respond to the UK's CRC Energy Efficiency Scheme and to deliver 'more for less'. Delivering these efficiencies will make Hertfordshire a more resilient county, and will generate opportunities for local businesses and entrepreneurs in the design, manufacture, distribution, installation and maintenance of low carbon goods and services. It is in the context of the above that the following recommendations have been developed.

5.3 Recommendations: key strands of low carbon economic activity

The low carbon economy agenda will quickly extend its influence over the next decade, as the drivers outlined above gain momentum. Already, a number of areas in the UK and further afield are establishing the agenda as a central organising principle for their future prosperity.

Sustainable, low-carbon economic development – its delivery has implications for all of the county council's departments as well as the council's partners across Hertfordshire. The low carbon economy agenda is manifestly cross-cutting. In the future, it will need to be aligned with corporate planning, investment decision-making and specific documents such as the Sustainable Community Strategy, the Local Area Agreement, any Multi-Area Agreements and Local Development Frameworks.

Hertfordshire Works' draft economic strategy (2009-2021) outlines the county's ambition to 'create a vibrant (diverse) low carbon economy'. At minimum, this will be required if the county's economy is to be resilient over the next decade. But with the cluster of low carbon economy organisations and businesses already active in the county, the opportunity is there for the agenda to really drive Hertfordshire's prosperity from 2009. This will require a pro-active approach by, and dedicated resource from, the county council and its Hertfordshire Works partners – at a time when resources are

scarce and partners are focused on other issues such as the recession. It is our firm belief, as set out in this report, that through leadership and co-ordination, the low carbon economy agenda can support both the efficiency agenda and the recovery from the recession.

In conclusion, Hertfordshire should consider the following strands of activity in pursuance of its low carbon economy ambitions:

- *Establish Hertfordshire Works as the county's owner of the low carbon economy agenda, and take a pro-active approach to identifying low carbon investment/funding opportunities*

The low carbon economy agenda needs leadership and co-ordination, and Hertfordshire Works is clearly best placed to provide this in the context of the new economic development strategy for the county. Whilst the low carbon economy is linked to wider climate change adaptation, its implications for the future economic prosperity of Hertfordshire are so profound that the agenda should be led by the county's economic development partnership. As part of the implementation of the economic development strategy, Hertfordshire Works should consider establishing a low carbon economy task force or sub-group to drive its leadership and co-ordination activities.

There are a number of aspects to this leadership and co-ordination role:

- Visibility and leadership. There are, as this report describes, a number of promising low carbon economy activities being taken forward by various public and private sector partners across the county, but the somewhat disjointed nature of the activities has lessened their impact. If Hertfordshire Works champions the agenda, these activities will be strengthened. Altogether, this will send a clear signal that Hertfordshire is pursuing the low carbon economy agenda with intent. There are many audiences: potential investors, existing businesses, training providers, business support organisations, the workforce.
 - Scoping opportunities. It is important to ensure that the county is identifying the available low carbon economy funding pots as they arise, for instance calls for bids from central government (BIS, DECC) or agencies such as the Technology Strategy Board. It is also important that any of the county's public sector capital investment programmes and projects are flagged up in advance by Hertfordshire Works in order to be exploited for low carbon business opportunities.
 - Responding to opportunities. It is important that the funding/investment opportunities identified are linked with appropriate employment, skills and business support to ensure Hertfordshire's businesses, workers and communities secure the economic benefits of these opportunities. This will require co-ordination around a range of activities, outlined below.
- *Incorporate the low carbon economy agenda into investment decision-making*

Governments around the world (most notably the Obama administration) have announced green stimulus packages for their economies; Lord Stern advocated a Green Economic Recovery to the G20; the European Union has amended its rules to allow member states to invest ERDF funds into domestic energy efficiency; and the UK Government recently established its own £750m Strategic Investment Fund focusing on the low carbon economy. The transition to a low carbon economy is a major opportunity to reverse the global economic slowdown and lay the basis for future sustainable economic growth. The policy thrust around the world has been to ensure that recession-led stimulus packages provide a concurrent stimulus to the low carbon economy agenda.

If Hertfordshire incorporates the low carbon economy agenda into its own investment decision-making, it will in effect create its own stimulus package. It is difficult to overestimate the potential and the importance of public sector spending for driving the low carbon economy over the next few years, at a time when bank lending is low and business/consumer indebtedness is high. This is not about spending more public sector money than is already planned (after all, the public purse is already tight and will tighten further); it is about being smarter about the way in which this public sector money is spent, by linking it to strategic priorities such as the development of a vibrant low carbon economy. In the medium term, this will mean the formal inclusion of carbon costs/savings in budgets and investment appraisals (it is likely that HM Treasury will soon incorporate carbon costs/benefits into its 'Green Book' – its guidance on the economic assessment of public sector spending and investment – so an advance movement on the issue by Hertfordshire would send a strong signal of intent). In the short term, there are a number of other activities which Hertfordshire should strongly consider:

- Hertfordshire County Council's sustainable procurement strategy is an excellent initiative. As the strategy is rolled out across the council, it is important that it incorporates low carbon criteria (particularly relevant to capital investments) linked to the criteria it already includes such as support for local supply-chains, local jobs and training. The refinement and implementation of such an effective, pro-active sustainable procurement strategy will enable the council to reduce its carbon footprint, stimulate local low carbon supply chains and provide job opportunities for local people. It will be particularly important to ensure that sustainable procurement stimulates local markets as well as merely local demand (i.e. so the new demand can be met by local firms).
 - The stimulus that the sustainable procurement strategy will provide for the county's low carbon economy will be strengthened yet further if public sector partners (including district councils) across Hertfordshire adopt the same sustainable procurement strategy, and therefore maximise the low carbon economy potential of their combined spending.
 - Finally, the climate change mitigation and adaptation measures of the council and its partners (driven by regulation such as the CRC Energy Efficiency Scheme) must be mined for local economic opportunities. Each of the energy saving/efficiency interventions undertaken to reduce the council's/county's carbon footprint is potentially a commercial opportunity for a local business, entrepreneur or research institute.
- *Exploit the county's existing low carbon expertise, particularly the BRE innovation park presence*

Hertfordshire should ensure that, in pursuing low carbon investments and climate change mitigation/adaptation, it exploits the low carbon expertise on its doorstep – particularly the University of Hertfordshire, the business sustainability centre at Ashridge and BRE. A key thrust of UK Government climate change policy (as set out in its Low Carbon Transition Plan) is reducing the carbon footprint of the country's buildings, particularly homes. Buildings account for over 30% of the UK's carbon emissions and are a major focus for carbon emissions reduction activity.

Much of the sustainable buildings activity across the UK is focused on investment programmes such as the Low Carbon Buildings Programme; on new standards for buildings such as the Code for Sustainable Homes and BREEAM Excellent; on the piloting of low carbon building technologies; and the demonstration of new ways of building/retro-fitting homes. In each of these activities, BRE is heavily involved – and much of their work is undertaken at the BRE Innovation Park in Watford. This provides Hertfordshire with an excellent opportunity to support a locally-based research institute, whilst

drawing on BRE's own expertise to inform Hertfordshire's own sustainable building investments and programmes, such as Building Futures.

There are a number of ways the relationship with BRE (and similar organisations) could be strengthened:

- Establish a 'test-bed' relationship with BRE, wherein the BRE is enabled to test emerging low carbon technologies on social homes and publicly-owned buildings across the county, and the county's public sector can test the feasibility and cost-effectiveness of its own low carbon investments with the BRE and its innovation park.
 - Involve the BRE (and similar organisations) in major low-carbon capital programmes, such as domestic energy efficiency schemes like the Hertfordshire and Essex Energy Partnership (HEEP). Working with such organisations in advance will also help to ensure that local businesses and workers are appropriately engaged and skilled to take advantage of opportunities.
 - Work with the BRE (and similar organisations) to demonstrate the attractiveness of low carbon technologies to households/businesses/partners. For example, the forthcoming feed-in tariffs and renewable heat incentives, being introduced by UK Government to reward the use of renewable energy, can be demonstrated on social homes and publicly-owned buildings across the county.
 - Work with the BRE (and similar organisations) to increase the visibility of Hertfordshire's low carbon economy agenda, and help to get the county recognised as a leading low carbon economy. The 'Build Hertfordshire' event being held on 10th December 2009 by the council, BRE and Build East is an excellent example of work already being done, and provides an excellent opportunity to develop Hertfordshire's visibility in the low carbon buildings agenda.
- *Ensure that the county's business support (Exemplas, Green Potential, etc) is geared up for the opportunities, and co-ordinated*

Public sector business support has a vital role to play in raising awareness of, demonstrating the benefits of, and signposting specialist support for the low carbon economy. To ensure the opportunities are being maximised, a programme of training on key low carbon economy issues – namely sustainable building standards, environmental management accreditation, carbon footprint benchmarking and reduction, corporate social responsibility strategies, new and forthcoming legislation as the CRC, research and commercialisation support from the HE sector, and market penetration routes for emerging green technologies – for business support officers not specialising in environmental issues, may merit consideration. The Green Potential offer at Exemplas should be supplemented by a suite of clear products and services, bringing together the expertise of both specialist environmental consultants and 'generalist' business support officers, and also linking to the expertise available within the University of Hertfordshire. Marketing of the low carbon support offer should be pro-active and targeted, and clear about the services offered; consideration should be given to raising business support capacity if Hertfordshire is to actively pursue the low carbon economy agenda more rigorously in future.

- *Ensure the FE/HE sector is engaged to ensure the right skills are available, and that entrepreneurs and ideas are supported and commercialised, i.e. linked to the business support mentioned above*

The clear trajectory of skills requirements for the low carbon economy, and the need to ensure that all residents of Hertfordshire possess the skills they need to access low carbon jobs, provide a compelling case for the prioritisation of low carbon skills development. This includes higher-level skills and qualifications, the STEM subjects, effective marketing and commercialisation approaches and specific quality standards in the skilled trades – particularly sustainable building trades. Skills are often highlighted as a potentially damaging constraint to low carbon economy development. In Hertfordshire, it is important that local training providers, FE colleges and sixth-forms are engaged in the agenda and aware of the growing demand for low-carbon skills – particularly the demand that will be generated by the county's own (low carbon) capital investment programmes. This includes providing the training and skills for local residents in energy efficiency and renewable energy technologies to service not only the low carbon jobs expected in Hertfordshire but in the wider Greater South East – and to ready existing businesses for a potentially fundamental change in the nature of demand for their products and services. It will be important to liaise with Sector Skills Councils (led by SummitSkills) to establish the likely level and nature of demand by business for skills and training and to ensure the county's educational offer is appropriate (particularly in skilled trades such as construction and engineering, and particularly in areas facing challenges in securing local engagement with emerging areas of low carbon job growth).

There is of course a critical second dimension to building a competitive 'low carbon education' offer in the county. The HE sector must provide leadership in helping local businesses to commercialise R&D in high-growth low carbon technology sectors, through undertaking high quality research, offering high quality facilities, and by providing advice on the strategic sales and marketing aspects of commercialisation – the University of Hertfordshire's research strengths in the low carbon agenda are a real opportunity for the county, if they are linked to the needs of its businesses. One specific option worth considering is development of new low carbon knowledge transfer 'products' such as Knowledge Transfer Partnerships (KTPs), perhaps through development of a ring-fenced fund for local EECGS sector projects or at least targeted marketing to companies in this field; research by UoH academics has already made a strong case for expanding this type of intervention.

- *Align planning policy with the low carbon economy agenda*

Land-use planning remains an important low carbon economy instrument for Hertfordshire, despite the two-tier structure of the county's local government wherein Local Development Frameworks are the responsibility of district councils. Planning policy and development control should play important roles in the development of Hertfordshire's low carbon economy, by encouraging developments/buildings which are designed to low/zero carbon standards and in line with existing/emerging guidance such as the Code for Sustainable Homes, BREEAM Excellent, Eco-Homes XB, the Climate Change Planning Policy Statement and forthcoming changes to Building Regulations. The county should build on the valuable progress of the Building Futures initiative in developing joined-up sustainable planning and building principles, with all eleven local authorities working together to ensure that:

- Local Development Frameworks are favourable to low carbon and renewable energy developments, and incorporate the low carbon economy principles set out above – efficiency, resilience and opportunity.

- Strategic employment sites enable the growth of a low carbon economy in Hertfordshire, and that all sites for employment use/incorporate low carbon principles in their construction, energy use and transport infrastructure/connectivity – and that Section 106 Agreements consolidate the low carbon economy opportunities, through low carbon transport/infrastructure, low carbon affordable homes and low carbon training opportunities.
- *Work with regional partners to leverage funding streams and develop broader low carbon economy opportunities*

The low carbon economy agenda is a constraint on all industries and locations. There will therefore be opportunities (e.g. in low carbon cluster development, in major sustainable building programmes, in low carbon transport infrastructure, in the exploitation of renewable energy sources) which are more appropriate to be worked up with neighbouring authorities and/or with regional bodies such as EEDA and Renewables East. It is important to establish/maintain relationships with these partners – in particular, the regional bodies will have access to funds (through programme budgets, ERDF funds or other agencies such as the Technology Strategy Board) which can help to pump-prime strands of the low carbon economy agenda in Hertfordshire.

- *Explore the potential for a Hertfordshire low carbon technology cluster and related support package*

In this report we have noted the substantial pool of low carbon economic assets across the county, including private firms, research institutes and centres of education and training. There is sufficient evidence to identify the potential for a co-ordinated and supported low carbon technology cluster within the county, though the extent of potential to make this a reality depends of course on the appetite for engagement of key local corporates and centres of education, such as RES, BRE and Ashridge. There are encouraging signs in some respects here (for example T-Mobile have already engaged with a county event on business energy efficiency) but a pilot phase is required to gauge the true potential. Any cluster initiative should be well planned, with a clear set of objectives to make a strong case for partner involvement. These might include: the stimulation of local low carbon supply chains to major organisations; the attraction of inward investment providing high-skilled jobs in low carbon technology sectors; development of local R&D in the renewable energy sector; engagement between the business sustainability centre at Ashridge and local internationalising SMEs; or tailored commercialisation schemes (e.g. spin-outs, supported by finance and/or incubation workspace) from university or even corporate research activity.

It follows that once the scale and scope has been developed and buy-in secured from relevant partners, there is an opportunity to develop a programme of cluster support (such as brokerage, networking, information/awareness raising, start-up or spin-out finance, specialised workspace and HE collaboration projects), possibly taken forward by Hertfordshire Works via a dedicated cluster manager. Potentially the focus could be extended from high-technology sectors to the wider business sector in the county, with the cluster providing a focus for efforts to stimulate improved energy efficiency more generally amongst local SMEs, and to raise awareness of support opportunities such as interest-free loans from the Carbon Trust, which currently tends to focus on big business and the public sector (this could help bridge the SME gap). Clearly, any effort to build a local green technology supply chain will need a pool of end customers, and the cluster could also be used as a vehicle for demonstrating to SMEs the benefits of, for example, adopting small-scale renewable technologies to generate energy.

- *Create a sustainable transport and communications infrastructure to reduce local vehicle-dependence and 'green' the local distribution sector*

The challenge of cutting transport-related emissions in a county known for its vehicle dependence and relatively poor east-west and public transport connections will be an important element of Hertfordshire's low carbon transition, and merits an activity strand in any forward strategy relating to the agenda. There are several potential activities here that may merit consideration:

- Creating a county-wide, co-ordinated green commuting initiative, building on the work of existing district-level projects (such as the Maylands Business Park scheme), to increase demand to commercially viable levels and help instigate a genuine behavioural shift amongst local workers. The local presence of firms such as T-Mobile, who have already showed themselves willing to engage with local SMEs for CSR purposes, may provide an opportunity to increase adoption of remote teleworking and homeworking tools (such as videoconferencing and mobile broadband), for example.
 - Ensuring that transport-related actions taken forward from the new Hertfordshire Infrastructure and Investment Strategy incorporate the central aims of developing low carbon communities and supporting the operation of low carbon businesses (for example, in terms of public transport, providing both households and firms with a realistic alternative to vehicle dependence).
 - Exploiting opportunities, given the likely inevitability of the county retaining a significant logistics and distribution sector on the back of its physical location, to engage local research institutes to develop technologies to 'green' the sector and develop a local specialism – for example low carbon HGVs – in the same way that the North East has now become a Low Carbon Economic Area for ultra-low carbon vehicles.
- *Empower low carbon communities and stimulate enterprise at the very local level to deliver services*

Any vision of low carbon communities is likely to include mechanisms for the very local delivery of services (both relating to domestic energy efficiency and at a wider level), for example through the development of social enterprises. Recognising this, the government's Low Carbon Communities Challenge is currently funding and piloting 20 separate local-level initiatives with the aim of identifying 'what works' and helping to roll this out in communities across the country.

There are two activities to consider relating to low carbon sectors: firstly working with communities and districts to empower local people to lead on the domestic energy efficiency agenda, for example by delivering smart meters, home energy audits, access to demonstration homes and better signposting of advice and support infrastructure; and secondly, exploring the options of helping communities to set up ESCOs in order to encourage renewable energy provision at the neighbourhood level. More widely, the ability of social enterprises to bring significant cuts in the carbon footprint of services – from elderly care to food/produce delivery to local recreational amenities – provides another opportunity to contribute to the low carbon transition.

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Appendix B List of Consultees

Oxford Economics would like to thank all consultees who participated in the study:

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- Tim Hutchings, Chief Executive, Hertfordshire Chamber of Commerce
- Jaya Skandamoorthy, Director of Enterprise & Innovation, BRE
- Johnathan Reynolds, Sustainable Development Manager, East of England Development Agency
- James Beal, Managing Director, Renewables East
- Dr Stephen Boffey, Pro-Vice Chancellor (Regional Affairs), University of Hertfordshire
- Maurizio Catulli, Senior Lecturer, University of Hertfordshire
- Paul Pullin, Economic Development Manager, East Hertfordshire District Council
- Adam Wood, Projects Director, Exemplas
- Hilary Oakley, Director of Training and Consultancy, Exemplas
- Dr Richard Freeman, Environmental Consultant, Exemplas
- Dr Mike Page, Project Director – EASIER, University of Hertfordshire
- Mark Housden, Procurement Manager, Hertfordshire County Council
- Maria Cutler, Regeneration and Town Centre Officer, St Albans District Council
- Chris Taylor, Regeneration and Town Centre Manager, Dacorum Borough Council
- Liz Dand, Economic Development Officer, Stevenage Borough Council
- David Fitzpatrick, Chief Executive, Hertfordshire Community Foundation
- Andrew Weaver, Head of Housing and Health, Hertsmere Borough Council
- Rachel Cole, Manager, Climate Energy Ltd
- Lenitha Conradie, Programme Manager, Hertfordshire and Essex Energy Partnership

Appendix C The Oxford Economics Carbon Emissions Model (CEM)

We have developed a **Carbon Emissions Model (CEM)** for Hertfordshire in order to derive carbon dioxide (CO₂) emissions forecasts for each of the ten county districts, and for Hertfordshire as a whole.

It is important to realise, when interpreting this information, that these carbon emissions forecasts do not represent a 'policy-off' or 'business-as-usual' scenario; they are based on a number of indirect assumptions about incoming carbon legislation and sector growth trends that are embedded within our employment forecasts. Therefore, actual emissions will be different if these assumptions are not realised by future events, and the figures should be treated as indicative only. Since reduced emissions are sometimes linked to reduced employment and vice versa, individual figures cannot be interpreted as 'good news' or 'bad news' in their own right.

The CEM gives forecasts for total CO₂ emissions in each district (and for Hertfordshire as a whole), aggregated from CO₂ emissions from the following four sources:

- Industrial and commercial (including energy sector);
- Domestic households;
- Transport;
- Land use, land use change and forestry (LULUCF).

Data Sources:

The CEM is based on historical data from the Department of Energy and Climate Change (DECC) which aims to provide nationally consistent carbon emission estimates at local authority and regional level. This data was available from 2005–2007, which forms firm data points for these years. We have then developed our own forecasting model to produce annual emissions estimates for the period 2008–2020.

Note: The DECC dataset is named “Full Local CO₂ emission estimates, sector and fuel details”, and was released on 17/09/2009. It can be found by going to the following webpage, and clicking on ‘full dataset’:

http://www.decc.gov.uk/en/content/cms/statistics/climate_change/climate_change.aspx

The CEM also uses forecasts from the Oxford Economics Industry Model (OEIM).

The CEM makes use of land area data from the Office for National Statistics (ONS). We took UK Standard Area Measurements (SAM) data, available from:

<http://www.ons.gov.uk/about-statistics/geography/products/geog-products-other/sam/index.html>

The model also takes data on MID (business-as-usual) LULUCF emissions forecasts from table 4.1, in the following DEFRA document:

http://www.edinburgh.ceh.ac.uk/ukcarbon/docs/2009/Defra_Report_2009.pdf

The model considers carbon dioxide emissions; wherever necessary, we have converted carbon into carbon dioxide, using the widely accepted conversion rate of 1 pound of carbon producing 3.667 pounds of carbon dioxide (by combining with 2.667 pounds of oxygen).

Methodology:

Industry and commercial emissions:

- We created UK 'carbon weights' by industrial sector by using OEIM forecasts for UK emissions and employment by sector. By dividing the emissions in a sector by the number of people employed in that sector, and dividing this by the emissions for the average UK worker (total UK emissions divided by total UK employment), we were able to derive 'weights' showing how carbon-intensive specific sectors were.
- For each Hertfordshire district, we then calculated a carbon-weighted employment figure, based on the actual employment breakdown within that district. So a district which employed significantly more of its workforce in the emissions-intensive chemicals and processing industries sector would be forecast to have a higher carbon-weighted employment figure than a district which had a large agricultural sector, for example.
- This carbon-weighted employment figure was then multiplied by the average emissions per UK employee, to give a pre-adjusted industrial and commercial emissions forecast.
- The pre-adjusted industrial and commercial emissions forecast also takes into account emissions from the energy sector. These emissions are forecast from the OEIM, and we have modelled the energy sector as having no employees as such. Otherwise, we could have a problem where a district with a high number of energy sector employees could be a head office and not emitting a significant amount of carbon. So we shared the energy sector emissions across the districts by multiplying UK energy sector emissions by each district's share of total UK employment.
- We then adjusted our 2008–2020 forecasts based on scaling factors capturing the differences between our calculations for 2005-7 and the 2005-7 DECC historical data points.

Domestic emissions:

- We assumed that domestic carbon dioxide emissions are a function of the population (more people mean more households and therefore more domestic energy use).
- We worked out the average level of UK domestic emissions per person, by taking total UK household emissions, and dividing them by total UK population (both from OEIM forecasts).
- We then took Hertfordshire district population estimates from OEIM forecasts, and multiplied this by average UK domestic emissions per capita, to get pre-adjusted domestic emissions by district.
- Then we adjusted our 2008–2020 forecasts, again based on scaling factors capturing the differences between our calculations for 2005-7 and the 2005-7 DECC historical data points.

Transport emissions:

- We assumed that transport-related carbon dioxide emissions are a function of GVA (more output means more transport use and therefore more emissions from transport).
- We calculated the average level of UK transport emissions per unit of GDP, by dividing total UK transport emissions by total UK GDP (both from OEIM forecasts).
- Then we took Hertfordshire district GVA estimates from OEIM forecasts, and multiplied this by the average level of UK transport emissions per unit of GDP, to get pre-adjusted transport emissions by district.
- Then we adjusted our 2008–2020 forecasts, again based on scaling factors capturing the differences between our calculations for 2005-7 and the 2005-7 DECC historical data points.

Land use, land use change and forestry (LULUCF) emissions:

- We assumed that LULUCF carbon dioxide emissions are a function of land area (more land gives more potential for deforestation, emissions from soils etc).
- We took land area data in hectares from UK Standard Area Measurements for 2007, and assumed that these values didn't change over time.
- We had UK LULUCF emissions data for 2005-7, and had DEFRA forecasts for 2010, 2015 and 2020. For the years in-between, we assumed a linear (straight line) trend and extrapolated annual data points.
- We used the DECC data for 2005-7 for the LULUCF emissions for each district, and then forecast the 2008-2020 emissions. This was done by taking the previous years emissions, and adding to it the percentage of total UK land area each district had, multiplied by the UK LULUCF net change in emissions for that year.

Total emissions:

- Our final forecast for total CO₂ emissions came from adding up the four aforementioned emissions sources.

Our findings:

Below, Table 1 shows a summary of what the CEM shows happening to total CO₂ emissions in each of the ten Hertfordshire districts, and for the county as a whole. The emissions are given in thousands of tonnes of CO₂ emitted.

- Table 1 shows that Hertfordshire as a whole is forecast to **decrease its CO₂ emissions by around 8%** between 2005 and 2020. This is less than the UK, which is expected to reduce its overall CO₂ emissions by more than 9% over the same period. The difference is because:
 - Hertfordshire's emissions from the industrial and commercial sector are expected to increase by almost 22% over the period, while the UK's is only forecast to increase by 5%. The increases are forecast mainly in the energy sector however it must also be noted that with a relatively larger increase in carbon-intensive sector employment, one would expect Hertfordshire not to be able to cut emissions by as much as the UK.

- Hertfordshire's population is estimated to increase by 11% between 2005 and 2020, while the UK's is forecast to grow by 9%. This means that domestic emissions are expected to be higher in the future in Hertfordshire, as there are relatively more household users of energy, compared with the UK as a whole.

We can see that the district of Dacorum is forecast to make the largest cuts in CO₂ emissions, decreasing them by almost 22%. This is because we have expected the district to reduce its industrial and commercial carbon-weighted employment by over 40%, as a result of employing fewer people in carbon-intensive industries. Despite overall Dacorum employment levels forecast to stay constant until 2020, we expect employment in the chemicals and processing industries, metals and engineering, and other 'low-tech' sectors to decrease significantly, thus reducing emissions.

All other Hertfordshire districts are expected to reduce emissions, with the exceptions of Hertsmere, which is forecast to increase CO₂ emissions by nearly 10% between 2005 and 2020, and Stevenage, expected to increase emissions by around 2%. While domestic emissions are expected to fall in Hertsmere, transport emissions are forecast to increase almost 20%. This is mainly driven by Hertsmere's GVA being expected to increase by more than 70% over the period (compared to 35% for the UK); with our model taking GVA as a key factor in transport emissions, then an above average GVA increase will lead to higher expected transport emissions

Table 1 – Hertfordshire and districts total CO₂ emissions forecasts, 2008-2020

Total CO ₂ Emissions (K tonnes CO ₂)	2005 (actual)	2006 (actual)	2007 (actual)	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	% Change 2005-2020
Broxbourne	506	501	506	488	493	493	495	496	493	493	494	493	489	478	467	457	-9.7
Dacorum	996	913	894	883	881	871	868	862	854	848	846	841	831	812	793	778	-21.9
East Hertfordshire	1008	1009	994	997	999	988	988	983	974	968	966	961	949	927	904	883	-12.4
Hertsmere	912	898	895	943	953	950	960	968	975	984	997	1007	1010	1007	1003	1000	9.7
North Hertfordshire	920	941	926	893	897	894	900	903	901	901	905	903	895	878	860	845	-8.1
St Albans	1168	1149	1130	1154	1165	1161	1167	1170	1170	1171	1178	1182	1177	1165	1152	1145	-2.0
Stevenage	572	583	566	564	563	563	573	577	579	583	590	594	594	591	587	586	2.5
Three Rivers	742	742	718	694	701	699	702	703	701	700	702	700	694	682	671	662	-10.8
Watford	525	527	514	500	498	493	493	491	487	486	487	487	484	477	470	464	-11.7
Welwyn Hatfield	884	886	872	868	873	871	880	882	880	879	882	882	877	868	858	851	-3.7
Hertfordshire	8232	8150	8015	7954	7985	7940	7981	7988	7967	7961	7993	7995	7942	7824	7703	7608	-7.6

Table 2 - Hertfordshire CO₂ emissions and employment forecasts by industrial sector

Hertfordshire	2007	2015	2020	% Change 2007-2020
Total Employment (000s) in the Industrial and Commercial Sector	573	580	608	6.2
Agriculture	3	3	3	+1.5
Extraction	0	0	0	-6.1
Food, Drink Tobacco	3	3	3	+1.3
Other Low Tech	9	7	6	-29.1
Metals and Engineering	21	15	13	-36.9
Chemicals and Processing Industries	10	8	7	-28.2
Other and Recycling	3	3	3	-17.1
Utilities	2	3	3	+87.4
Construction	52	53	57	+8.8
Distribution	113	112	118	+4.2
Hotels and Catering	30	31	33	+9.0
Transport and Communication	32	32	33	+1.8
Financial Services	15	14	15	+1.6
Business Services	132	137	145	+9.4
Public and Other Services	147	159	170	+15.0
Energy	-	-	-	N/A
Total CO₂ Emissions (K tonnes CO₂) from the Industrial and Commercial Sector	2482	2744	3137	26.4
Agriculture	11	8	7	-35.4
Extraction	4	3	3	-29.0
Food, Drink Tobacco	43	50	56	+30.1
Other Low Tech	128	129	133	+3.4
Metals and Engineering	484	462	448	-7.4
Chemicals and Processing Industries	585	615	613	+4.7
Other and Recycling	50	44	41	-18.2
Utilities	31	44	45	+44.7
Construction	42	43	47	+10.6
Distribution	307	309	309	+0.8
Hotels and Catering	69	67	67	-3.1
Transport and Communication	25	29	30	+17.9
Financial Services	15	18	20	+36.2
Business Services	47	50	53	+14.0
Public and Other Services	192	195	206	+7.2
Energy	448	677	1059	+136.4

Table 2 shows the CEM forecasts for total CO₂ emissions, and total employment from the different industrial and commercial sectors within Hertfordshire.

- CO₂ emissions in the energy sector are forecast to more than double between 2007 and 2020, expected to rise by more than 136%. This sector makes up the majority of the industrial and commercial sector emissions increase.

- The CEM forecasts that in general, the heavily polluting industries are forecast to see a decline in employment between 2007 and 2020. The 'other low-tech' sector (expected to reduce employment by over 29% over the period), metals and engineering sector (decrease of nearly 37%), chemicals and processing industries sector (decrease of over 28%), and the 'other and recycling' sector (decrease of around 17%) all see significant reductions in their workforces.
- However these sectors do not all see respective decreases in CO₂ emissions. Despite an expected employment decrease of over 28%, the chemicals and processing industries sector is expected to increase its already significant CO₂ emission levels by nearly 5%.
- Other sectors forecast to experience large CO₂ emission rises are the food, drink and tobacco sector (an increase of over 30%), the utilities sector (up nearly 45%), and the financial services sector (up over 36%).

Table 3 – Hertfordshire's forecast employment and emissions by sector as a share of the total

Hertfordshire	2007	2020	Hertfordshire	2007	2020
Sector share of total industrial and commercial employment (%)			Sector share of total industrial and commercial emissions (%)		
Agriculture	0.5	0.5	Agriculture	0.4	0.2
Extraction	0.0	0.0	Extraction	0.1	0.1
Food, Drink Tobacco	0.5	0.4	Food, Drink Tobacco	1.7	1.8
Other Low Tech	1.6	1.1	Other Low Tech	5.2	4.2
Metals and Engineering	3.7	2.2	Metals and Engineering	19.5	14.3
Chemicals and Processing Industries	1.7	1.1	Chemicals and Processing Industries	23.6	19.5
Other and Recycling	0.5	0.4	Other and Recycling	2.0	1.3
Utilities	0.3	0.5	Utilities	1.3	1.4
Construction	9.1	9.4	Construction	1.7	1.5
Distribution	19.7	19.3	Distribution	12.4	9.9
Hotels and Catering	5.3	5.4	Hotels and Catering	2.8	2.1
Transport and Communication	5.6	5.4	Transport and Communication	1.0	0.9
Financial Services	2.6	2.5	Financial Services	0.6	0.7
Business Services	23.1	23.8	Business Services	1.9	1.7
Public and Other Services	25.8	27.9	Public and Other Services	7.7	6.6
Energy	-	-	Energy	18.1	33.8
Total	100.0	100.0	Total	100.0	100.0

Table 3 shows what share of total industrial and commercial employment and emissions each sector makes up, in 2007 and in 2020.

- We can see that the largest CO₂ emitters are the energy sector, metals and engineering sector, the chemicals and processing industries sector, the distribution sector, and the 'public and other services' sector.
- The energy sector is forecast to increase its share of CO₂ emissions from around 18% in 2007, to almost 34% in 2020.
- Despite emitting around 24% of CO₂ in 2007, the chemicals and processing industries sector only accounted for 1.7% of employment in the county.
- The opposite pattern is prevalent in the business services sector, which employs roughly 23% of the county's workforce, but causes less than 2% of CO₂ emissions.