

Vision 2050: A Sustainable future for Cheshire West and Chester

A report for
Cheshire West and Chester Authority

Chester Climate Change and Sustainability Ginger Group

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This document is designed for double-sided printing

Executive Summary

This Vision for a Sustainable West Cheshire is intended to guide the Cheshire West and Chester Authority (CW&C) in taking decisions about the future of the area. It is centred on the premise that if we are to achieve a truly sustainable community by 2050 the direction of travel set now must be right. This Vision, prepared for the new CW&C Council, recognises its responsibilities as an estate manager, service provider and community leader, whose influence extends to the community, local businesses and other public service providers. This document is designed to inform the development of the new Sustainable Community Strategy during 2009.

The '[Context](#)' section paints a picture of the place in which current trajectories predict we will be living in 2050. A common thread emerging is the reduction in individual and collective impacts on resource use of all kinds due to climate change mitigation measures and the depletion of resources, especially oil. It suggests that by 2050 the CW&C area must be characterised by:

- Cohesive communities with most of their needs provided locally, frequently with the involvement of local people;
- Improved health and well-being through increased walking and cycling, and improved air quality;
- More local employment and local businesses with shorter supply lines;
- A vibrant and dynamic local economy;
- Readiness to respond to fiscal strategies leading to a UK economy of modest or zero net economic growth;
- Increased proportions of energy and food produced locally;
- Reduction in waste arisings and optimum rates of recycling;
- Improved habitat management, leading to enhanced biodiversity and greater provision of ecosystem services;
- Improved flood defences, sustainable water supplies and ecological waste water treatment;
- Reduced road freight and fewer car journeys;
- Increased rail and water-based freight and more journeys by public transport;
- Mixed use, demographically mixed developments.

Recommendations for action are then summarised around ten themes:

1. *Community energy and energy efficiency:* There must be an emphasis on efficient use, renewable sources and small-scale electricity generation local to our communities. Key actions are around supporting community energy schemes, improving the energy efficiency of existing housing stock, supporting new energy start up businesses, introducing energy education and control into homes and schools, and engaging partners in planning for energy reduction.

2. *Transport and accessibility:* The focus is on the enhancement of localised and integrated systems of public transport in conjunction with cycling and pedestrian infrastructure to encourage people to travel more efficiently using less carbon based fuel. Measures include the careful planning of new developments, coordination of travel planning by major employers, and activities to engage communities in the design of local cycling and walking opportunities.

3. *Resource management and waste:* The importance of both the use and recycling of materials locally, reductions in the use of non-recyclable materials and design for low energy consumption must be embedded in all our activities, supported appropriately by awareness-raising campaigns.

4. *Engaged communities:* Transport and resource restrictions will lead to greater emphasis on local arrangements and the need to provide more personalised support services to an increasingly older and more stable population. Communities and individuals should be encouraged to take responsibility for their own needs, with public agencies becoming catalysts and facilitators rather than just providers. Steps towards empowerment include support for low carbon groups and promoting democracy and participation within the school curriculum.

5. *Low carbon economy:* Central to the creation of a sustainable, low carbon economy is the local re-circulation of money. This will help to fund community regeneration, local services and further local job creation. The reliance on the internet for business is likely to grow, and video conferencing for businesses should be supported. Promotion of the use of natural resources, re-use and repair businesses will be important.

6. *Development and the built environment:* As resource costs rise and the effects of climate change become evident, innovations in architecture, building construction and standards, energy generation and infrastructure planning need to be accommodated. The use of local materials and recycling will increase. As most of the current building stock and infrastructure are likely to still be in place by 2050, a key concern is identifying adaptation and improvement opportunities.

7. *Natural resources:* Reduced use of imported goods will make home grown materials more valued. Timber, and other plants such as hemp, flax and reeds will become increasingly important for use as building materials and in textile manufacture. The economic and environmental benefits derived from ecosystems, for example in water retention and purification, will be recognised, and opportunities for re-naturalising land to capitalise on this should be sought.

8. *Open space:* Open space is a capital resource whose careful management can yield a range of benefits. Specifically, the local management of open spaces within residential areas for multiple uses, such as recreation, timber crops, fruit and vegetables, can facilitate provision of a range of societal benefits.

9. *Food and farming:* The development of local markets in West Cheshire and surrounds will be important as we rely less on internationally traded, out of season food. Provision should be made for food production by the commercial sector and informally. Opportunities for community supported agriculture, in which the public are customers and workers together, should be encouraged.

10. *Water and flooding:* Three aspects of water planning are considered: supply, flooding and sewage control. The vision is to manage areas of land upstream for water retention by allowing rivers to flood into wetlands and woodlands, thereby providing clean water, and to provide numerous small areas to treat locally-produced sewage wastes using natural processes.

Overall, the report provides an integrated vision of the constraints predicted for the next few decades, and how an enlightened new Authority can turn these into a comparative advantage.

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Introduction

A person considering the future of Cheshire in 1809 would not have been able to imagine the things we take for granted now; what we earn and what we buy, how we live, work and spend our leisure time. Looking back to the time before trains, cars and electricity, we can see that the main driver of change has been the widespread availability of energy, especially for motive power. Abundant and comparatively cheap energy has enabled unprecedented technological advancement, growth and freedom. Now 200 years later, it is clear that we are reaching the closing stages of the period that will be looked back on as the Age of Oil. Depletion of global oil, coal and gas resources themselves and the harmful build-up of the products of their combustion are the twin underlying drivers of the forces that are set to shape our society in the foreseeable future. This report is an analysis of the key vulnerabilities envisaged for the economy, environment and people of Cheshire West and Chester. It points to ways of adapting to the challenges to come whilst contributing to the mitigation of their causes.

Research, experience, analysis of current trends and overall a developing understanding of sustainability have been used to create this glimpse of a sustainable Cheshire West and Chester just 42 years into the future. As the area enters a period dominated by the shaping forces of climate change and progressive resource depletion, there is no escaping the fact that, since we

currently enjoy a time of relative plenty, coming out of it will require a degree of belt tightening. Indeed, Chester has been highlighted as the Local Authority area that is third most vulnerable in the UK to the impacts of the 'credit crunch' ([Oxford Economics 2008](#),). The 'credit crunch' can only make matters more extreme in the short term, but it does offer an opportunity to reassess our economic dependencies on external sources for goods and services and consider investment in development to support more local provision, to the benefit of the regional economy. In formulating this vision we have found that it points to a future offering many economic benefits as well as advantages in human well-being and social cohesion. The future need not be bleak. In particular, the findings echo those of a recent Defra document, which stresses the necessity of community action in solving these daunting problems. It states, "On the key environmental issue of the day, progress depends on enabling people to act together. The focus needs to be on creating a supportive framework for collective progress, rather than exhorting individuals to go against the grain" ([Defra 2008a](#)).

This report lays out the context in which inevitable societal changes will occur, and presents an explanation of the thinking behind the policy recommendations for each of ten themes. It then presents the key components of these and recommends a range of deliverables,

defining indicators and setting reasonable targets for each. The National Indicator *(NI) 188 Planning to Adapt to Climate Change: Indicator Guidance* requires Local Authorities to embed the management of climate risks and opportunities across all levels of services, plans and estates, and to provide a means of measuring progress in preparedness by addressing these risks and opportunities. This requirement is inherent in the decisions made in drawing up the recommendations contained in this report.

What emerges is an integrated picture of Cheshire West and Chester better prepared for the challenges of coming decades, and positioned to receive fewer nasty surprises and many benefits. In addition, this document is designed to inform the development of a new Sustainable Community Strategy over the next year. Cheshire West and Chester Shadow Authority has a duty to produce and deliver this strategy, in conjunction with its key strategic partners, in accordance with Section Four of the Local Government Act 2000. Vision for CW&C in 2050 will be an important building block for the sustainable community strategy because it outlines how we may promote and improve the economic, social or environmental well-being of

the area. Many desirable goals will require the active participation of residents and community groups in the localities where the changes will take place. It will be impossible for CW&C to micro-manage local communities. This means that certain decision-making powers will need to be devolved to local communities, probably to Parish Councils, but with the participation of, for example, local Transition or Low-Carbon Community groups, Women's Institutes, business groups, allotment-holders groups and other active people who can make the changes necessary for progress to be made. This report is a robust analysis of existing trends, projections and probable future constraints combined with an imaginative and hopeful vision of how these constraints may be overcome while at the same time strengthening our economy, environment and social cohesiveness. It is not mere 'blue skies' thinking. These goals can be achieved through the strengthening of our resource base and reduction of our dependence on long supply lines vulnerable to price vagaries and shortages in this resource-competitive world. This document should be regarded as a beginning on which to build a sustainable future.

Context

The people of Cheshire West and Chester are entering a new, uncharted era as the physical realities of our accumulated and collective impacts on the environment become manifest.

There has been a great deal of confusing information, counter claiming and hype surrounding climate change, but the core science is, in fact, quite simple. It is summarised below. It would be

insufficient, however, to look at climate change without considering the overall implications of our use of resources, of which climate change is just one symptom, albeit one that is critically important for our future.

Human expansion in both numbers and industrial development depends on continuous supplies of energy and materials. Crucially, we appear to be at the beginning of a permanent decline in oil production i.e. oil geologists believe that we are experiencing the peak of global oil production, and the decline from it will be rapid. Each year from now on there will always be less oil than was available the previous year, and it will be more expensive to retrieve.

Politically, we could be entering a very dangerous time, and measures have been proposed to avert the globally significant potential conflicts that may arise from increased international competition for diminishing oil supplies (see [Appendix 2](#)). In practical terms it means that the price of fuel and products that depend on high fuel inputs will continue to rise year on year. Together the peak of oil production and the need to reduce or eliminate net carbon emissions will necessitate far-reaching changes to the economy of the Cheshire West and Chester area and the UK as a whole, and to the lifestyles of its people.

The essentials of climate change

The human collective response to climate change is probably the most urgent and potentially dangerous challenge humans have ever faced. The existence of global-scale mitigation models such as *Contraction and Convergence* ([Meyer 2000](#)) provides real hope, but only if action is taken very soon indeed. The case for human-induced climate change is extremely robust. Here are its main elements:

1. A demonstrable physical relationship exists between carbon dioxide (CO₂) and temperature, which has been known for over 100 years ([Arrhenius 1896](#)). Arrhenius showed that adding CO₂ to the atmosphere will increase the temperature by a known amount. The overwhelming weight of evidence indicates that the warming we are witnessing today is caused by

CO₂. No evidence contradicts it, though other factors (such as described by the cosmic ray hypothesis) are believed to modify the amount of warming by a very small proportion.

2. The extent and rapidity of warming witnessed in the last few decades is unprecedented. Figure 1 shows a graph of the CO₂ concentrations of the Earth's atmosphere over the last 650,000 years, showing that there has been an upper limit of around 300 parts per million (ppm) and a minimum of around 180 ppm during ice ages. Only in recent decades has the maximum been exceeded.

3. Recent CO₂ concentrations are shown in Figure 2, the dashed line indicating our present concentration of 385 ppm, far in excess of any concentration reached in the last

650,000 years.

The calculated CO₂ emissions from human sources are around double the 'extra' amount in the atmosphere

shown in the graph by the dashed line, because a proportion of the CO₂ released is absorbed into the world's oceans and soils.

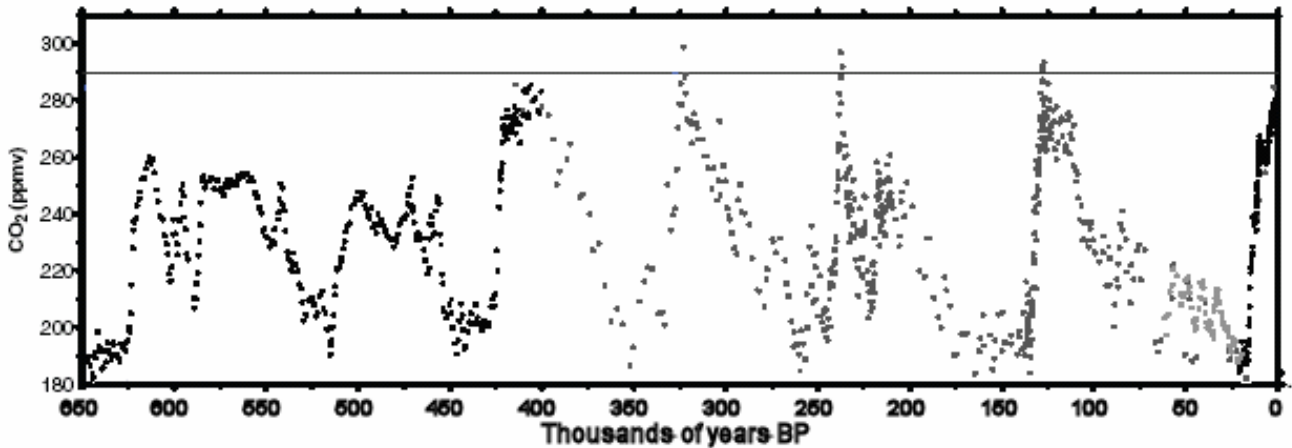


Figure 1. Atmospheric CO₂ concentrations over the last 650,000 years. Troughs show ice ages and peaks show interglacial (warm periods). The line at 290 parts per million is the mean concentration for the one thousand years prior to the beginning of industrial development. BP = 'before present'; ppmv = parts per million by volume. (Adapted from [Siegenthaler et al. 2005](#)).

Analysis of the relative proportions of carbon isotopes (i.e. ¹²C and ¹³C, forms of carbon that differ in the number of neutrons carried) in the atmosphere reveals that the extra carbon comes from fossil sources and not from the active carbon cycle. In 2008, concentrations reached 385 ppm. This means that the rate of increase is greater than the projection described by the line of the worst case scenario (left-most line at the right-hand side of Figure 2). In other words, despite nominal agreements to curb emissions of CO₂, we have made no progress, and the situation is worse than it was when the graph was made.

4. Temperature increases match those predicted by observed increases in CO₂ and can only be accounted for by inclusion of anthropogenic (human-derived) emissions of CO₂. Figure 3 compares observed global-scale changes in surface temperature with the results of climate models showing natural forcings (i.e. natural phenomena that affect temperature) alone, and natural forcings added to anthropogenic forcings. This evidence demonstrates very strongly indeed that CO₂ and no other factor is causing the observed global warming, and that its origin is fossil fuels burnt by humans.

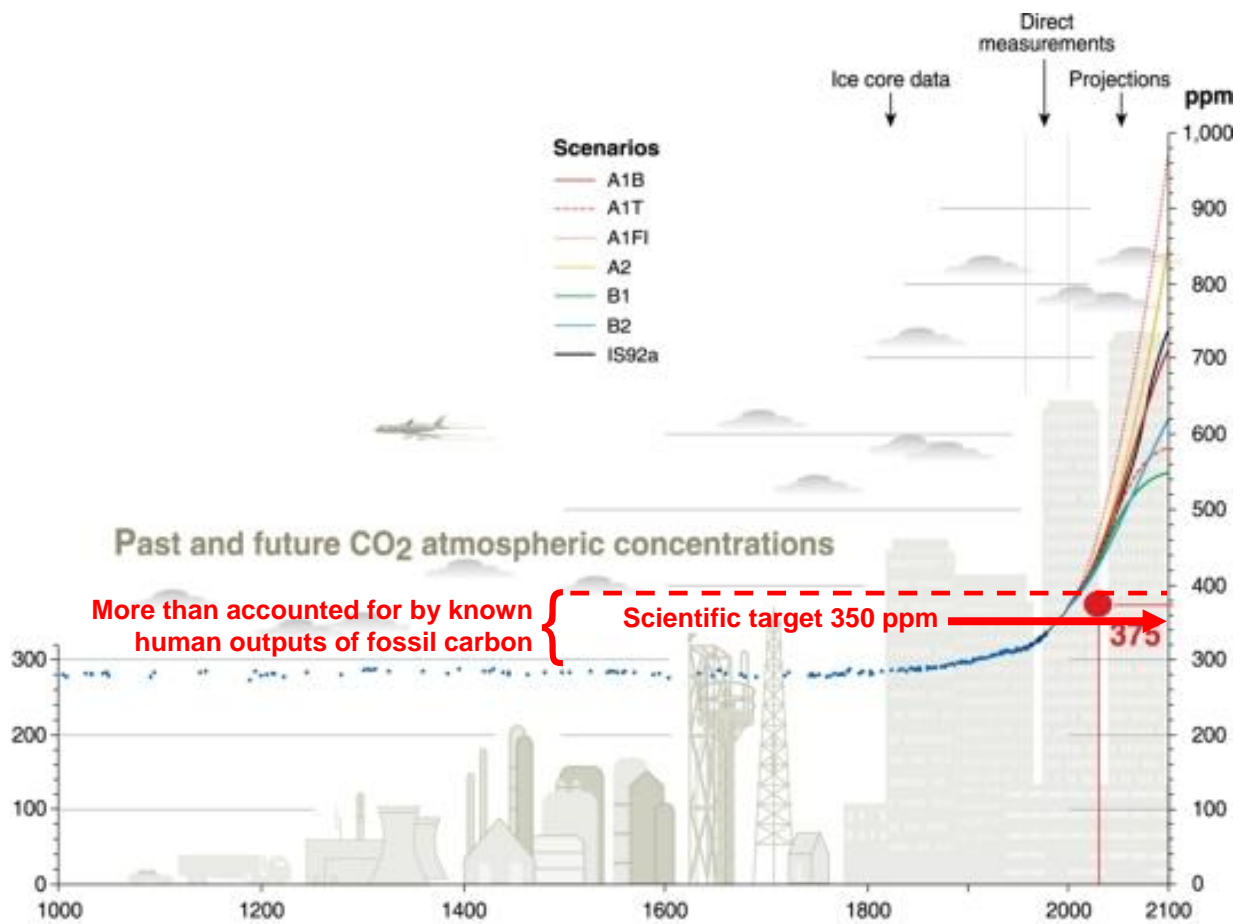


Figure 2. Recent atmospheric concentrations of CO₂. The X-axis is time, from 1,000 years ago to 100 years hence, and the Y-axis is CO₂ in parts per million of atmosphere (ppm). The steady 280-290 ppm over the last 1,000 years can be seen to rise as concentrations increased at the beginning of the Industrial Revolution. The rapid increase in the late twentieth century can be seen clearly. After 2005, the various curves represent different IPCC greenhouse gas emissions scenarios (based on projections of current data), with Business as Usual (i.e. no action taken) being the left-most line, and a series of greenhouse gas emission mitigation options forming lines to the right of it. The point at 375 marks the concentration pertaining when the graph was made in 2005, and can be ignored for our purposes. (Source: [IPCC](#) Philippe Rekacewicz/Emmanuelle Bournay/UNEP/GRID-Arendal 2005)

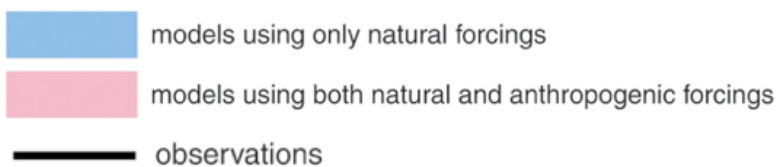
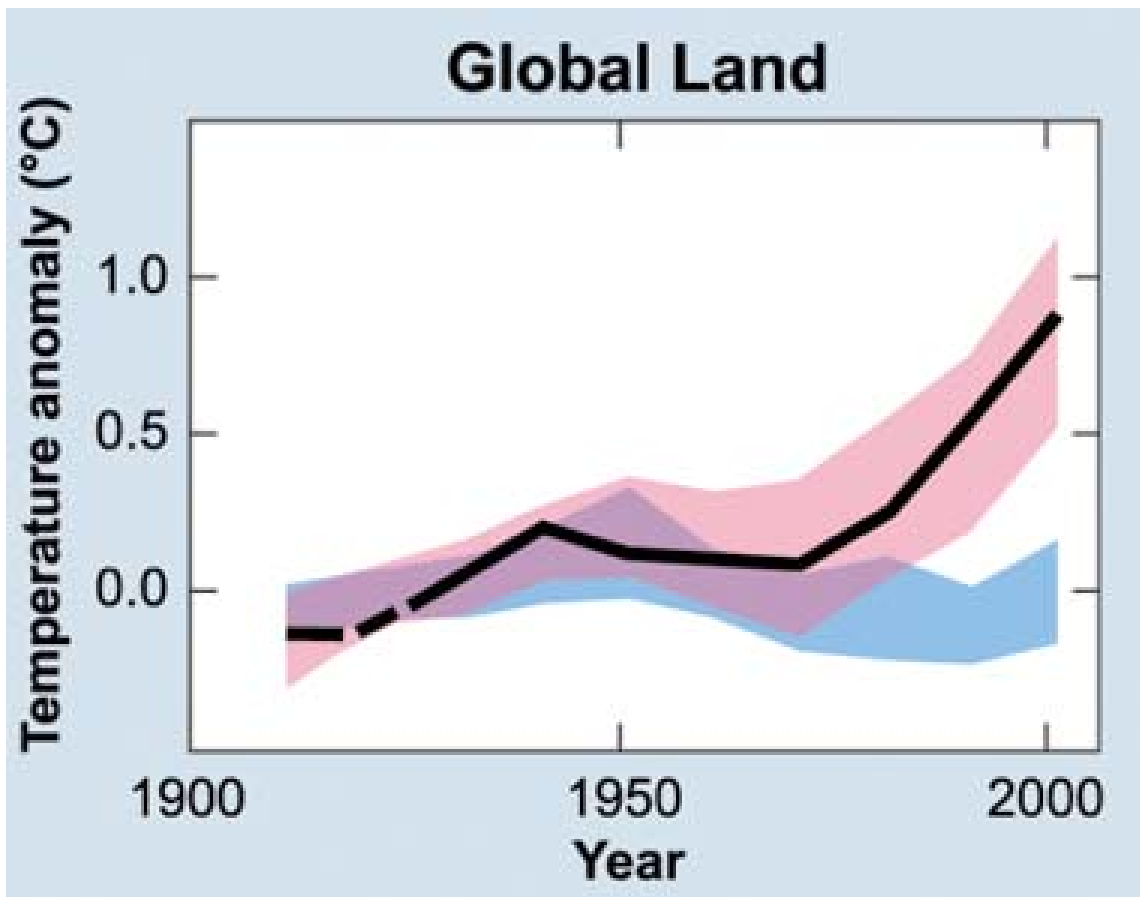


Figure 3. Comparison of observed global-scale changes in surface temperature with results from climate models using either natural or both natural and anthropogenic forcings. The solid line shows recorded temperature, the upper band the calculated temperature range from natural and human sources, and the lower band the calculated temperature from natural sources alone. It is clearly seen that only by inclusion of human greenhouse gas contributions do the models match the recorded temperatures (Source: [IPCC 2007](#))

The challenges put up against this analysis by ‘sceptics’ mostly offer other explanations to account for warming e.g. changes in solar output, but these do not stand up to scientific scrutiny. All detectable influences on climate are incorporated into existing models, and where possible the projections are verified by direct observations. At most, any ‘competing’ hypothesis could only explain some minor adjustment to calculated temperatures because it cannot be

denied that extra CO₂ is shown to be present in the atmosphere, that it has proven effects on temperature, that it has fossil origins, and that the warming broadly agrees with research predictions published over a century ago. A recent updated report of climate science that is accessible to non-scientists can be found in [Hawkins *et al.* \(2008\)](#). For an up-to-date reminder of the urgency and seriousness of our current predicament, see [Anderson and Bows \(2008\)](#).

Peak oil

Known oil reserves, predictions of future discoveries based on past results, and global rates of oil use have been used by oil industry geologists to produce the graph in Figure 4. Geologists tell us that we are now at the peak of the curve, and that a decline in production is inevitable. In addition, we have used nearly all of the light, clean oil, and what remains is heavier, deeper,

and more difficult and expensive to pump (Heinberg 2005). This changes the economics of pumping oil, based on what is known as 'energy return on energy invested' (EREI), a ratio that shows the amount of energy required to pump a barrel of oil. As the oil stocks decline, the EREI gradually decreases until, as it approaches 1, it will take a barrel to pump a barrel.

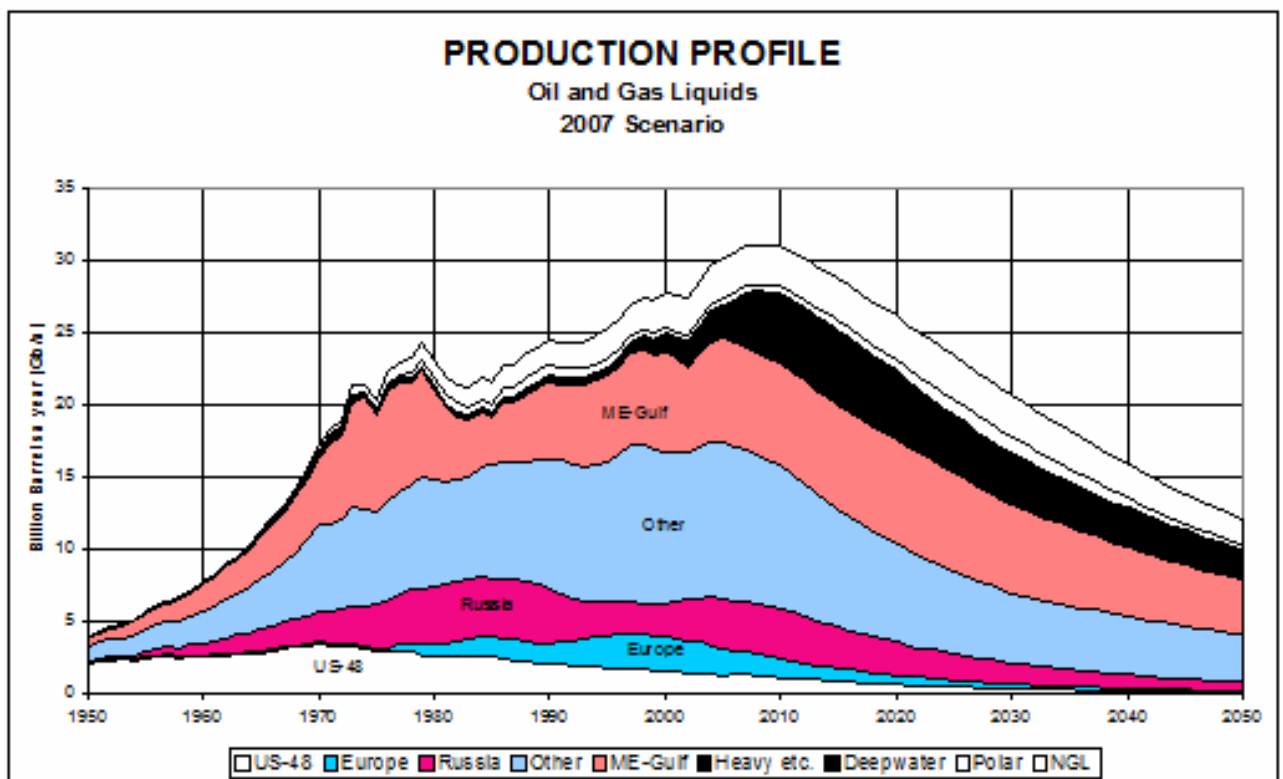


Figure 4. The pattern of past global oil and gas production and the predicted rate of decline. Oil production rose significantly in the latter decades of the twentieth century. The peak of oil discovery was in the 1960s, and 1981 was the year in which the rate of oil use exceeded the rate of discovery. We are now at the peak. (Source: [Campbell, ASPO](#))

Resources

Resources are raw materials that we use directly and from which we grow or make things. Many of today's global problems have their roots in resource management; either

resources are removed from the environment at rates greater than the rate of natural replacement, or they are added to the environment at rates greater than can be

assimilated by environmental processes, sometimes both at the same time. It has been considered somewhat acceptable for corporations to disregard many environmental responsibilities until recent years because their adverse economic effects tend to be diffuse, with no particular sector affected. What is recognised now is that by the time diffuse impacts (such as CO₂ emissions) become an obvious economic problem, they are ubiquitous and therefore very difficult to bring under control. In order to make positive changes, our best response to them is therefore to address the fundamental causes of the problem in hand.

There are three categories of resources to consider: non-renewable (usually mineral) resources, renewable (biologically or solar derived) resources, and wastes from other processes.

1. Non-renewable resources are removed from the Earth's stock of materials, and are our *capital* resources. They are generally mined from relatively few sites, which depletes the resource and involves inputs of energy for extraction, transportation and processing. They also tend to be extracted by large, multinational companies, and the scale of their operation makes them susceptible to increases in the costs of energy.

2. Renewable resources are obtained from processes, and thus represent resource *income*. They either grow and are harvested or they capture energy from solar-driven processes i.e. wind, light and water movement.

An important distinction between the two is that the use of renewables is dependent on the rate of renewal, while the use of non-renewables is dependent on the rate of extraction. Thus the supply of non-renewable resources has the advantage of responding to increased extraction effort, but also the disadvantage that the supply might run out. The advantage of renewable resources is that they will never become totally depleted (unless the process that generates them is destroyed (see e.g. [Worm et al. 2006](#)), but they are not obtainable in high concentrations, and harvest rates need appropriate management.

One of the reasons why industrial society has expanded so quickly is because the means of production was moved from renewable to non-renewable resources. Unfortunately, as demand has grown, the natural stocks of many non-renewable resources have been depleted just as rapidly.

3. Wastes from one process can be resources for subsequent processes, and optimal resource efficiency would require the maximisation of these linkage and re-use aspects, and minimisation of raw materials or processes that produce unrecyclable or toxic wastes, which require land and further material resources for their disposal.

With this basic information in mind, it is comparatively easy to envisage how restrictions imposed by the need to reduce CO₂ emissions because of climate change impacts, along with the effects of continually declining rates of oil supply, might shape our

resource use in future years. Indeed this is already starting.

Essentially, the problem is simple. Current lifestyles in the developed world are shaped by the ability to consume resources with impunity. Our liberal access to energy resources has enabled the rapid economic expansion we've seen. The end of the era of cheap oil and the ability to pollute means we have to re-learn efficiencies in behaviour, design, planning and process. Our institutionalised wastefulness, while making the transition to sustainability difficult to accept initially, will in fact enable us to take up a lot of the slack without necessarily losing the basic needs on which we rely.

Stern Review

Sir Nicholas Stern, in his review for the British government of the economic impacts of climate change ([Stern 2006](#)), concluded that climate change is the greatest and most wide-ranging market failure ever seen, and that the economic analysis of it must deal with long term horizons, using the economics of risk and uncertainty. The Stern Review stated categorically that mitigation of climate change must be viewed as an investment because the consequences of not taking action

It must be stressed, however, that since the era of cheap and liberal energy availability is ending, no technology that currently exists, whether renewables, nuclear, biofuels, hydrogen, coal, tar oil, or any other, has the capacity to replace what oil has given us. We are forced to find ways to reduce our total energy consumption, probably by at least half, through innovation, design, efficiencies and common sense (see [Helweg-Larson and Bull 2007](#)). Some of the necessary changes will be very minor e.g. if every UK household installed just two low energy lamps, it would save the electricity produced by a typical power station.

will be around five times greater than the costs of mitigation. In particular, the report stated, *"Tackling climate change is the pro-growth strategy for the longer term, and it can be done in a way that does not cap the aspirations for growth of rich or poor countries"*.

The findings of *Vision 2050* inform a new 'Mini-Stern' report into the expected economic importance of climate change for the Cheshire & Warrington Sub-Region, which will be published very soon (CWEA 2009).

Picturing Cheshire West and Chester in 2050

In making this projection, the authors have borne in mind the key overarching considerations. These

are: *the physical effects of climate change*, including temperature increase, sea level rise and weather

extremes; *the low-carbon way of life*, e.g. new designs of buildings and transport systems, new sources of energy, and increased localisation; and *sustainability* in the sense of Brundtland (*Our Common Future*, [WCED 1987](#)) who, with the US Environmental Protection Agency, defined the concept as 'meeting the needs of the present without compromising the ability of future generations to meet their own needs'. A sustainable future for the area is thus one that produces the resources it requires to develop and function well within a changing economy and environment. This can be done both directly and through trade.

In thinking about the future development of Cheshire West and Chester, it is important to pass all decisions through the conceptual filter of sustainability during assessment, and to know that other democracies are likely to be doing so too. Without proper consideration of what is sustainable, a realistic image of the Cheshire West and Chester of the future is unlikely to be reached.

Many of the changes recommended in the report can be implemented or begun immediately, but their conclusion can only come after considerable planning and change. The new Sustainable Communities Bill promises to be helpful in this regard. We have settled on 2050 as a date whereby the majority of these programmes can be complete, and have provided interim targets against which to measure progress. The ultimate goal, in 2050, will thus be contingent on what has been achieved by the earlier target dates.

Because there are many unknowns in a projection like this, the authors have tried to answer the question, "What inevitable and desirable changes will affect the way our society is managed?" Substantial work has been done on this topic, and we can make some general statements about 2050 with a degree of confidence. The available evidence suggests that the following will be relevant to Cheshire West and Chester:

- **Evident climate change.** Summers will be hot, with 40°C reached probably frequently, and the proportion of deaths in summer is expected to increase. These might be countered by fewer temperature-related deaths in winter. There are likely to be both floods and droughts in summer, sometimes causing crop failures. The quality of water bodies for consumption and recreation will be reduced i.e. there will probably be toxic algal blooms ([Paerl and Huisman 2008](#)). Floods due to more extreme weather fluctuations, and exacerbated by sea level rise may lead to loss of some low-lying areas such as Sealand and some river valleys.
- **Resource restrictions.** The hallmarks of resource use are likely to be efficient use, minimum waste, recycling of materials, repair of products, use of ecosystems for human needs e.g. water purification, flood defence, and production of food and fibre. Pressures on land will

probably mean reduced consumption of meat. If we are to protect our quality of life, net carbon emissions will have to be close to zero. This means that either we will not burn fossil fuels or that the carbon released from this means will be captured by technologies not yet available. Oil (the most energy-rich and flexible fuel resource we have) will be getting progressively closer to exhaustion, used less for all normal purposes, and made available only for a narrower range of applications.

Coal will be greatly diminished unless the problem of emissions can be solved, and natural gas, if available, is likely to be very expensive. There may be new technologies for energy generation or carbon sequestration. Replacement fuels will have changed the way we use energy, since electricity promises to be the most common form. Economics and practicalities suggest that most will be generated from renewable sources such as wind, wave, tidal, solar, geothermal and biomass. A major proportion of electricity will be generated close to demand and smaller in scale than is currently the case, and will include domestic scale generation. The emerging 'concentrating solar' technology might offer large scale electricity availability, and could be deployed comparatively rapidly. There is likely to be some use of hydrogen as energy storage and as a vector between electricity, transport and heat power demands. Sequestration of carbon from the atmosphere will probably play an important role because it directly reduces atmospheric CO₂ concentrations, thus permitting some use of fossil fuels.

- **Low-carbon technologies.** It will be essential that building design and construction and industrial processes are energy-efficient and low carbon. Fuels other than petrol and diesel will power vehicular transport. The technology used will depend on the distance travelled and predictability of the route. There is certain to be a somewhat reduced role for private cars, which will be displaced partially by better mass transit, and partially by a reduced need for mobility if homes, work and services are organised more locally. Unless some new and unexpected source of energy is discovered, increasing fuel costs can be expected to lead to the use of slower forms of transport and more expensive imports and exports, with airfreight largely abandoned except for expensive goods. Ships may be mostly wind-powered, carry non-perishable goods, and will use low carbon fuels for specific purposes e.g. dredging. Accordingly, there is likely to be much more emphasis on local production of food and fibre (including timber), and local manufacture of goods.
- **Economic activity.** As the 'global economic crunch' takes its toll, and in response to the continued failure of market economics to address the global problems of resource management and poverty, particularly in respect of the Millennium Development Goals

(<http://www.un.org/millenniumgoals/>) certain leading economists are looking again at ways to replace the market economy (dependent on perpetual growth) with one that works in a steady-state (Daly 1991; Turner 2008; *New Scientist* 2008). This will help to formalise many of the structural changes that will be needed to meet the challenges of climate change, oil depletion and sustainability on many levels. Inescapably, there will be a shift away from the national-scale oil-based (transport-based) economy towards more localisation of production and sale. There will be new priorities for energy production and the enhancement of ecosystems in order to provide services for society with minimum investment (*sensu* Water Framework Directive; 2000/60/EC). High costs of travel are certain to bring fewer tourists, although those that come may be of higher individual value. Resource constraints will probably shift the retail sector away from items of little practical value and built-in-obsolescence, and towards higher quality goods, especially those produced locally. Employment will be extended to include repair and re-manufacture, provision of localised water and sewerage services, ecosystem maintenance, and small-scale forestry, building and agriculture. Food and farming will increasingly be central to life in Cheshire West and Chester. If telecommunications are prioritised, transactions and e-commerce may change less, but transport is certain to have a reduced role, with alternatives to oil restricted by availability. That said, the knock-on effects of high energy prices combined with lower total energy availability will act to change the balance of the economy. It is hard to see how multinational businesses can continue in the way they are now, and fragmentation of operations is already occurring. The energy options are limited compared with those to which we have become accustomed. The degree to which this will take effect depends partly on the availability of electricity, which can be in our hands if we act decisively.

- **Transport.** Transport will be a prime target for reduction and efficiencies because fuel is certain to be less available and much more expensive. Overall efficiency will increase if use is made of local and regional resources, thus avoiding superfluous movement of goods and people. Depending on the changing economic situation, freight transport may feature bigger lorries to feed central depots with onward distribution by low-carbon vehicles. Later, it can be envisaged that container trains will carry freight to central depots, accessible for road transport to local destinations. Canals and major rivers will come back into greater use, and will need depots for goods handling. People will come to regard access to the facilities they want as more important than mobility *per se*. There is likely to be a greater reliance on public transport, car sharing, and bicycles, and a reduced need for long daily journeys if people work and live in closer proximity. Demographic changes suggest that facilities for journeys by disabled and older people will be enhanced. Proportionately, we should expect more buses and fewer car journeys, more bus-dedicated lanes on roads, and a large bus

exchange or more than one exchange in large towns. In this scenario, there will be less need for car parks, and more need for bicycle parks. More provision for bicycles, pedestrians and for people with disabilities as well as for those who wish or can afford to drive cars.

- **Business.** Economic constraints will make 12,000-mile production routes (such as from China) uneconomic and prone to disruption, so that supply lines will be generally shorter. This can be expected to stimulate an increase in local manufacture and assembly, with enhanced diversity in manufacturing and with a greater proportion of locally-based, small companies. Recycling will become a core economic activity, and landfill mining may occur ([Hogland et al. 2004](#)). There will be greater use of natural resources e.g. local food production, timber production, coppicing and energy crops, making wood in perpetually short supply. The lesson provided by Cuba's response to and recovery from the sudden cut in oil supplies after the collapse of the Soviet Union indicates that we could expect possibly 20% of the workforce to be directly involved in food production ([Pfeiffer 2008](#); [Wright 2008](#)). Much farming will be for local needs, with export continuing to be important where appropriate. There may be opportunities for growing new drought-tolerant crops. We will see local, small-scale and large-scale renewable energy production for either locally or commercially owned. A proportion of large-scale projects may be community-owned.

Risks and vulnerabilities in Cheshire West and Chester

There has been some debate about the relative merits of mitigation and adaptation to climate change. The overwhelming threat from the consequences of climate change and the additional threat coming from increasing oil costs favours the former, since we cannot sensibly risk the full impacts of climate change, and the reduced emissions of greenhouse gases through oil depletion and the emergence of renewable sources of energy will contribute somewhat to mitigation. The risks coming from Peak Oil are economic, and potentially military, and thus something that we can manage for risk reduction. The situation is more complex with

climate change because, although we can take measures to adapt to what is coming, without addressing the causes, the problems themselves will become worse. Munich Re, the reinsurers, report that the costs arising from weather damage are increasing presently at least 7% per annum ([UNEP 2006](#)), which is around twice the rate of economic growth (in the medium term before the current meltdown). If this rate of growth is maintained, it follows that in the next few decades economic losses from climate damage will equal total global production. This is in purely economic terms; the human and species costs are expected to be equally immense. Clearly, we cannot

avert the threats of climate change by mere adaptation. For this reason, while the document *NI 188 Planning to Adapt to Climate Change: Indicator Guidance* is welcome, it cannot sensibly be regarded as sufficient to address the threats posed by unmitigated climate change, nor the constraints that will be imposed by permanent oil depletion.

As a relatively prosperous part of Britain the CW&C area might be considered protected from important economic impacts but the Chester area has been singled out as number three in a list of the most vulnerable authorities in the UK to threats from the economic downturn. This results in large part from its economic dependence on financial services institutions and commerce, as well as on companies such as Vauxhall in Ellesmere Port, particularly in the light of local economic change with globalisation ([Oxford Economics](#)

2008). In common with many cities in Britain and abroad, the economic gains to be made from international business trading have encouraged what can now be seen as an over-reliance on this source of income at the expense of more localised economic securities.

This document deals with both mitigation of the underlying drivers of climate change, and adaptation in anticipation of its resulting effects. The seriousness of the expected consequences of climate change cannot be overstated. Scientific analysis indicates strongly that we cannot hope to adapt to the degree of climate change expected. We must reduce our impacts on the environment. To understand this and attempt mitigation without adaptation would be foolhardy, but to concentrate on adaptation without mitigation would be little short of madness.

Summary

The common thread of these changes will be reduction in our individual and collective impacts on resource use of all kinds. Climate change and Peak Oil are merely the symptoms that are beginning to present us with acute problems now. The real challenge will be to improve the efficiency of our use of resources and access to further supplies. Yet this challenge is far from insurmountable. Getting there will need careful and enlightened economic and land use planning, but the rewards can be more than merely the maintenance of a decent

quality of life. There are many opportunities to improve the lives of the people of Cheshire West and Chester, to reduce the vulnerability of our present dependence on long, transient or insecure supply lines, and increase the economic strength of the area by enhancing the circulation of wealth locally. Our approach is based on the understanding that to give effective local leadership, a local authority needs to be ahead of the game, and anticipate future developments, as well as being fully compliant with centrally-set requirements.

Rising numbers of voices are saying that the 'credit crunch' or 'depression', may be more than just another cyclic trough in the turbulent sea of economics, triggered as it was by overselling of credit. It might be an indicator of overlooked but deeper problems that are inherent in our modern way of life; in the very way our economies and industry are organised and run. Some observers are now saying that the deeper crisis may be a response to the check in the pace of industry that resulted from the rapid increase in oil prices in 2008. If that is true, it is a stark warning of what may be in store as oil reserves diminish and prices rise in perpetuity. We surely cannot continue for long to gamble with our future, increasing our collective debt to maintain an unsustainable economic system.

National and international economic strategies are beyond the control of regional government, but it will be possible to reduce local vulnerabilities to global market fluctuations by increasing the proportion of home grown jobs and materials. It is up to local people and local government to find ways to increase the stability of the regions of Britain, and one of the aims of this

document is to point to ways to do this. We are not alone in doing so. Several attempts have been made to address ways of managing society in ways that can be called sustainable. Not the least of these has been produced by the NHS, whose low carbon strategy sets out a specific, realistic and well-researched path for meeting the government's goals for an 80% cut in carbon emissions by 2050 ([Pencheon et al. 2009](#)).

There follow ten sections addressing economic and social themes, and offering strategies and ideas that can be used in the transition to a more sustainable environment, economy and community. Central to the development of these proposals will be the involvement of the public, either as individuals or organised groups. The targets are written as a guide designed to incorporate changes and revisions as progress is made towards them. Regular appraisal and reassessment involving the Authority and stakeholders should be planned from the outset. In particular, the response of the new Authority to the present economic and environmental crises must be coordinated and overarching in order to avoid the likelihood of one project undoing the work of another.

Key areas of change

Ten key areas comprise the main section of the report.

These are:

1. Community energy and energy efficiency
2. Transport and accessibility
3. Resource management and waste
4. Engaged communities
5. Low carbon economy
6. Development and the built environment
7. Natural resources
8. Open space
9. Food and farming
10. Water and flooding

Each section consists of an overview of the societal changes that are needed in order to begin the move towards sustainability and could be taken reasonably. These are followed by a list of key steps that could be addressed by the Authority and businesses working in partnership with it. Lastly, an action table in each section lays out the vision of how society could be in 2050, indicates the approach needed to be taken to achieve the goals, and lists first steps that could be taken now, in order to deliver real change.

Section 1. Community energy and energy efficiency – *small scale, renewable, distributed*

Overview

Energy provision cannot continue in its present form. Our future choice of energy resources will be a key issue in everyday life. Insecure reserves and ever-increasing costs will mean not only that the poorest in society will be in greater danger of fuel poverty, but that the whole of society will be at risk from intermittent supply. This is exacerbated by the fact that at present we have a centralised system of energy distribution that is prone to disruption from extremes in weather or terrorist attack, leading to social and economic consequences for large numbers of people.

The most effective single measure to protect ourselves from volatility in the energy markets is to reduce energy usage. It is always more energy efficient to conserve energy than to generate more by any means. This makes it imperative to conserve energy as well as generate it sustainably. Great strides have been made in improving the insulation of homes with cavity walls and lofts, but the work has been done on a piecemeal basis and much more can be done. Much of the housing stock is pre-1930s and requires solid wall insulation and other modern methods of improving energy ratings. The UK still lacks a coherent policy on improving energy efficiency of older homes. The completed refurbishment of residential properties to date are to an insufficient standard and need to be extended throughout the housing stock, 90% of which will be still in place in 2050, ([Kelly, 2008](#)). Furthermore there is a general lack of awareness of the energy demands of different appliances. Despite the availability of a number of devices that can display household energy use ([IED](#)), typically reducing energy consumption by between 5 and 25%, the UK has been very slow to introduce the technology into homes.

We are entering a new era of opportunity. Our electricity supply systems are reaching the end of their design lives, making this the right time to radically redesign how we supply our energy. Distribution Network Operators who operate and maintain the wires delivering our electricity are increasingly interested in the role that small scale, locally-managed generation can play. This represents a complete change from the provision of power via large centralised generators that has been the philosophy in recent decades. It means that communities can have the opportunity to develop their own electricity supplies locally whilst still remaining connected to the public supply. The recent announcement by the government of the introduction of 'feed-in tariffs' will encourage uptake of small scale generation. The potential to reduce losses and energy bills is inherent in this sort of change in supply and reduces reliance on foreign imports of energy. At the same time it can raise awareness of energy

use, enable demand-side management and encourage responsible energy use. It may also be a means to encourage increased community cohesion ([EPRI intelligrids](#), [Greenpeace Hatziaargyriau](#), [LENS](#), [Smartgrids](#), [Smart Power](#)).

Whilst a number of councils have championed installation of microgeneration ([Kirklees](#)), there has been little co-ordinated work to encourage community energy schemes on the existing electricity distribution network. There is no theoretical reason why every community cannot have a community energy scheme and these are generally more cost effective than domestic installations ([Power in Numbers](#) 2008). Existing and pioneering work in this field at Blacon and Ashton Hayes can be developed and expanded across the area. The Council would benefit from building on these nuclei, ([Appendix 3](#)). Like many projects in the Vision there is likely to be a significant ramping-up effect if the Council can enhance publicity and information about local projects through some kind of local green network. The publication *Getting On Target* ([Cornwall et al.](#)) provides a realistic plan for Local Authorities to develop a sustainable energy strategy based on the successes of seven Beacon Councils in addressing energy sustainability.

The Council potentially has an active role in encouraging businesses and bringing parties together, as well as providing start-up funding. The Council could facilitate partnerships, offer financial incentives and provide educational material for energy managers. Local companies (e.g. EA Technology Ltd), communities (Blacon and Ashton Hayes) and the University of Chester are in the process of developing a unique expertise in the area of community energy. As these schemes take off there is an opportunity for local small and medium-sized enterprises (SMEs) to provide installation and maintenance services.

Key steps

- Upgrade energy efficiency of houses across the area, including solid-walled properties and tower blocks (see [Section 6](#));
- Identify best available technologies for insulation, energy generation, supply, and efficient use. Baseline data should be collected for typical energy consumption in different building types. Advice on best practice should be sought from experience gained in Denmark, Sweden, Germany and the Netherlands;
- Make community and on-site renewables compulsory requirements for planning consents. For large developments or refurbishments, including those by landlords, make community energy schemes compulsory unless it can be shown that generation on an individual house basis is more efficient. Community energy schemes should provide the 'after diversity maximum demand' (the measure of the maximum power needed by a group of consumers) for all new developments or refurbishments of greater than 10 houses. This includes supply to local community buildings, businesses and shops. Insist on development of 'heat networks'

(see [Heat Networks](#)) in urban areas to facilitate district heating;

- Planning policy should include compulsory on-site generation in homes, businesses and public buildings in addition to the demands of the Code for Sustainable Homes ([CSH](#)). It is expected that renewable generation will be required to meet the higher levels of the Code. Wherever possible, energy supplies for business, public and domestic buildings should be linked;
- Boost community schemes by building on the experience of Ashton Hayes and Blacon, and aim to become a flagship for community and mixed ownership energy schemes.
- There should be a key role for Energy Advice Centres e.g. Energy Projects Plus. The Council's can bring people with appropriate technical expertise together with those with relevant business experience in order to start up new companies in the energy conservation sector. The Council can facilitate the refurbishment of hard-to-insulate homes where residents are in danger of living in fuel poverty (in private or social sectors), and should prioritise sectors of the population in need of training and employment in order to service energy conservation and refurbishment projects. Such a policy should help guard against fuel poverty whilst increasing the knowledge base of the population, thus developing the capacity to provide services across the area and beyond.
- The Council should work with energy suppliers to fund work particularly for social housing and the poorest sectors of society as part of the CERTS obligations ([CERTS](#));
- Energy suppliers should install digital energy consumption displays in as many houses as possible under the CERTS obligation ([CERTS](#)). Initially, these can be in social housing but the council can also encourage private householders to install them. Installation of a metering display should become a requirement in all planning consents, and be part of Council planning policy;
- Include energy management in the school curriculum. Energy consumption within each school in the Authority's area should be displayed. The Council should ensure that work on energy consumption, energy saving, and how we generate, deliver and use energy should be included in the curriculum. There is a range of materials for such work but these should be tailored for Cheshire West and Chester, with incorporation of local energy monitoring.
- Encourage businesses to move towards best practice for energy efficiency, and to invest in renewable energy, perhaps by use of incentives, competitions and awards. Council planning policy should encourage this;

- Develop a Cheshire West and Chester Low Carbon Fund to provide interest-free loans or investment for appropriate schemes. The loans should have a number of different pay-back methods such as on the sale of a house ([Kirklees](#)) or through a return on savings from energy bills. This should allow funds to be 'recycled' as opposed to grants schemes, where the money can be used once only. Contributions to start the fund could come from large businesses, the Council, energy suppliers or the sale of 'bonds' to residents. The structure could be based on similar schemes in Kirklees, on Woking's [Energy Services Company](#), or [micro-credit](#) schemes.

Funding

Funding for schemes should either be for one-off capital expenditure or to kick-start schemes that can be economically self-sustaining. Funding for community energy schemes could also come from a number of sources:

- Developers (new energy projects);
- CERTS (small renewables and innovative technologies fall under the remit of the CERTS for the energy suppliers).
- Interest-free loans. A Cheshire West and Chester Low Carbon Fund could finance a number of the initiatives in this document.

Benefits

As well as reducing carbon emissions, the recommended actions listed above will have the following benefits:

- Increased training, job opportunities
- Innovative technologies
- Community cohesion and pride.
- Increase the value of the housing stock and reduce fuel poverty.
- Be a flagship council for energy efficiency and community energy schemes. This will raise the profile of Cheshire West and Chester.

Achieving the vision: Community energy and energy efficiency

VISION	APPROACH	FIRST STEPS	KEY PLAYERS
<p>Best practice energy conservation</p> <p>All buildings in the CW&C area are carbon-neutral.</p> <p>Energy use and efficiency is optimised because every building has efficient energy control technology.</p> <p>Fuel poverty has long been eradicated in the CW&C area.</p>	<p>Conservation of existing energy resources before generation of new supply.</p> <p>Instigation of street by street schemes to insulate buildings and install heat recovery systems.</p> <p>Establishment of partnerships with businesses to upgrade the energy efficiency of commercial buildings.</p> <p>Use of financial incentives to promote energy conservation and recovery technologies in all homes and businesses.</p> <p>Working in partnership with suppliers, housing associations and communities to develop installation of energy management technologies.</p>	<p>Demonstrate effective insulation for a range of typical houses e.g. terrace, 1930s semi detached.</p> <p>Survey all dwellings vulnerable to fuel poverty and analyse their technical needs.</p> <p>Plan to finance the upgrading of all houses to above current building standards, including the introduction of novel financing for businesses and householders. Housing associations first.</p> <p>Use planning and tax policies to encourage refurbishment of private and commercial buildings.</p> <p>Review whether some very hard to insulate houses should be demolished.</p> <p>Provide information and advice to householders and commercial organisations, including landlords, and encourage minimum standards of energy sustainability.</p> <p>Work with communities to trial and develop a programme of smart metering and automatic demand side management across the area including tax incentives to encourage householders, businesses and landlords to adopt advanced energy management.</p>	<p>NWDA; Council; Housing associations; Suppliers; Householders and landlords; Communities; Businesses; Energy suppliers; Neighbourhood Energy Action; Energy Projects Plus.</p>

<p>Sustainable energy generation</p> <p>The energy demands in the CW&C area are provided by local, renewable and integrated energy systems.</p>	<p>Develop community energy schemes across the area using a range of technologies aiming to provide the 'after diversity maximum demand' for power and heat.</p> <p>Engage with communities, energy suppliers and business to develop community renewable energy schemes in existing homes and businesses.</p> <p>Develop planning policies for integrated renewable energy systems in all new developments.</p>	<p>Develop a strategic, time-bound strategy to support developments in Blacon and Ashton Hayes and their duplication across the area.</p> <p>Establish planning policies to ensure the inclusion of community renewable energy schemes in new developments and structural refurbishments.</p> <p>Ensure planning policy utilises waste heat and smoothes the profile of energy use by combining new business and domestic renewable energy schemes.</p> <p>Hold training for councillors and planners about best practice implementation of planning policy for renewables.</p> <p>Sponsor knowledge transfer through seminars, Internet and training for local homes and businesses.</p>	<p>CW&C; Businesses; Community groups; Energy suppliers; Distribution Network Operators; Energy Projects Plus.</p>
<p>Enabling funding</p> <p>The CW&C Low Carbon Fund has been an important factor in enabling all businesses to install and benefit from efficient energy conservation and renewable energy technologies.</p>	<p>Use contributions from large businesses in the CW&C area, energy suppliers, and Council funds to finance community sustainable energy projects.</p> <p>Make investment funding available for large and small energy generation and conservation projects.</p>	<p>Establish a negotiation board for obtaining funds from business, and earmark Council funding contributions.</p> <p>Establish criteria and frameworks for financing of projects, including loans, grants and investments.</p> <p>Set up an assessment board, made up of appropriate experts, to review applications and monitor projects.</p>	<p>NWDA; Council; Large businesses; Energy suppliers; Envirolink NW.</p>

Section 2. Transport and Accessibility – *localised, appropriate, integrated*

Overview

If energy security is to be achieved, Cheshire West and Chester needs a public transport system and a cycling and pedestrian infrastructure that allows the population to travel using considerably less carbon-based fuel. This will also reduce the isolation of poor or rural communities that at present can be socially excluded because of limited public transport available. The necessity for investment in public transport can be accompanied by planning policy that ensures access to commercial and social services without people having to travel large distances. Development should focus on both physical infrastructure and support and training to allow people to adopt different transport methods. Benefits will include reduced carbon emissions, social inclusion, safer neighbourhoods, a healthier population, better air quality, and enhanced biodiversity.

It is important to recognise that much mobility today is a less than satisfactory substitute for accessibility i.e. we do not need the journey itself so much as access to the resource. Reversing the programme of centralisation of schools, hospitals, separate retail 'parks' and industrial 'estates' (which are economic only because of cheap oil) would reduce the necessity for transport, and help make roads safer and more pleasant for pedestrians and cyclists.

In an era of perennially increasing fuel prices, individuals will want to minimise the number and distance of their journeys. The council has an interest in providing facilities locally. Out of town, retail developments are likely to suffer economic losses if customers shun cars for their shopping trips in favour of walking to local shops. It should be borne in mind that, although trains and buses are more efficient per passenger mile than cars or aircraft, they are still heavy users of fuel. We may legitimately ask where this fuel will come from, how much will public transport cost, and will it be sustainable?

Travel related to the location of new developments is an important factor in the carbon footprint of the area. Within existing planning policies wherever possible Cheshire West and Chester Authority should locate all new developments in areas that are accessible to pedestrians and bicycles and having good provision of public transport. This means not in 'out of town' developments. Large employers and developers should be required to have low total carbon travel plans and effective sanctions for non compliance.

There should be safe and easy-to-use provision for bicycles on all main roads, including roundabouts and junctions, as well as pedestrian and cycle routes on all points of approach to towns. In addition, pedestrian, cycle and locals-only routes

should be designated along or adjacent to country lanes where appropriate and in consultation with local residents. For example, there are many areas of Cheshire West and Chester where there are parallel roads. The more minor of such roads could be identified for designation as pedestrian and cycle and locals only routes. In these areas, butterfly and tree banks might be incorporated into traffic calming and can be built in cooperation with local schools. Cheshire West and Chester has large rural and semi-rural areas, and such measures would enable safer movement for cyclists and pedestrians. This could be counted as a large capital project.

Local communities can help in planning and design of routes and could provide some of the labour, thus promoting community participation while cutting costs. There are some good examples of urban streets that have been transformed by residents, who have redesigned them and done much of the work. A similar scheme could be extended to rural lanes as well as introduced in urban areas such as Chester and Ellesmere Port. Such projects should build on the Quiet Lanes initiatives and Sustrans' work with communities in the re-design of their streets.

A review of the freight infrastructure in Cheshire West and Chester should seek to establish central depots that can be fed by container trains and canal barges. Deliveries would be made by low-carbon vehicle, canal or river. Freight shipment and rail companies can be consulted over how best to use depots and infrastructure for efficiency and economy, perhaps focussing on areas such as Chester, Ellesmere Port, Northwich and Winsford. The Council can improve feasibility and share costs by working with other councils to develop the system over a wider area.

The Council should encourage companies to use and share video conferencing, and consider provision of such facilities in libraries. Some incentive or requirement can be developed for businesses to encourage their employees to car-share, use public transport, walk or cycle to work, and also provide information and changing facilities for employees. Champions for walking and cycling should encourage employees and businesses to participate.

Key steps

- Investment in the Cheshire West and Chester fleet could avoid substantial emission of CO₂. This should include purchase of electric and hybrid vans and cars, driver training for emissions reduction, selective use of locally-produced biofuels, and use of landfill gas for refuse vehicles. Funding could be sought from the Energy Saving Trust or Carbon Trust.
- Electrification of Chester-Crewe railway line. The new, hourly, diesel-only service between Chester and London involves 160 miles (Crewe-London) with overhead electricity supply. Network rail quote 193,000 bidirectional journeys in the Rail User Survey. Electrifying just 20 miles (Chester-

Crewe) would enable electric trains to be used for the Chester-London journey, thereby increasing the investment efficiency nine times. The change to an electric supply will save 1,112 tonnes CO₂ per year. The upper limit for electrification currently quoted by Network Rail is about £650,000 per single track kilometre, so the cost would be 20 x 1.6 x 2 x £650,000 = £41 million (train costs are excluded as it costs the same to hire either electric or diesel stock). This figure is well within the Local Transport Plan ball park for major scheme funding. Additionally, significant economic gains would be expected.

- Take steps to subsidise and in return increase co-ordination of bus services. The Council should work with bus companies to ensure that timetables are co-ordinated with each other and with train services, including provision of through tickets that are exchangeable among companies on the same route. This should be beneficial for the companies involved. Local communities should be consulted and involved in developing their services. High quality information on time-tables should be available on-line, in paper format and on real-time displays at bus stops. Buses should be required to make provision for carrying bicycles.
- Work with communities to introduce 20 mph speed limits across all but arterial roads for urban areas and villages. This measure will contribute to energy savings (by encouraging walking and cycling) and allow the whole population to benefit from a quieter, safer environment. Develop rural 'quiet lane' routes in conjunction with local communities.
- Introduce safe, traffic-free walking and cycling routes to schools, and encourage parental choice of local schools;
- Co-ordinate the cycling promotional schemes e.g. the Cycling Demonstration Town, Sustrans and Connect 2 bids, and improve infrastructure, awareness and training, particularly in conjunction with schools. Full-scale cycle and walking initiatives potentially can save between 200 and 600 tonnes CO₂ per year (See Appendix 1) and should be fully integrated into transport strategy. [Appendix 1](#) summarises potential climate change advantages of the Chester Cycle Demonstration Town project.
- Give advice on how people can get out of their cars in favour of public transport, pedestrian routes and cycling. This can be justified as a large capital project. Introduce bicycle pools for rent in Cheshire West and Chester, similar to those established in Velib, Paris where, for a small fee or deposit, a bicycle can be used from racks situated around the district and left after use at any other rack.
- A goods and passenger transport service, part-funded by shops and customers can be provided to accommodate shoppers' purchases in larger towns. Central depots could be established for later delivery of purchases

to rural areas of Cheshire West and Chester. For example, purchases made by shoppers in Chester could be taken to a central point for delivery to a collection point in their village (e.g. the pub). This type of scheme would make it easier for people to walk, cycle or take the bus as well as better facilitate the use of town centres. The delivery service might also take passengers.

- Pedestrianise city centre and shopping areas whilst providing cycle access. Surveys (Lipman 2008) show that already many shoppers do not use cars to get to shops and that streets busy with cars discourage shoppers. Such measures will support the future economic vitality of town centres. Further pedestrianisation of town centres will probably be broadly welcomed by shoppers.
- Introduce Pedicabs (bicycle rickshaws) for tourist transport in large towns as appropriate.

Achieving the vision: Transport and accessibility

VISION	APPROACH	FIRST STEPS	KEY PLAYERS
<p>Reducing the need for vehicles.</p> <p>CW&C recognises the important difference between mobility itself and good access to social, economic and environmental resources.</p> <p>The area enjoys reduced need for transport through better planning with high levels of walking and cycling.</p>	<p>Ensuring planning decisions fully incorporate the implications of punitive fuel costs.</p> <p>Using ease of access by non-car means as a primary concern in siting new developments and in planning roads.</p> <p>Finding ways to make new provision for walking and cycling in all urban and suburban areas by re-designating streets, and building new sustainable access and transport links.</p>	<p>Review planning policies to encourage reduction in travel, and support cycling and walking.</p> <p>Draw up accessibility maps to show distances travelled between home and industrial, retail and leisure destinations. Make plans to minimise these and enhance non-car access, reviewing measures for traffic reduction and calming.</p> <p>Consult local communities in planning decisions.</p> <p>Establish a working group to review the road network and identify roads for restricted access or closure to motorised traffic.</p> <p>Work with communities and operators to manage the transport and mobility landscape.</p> <p>Ensure all significant employers and organisations have enforceable travel plans and provide cycle facilities.</p>	<p>CW&C; Sustrans; Businesses; Regional partnerships; University of Chester; Community groups.</p>
<p>Increased efficiency</p> <p>Where the need for mobility exists, transport is fuel-efficient, easy to use, and integrated.</p> <p>Bus and train services are low CO₂, clean, efficient, and easy to</p>	<p>Working towards best practice for carbon efficiency of the CW&C fleet.</p> <p>Reducing the need for road traffic by developing non-road cargo routes.</p> <p>Encouraging reduced traffic into</p>	<p>Seek ways to convert Council and commercial vehicle fleets to low carbon alternatives.</p> <p>Seek funding for electrification of the Crewe to Chester railway line.</p> <p>Conduct an audit of freight movements in West Cheshire and devise ways to create a distribution 'hub' on a canal, river or train line in each large settlement,</p>	<p>CW&C; Businesses; Community groups; Railtrack; Rail operators; Bus companies;</p>

<p>reach.</p> <p>Council vehicles are low or zero carbon in operation.</p>	<p>retail centres to avoid duplication of freight journeys locally.</p> <p>Formulation of integrated public transport plans, to make journeys simple and efficient for users.</p>	<p>from which to distribute goods to businesses.</p> <p>Facilitate the establishment of companies to carry out home deliveries of retail purchases.</p>	<p>Freight operators; British Waterways; Enterprise agencies.</p>
<p>Provision of alternatives to the car</p> <p>Efficient and convenient alternatives to vehicle use are commonplace.</p> <p>Roads are quiet and safe. Residents 'own' their roads and feel safe to walk, cycle and play in them.</p> <p>Increased walking and cycling facilitates social interaction. Birdsong is often the predominant sound in suburban areas and villages.</p>	<p>Maximisation of road safety.</p> <p>Cessation of prioritising the car for personal transport, and accommodate other low-impact means of personal travel.</p> <p>Making a network of safe routes the primary choice for personal mobility.</p> <p>Formulating integrated public transport plans in order to make journeys simple and efficient for users.</p>	<p>Ensure that all new developments are within cycling and walking distance of basic amenities, and have good public transport links.</p> <p>Encourage employer cycle travel plans.</p> <p>In conjunction with local communities, review road speed limits for reduction to 20 mph, identify candidate roads for closure to traffic, and create safe mobility networks across CW&C.</p> <p>Review needs and create new links for pedestrians, bicycles, 'pedicabs' and buses, as well as 'human buses' for cycling and walking safely e.g. to school.</p> <p>Review public transport provision and make recommendations for its integration, including use of co-ordinated timetables among trains and buses, and use of 'whole journey' through tickets.</p>	<p>CW&C; Police Authority; Primary Care Trusts; Schools; Large and small businesses; Transport companies; Community groups.</p>

Section 3. Resource Management & Waste – *Conserved, managed, utilised*

Overview

Our current use of resources is inherently wasteful in terms of both energy and materials. The need to minimise both emissions of carbon and fuel costs demands a new look at our use and disposal of resources. It is anticipated that our economy and the well-being of the area's population is and will be increasingly vulnerable to disruption and absolute shortages of oil, electricity, tourists including race-goers, consumer goods, food, and jobs when compared with today's norms. While we can obviate many of these by use of recycling and renewable energy technologies, these are not panaceas enabling us to continue in the lifestyles we presently enjoy. Indeed, renewable energy generation itself relies on the availability of non-renewable resources such as silicon (abundant), indium (rare) and platinum (very rare), though new technologies are very likely to develop alternatives that are less dependent on scarce resources.

Whilst we should be seriously concerned about what the projections tell us, it is important to recognise that much of the problem is exacerbated by society's general reliance on long supply lines and globalised industry. Many analysts have not sufficiently considered the shaping influence of cheap fossil fuels. Without these, society would not be organised on the lines that today seem normal. If we can re-assess our needs with this anomaly in mind, it will be easier to adjust to future constraints. It follows therefore, that if we can find ways to (i) reduce our reliance on imported materials, and (ii) increase the local provision of goods and services, we will reduce our vulnerability to disruptive events outside our control. The extent of these changes, however, will be significant and is probably underestimated, e.g. records tell us that before the arrival of the internal combustion engine, the costs of quarrying and shaping stone could be less than those of transporting the stone just ten miles to the building site ([Hopkins](#) 2008). The authors of this report do not envisage a return to such times, but the shaping influence of fuel restrictions is unlikely to be insignificant. Handled properly, this could also result in a net economic benefit and increased quality of life for the people of Cheshire West and Chester.

There will be direct constraints on resource use as external supplies are reduced or become too expensive to continue in ways we have become used to. This is very likely to lead to changes in the pattern, not just the availability, of raw materials consumption, and therefore to a re-assessment of our local resources in the area. The chief of these is land, from which we can obtain stone and clay, and on which we can grow crops. It will be beneficial to make the most of geological and soil maps in planning in order to ensure the cheapest availability of resources if proximity becomes a major consideration in civic design.

Importantly, land may increasingly become an important constraint as more is obtained from it. Perhaps an early step could be to examine and extend the GIS database of Cheshire West and Chester.

Wastes minimisation, recycling and re-use

Optimal use of energy and physical resources will bring renewed economic pressures to use materials more than once. Life cycle assessment will enable comparisons of materials uses, so that wastes may be minimised, and arisings can be designed to feed into the production lines of other goods. Cheshire is currently one of the highest producers of waste in the UK. In 2007/08, Cheshire generated 567 kg of household waste per person and 744 kg of residual waste per household. During the same period, Cheshire recycled 41% of the household waste collected at the kerbside and at Household Waste Recycling Centres. By comparison, the area of Cheshire covered by the new Cheshire West and Chester council recycled 40% of household waste (Cheshire County Council, personal communication). The costs of ultimate disposal of wastes, already high, will add to the losses incurred through their lack of recyclability, leading to a general decline in the production of materials that cannot be recycled, except in special cases where alternatives are not available, which will be expensive. The option of incineration with energy recovery will be present, but if there is a general shortage of raw materials, burning them is not the most efficient or beneficial option while other sources of energy exist. Costs-benefit analyses of Energy from Waste (EfW) show that the replacement of materials combusted in EfW incinerators typically uses more energy than is generated by the incineration process ([FoE 2007](#); [Defra 2007](#)). The rapid deployment and comparatively benign nature of renewables as sources of energy can be expected to remove the pressure for incineration of material resources for energy generation.

Today amongst the public there is resistance to recycling, and an apparent love affair with weekly collections of unrecycled materials. It is likely that this view is influenced by the fraction of putrescible wastes, which are not currently collected separately. As resources become scarcer, we expect the position to change. Awareness-raising amongst the public for waste minimisation and re-use can be given a higher priority, so that the public are aware that they are expected to behave thoughtfully. Home composting may rise in popularity in tandem with the current renaissance in gardening.

A lot may be gained from encouraging a type of local closed-loop recycling where the waste material is used within the locality it originated from. This will depend on large organisations such as the Authority buying products made from local recycled materials. The current requirement for letting and specifying contracts within the public sector means that these specifications must be written into tenders. As the cost of fuel increases, a closed loop for higher value recycling routes may become viable. The existing large-scale manufacturing facilities on Cheshire's doorstep mean that investment in small scale local manufacturing from recycled materials is unlikely to be economic until resource restrictions change the economic dynamic.

Key steps

- Explore use of local building materials for development e.g. clay, reeds, wood, and stone, which could be introduced into planning policies and council advice;
- Encourage local manufacture of furniture, windows, fittings etc. from locally sourced wood;
- Encourage and support the repair-friendly design of products, especially items like tools and furniture;
- Support the local recycling of all materials;
- Restrict or tax non-recyclable raw materials and those that produce hard-to-manage toxins. Develop an ethos of waste management;
- Discourage the use of non-repairable products and non-recyclable materials, perhaps by supporting legislation or taxes to reflect the additional costs they impose on waste management;
- Establish a procurement requirement (with exemptions) for resource materials to contain a minimum percentage of recycled materials e.g. new paper must contain minimum 30% recycled material. Guidance can be had from events such as '*Greening The Supply Chain: Sustainability versus Value for Money*' ([Public Service Events](#) 2009);
- Encourage the use of recycled materials in manufacture;
- Support local community energy production e.g. solar electric, solar thermal, wind, water, tidal, biomass (see [Section 1](#));
- Support domestic energy sources e.g. solar electric, solar thermal, wind, heat pumps, biomass (see [Section 1](#));
- Support local food production, including a reduced meat component (see [Section 9](#));
- Minimise waste arisings by awareness-raising and encouragement of household and street-scale campaigns;
- Support organic waste management, including putrescibles in local-scale, mostly domestic composting;
- Design for low energy consumption e.g. passive solar gain in cold seasons, solar cooling in summer, proximity of work, home, retail and leisure to reduce the necessity for long journeys (see [Section 6](#));

Achieving the vision: Resource management and waste			
VISION	APPROACH	FIRST STEPS	KEY PLAYERS
<p>Low embodied energy</p> <p>A significant proportion of the raw materials used in local manufacturing and building, including timber, stone, clay and insulation materials are produced in the CW&C area by local companies. This has drastically reduced the costs of transportation and the embodied energy in buildings and goods.</p>	<p>Use of Life Cycle Assessment to estimate the fuel elements of the environmental and economic costs of raw materials, secondary materials and imported goods.</p>	<p>Conduct energy and environmental audits on a range of materials used or potentially to be used in building and manufacture in West Cheshire.</p> <p>Commission feasibility studies into growing, extracting and recovering materials locally to substitute for imports.</p>	<p>CW&C; Businesses; Energy & mining consultants; Colleges; University of Chester.</p>
<p>Local markets</p> <p>Rates of recycling are maximised and disposal volumes minimised by means of strict standards and effective local markets for recycled materials, and there is a thriving repair and renovation industry.</p>	<p>Creation of markets for goods made from secondary materials to avoid 'recycling mountains'.</p>	<p>Instigate a 'product miles' labelling scheme to identify local and imported goods.</p>	<p>CW&C; Businesses; University of Chester.</p>
<p>Integrated and holistic design</p> <p>Good design ensures that local waste arisings are low and managed for maximum value within the area, using recycling, composting and energy and materials recovery technologies such as pyrolysis.</p> <p>These initiatives are a valuable contribution to the economy in terms of increased revenue, reduced costs and job creation.</p>	<p>Use of new technologies e.g. anaerobic digestion and biochar for organic waste control with energy recovery.</p>	<p>Review the composition of the residual waste stream and reduce these materials in purchased products, e.g. by a labelling scheme.</p> <p>Remove from procurement lists those products made from unrecyclable materials, and encourage other organisations to do so.</p> <p>Establish minimum recycled content rules for Authority procurement.</p> <p>Lobby national government for strict standards on products to ensure they are repairable and recyclable.</p>	<p>Wrap; Waste Management Authority; CW&C; Manufacturing and retail businesses; Colleges; University of Chester.</p>

Section 4. Engaged Communities – *reduced dependency and increased well-being*

Overview

The response to climate change could bring significant advantages to communities in terms of well-being and social cohesiveness. It will be essential to ensure maximum efficiency in manufacture and distribution of goods and services and in the delivery of public services so that opportunities are available equitably. At the same time, largely due to the cost of transport, a greater emphasis will be placed on local arrangements and the need to provide more personalised support services to an increasingly older and relatively stable population.

Communities will benefit from being cohesive and viable economically, environmentally and socially. Decision-making is expected to be based more on subsidiarity (decisions made at the lowest possible level at which it is appropriate to make them). Therefore services should become more decentralised and sensitive to local needs, with Local Authorities taking up a more facilitative role. Local services and resources are likely to be managed more by local people working in partnership with agencies and based upon the findings of local research, and the role of local community groups should increase, assisted by coordinating groups such as the [Cheshire and Warrington Sustainability Alliance](#), the [Transition](#) movement, the [Low Carbon Communities Network](#), and the [Free Economy Community](#) (see references). Local political structures at neighbourhood level (Parish or Town Councils) will be able to link with the broader strategic political decision-making body of Cheshire West and Chester, where issues require a broader approach (e.g. transport). Citizenship education and lifelong learning will reflect these changes, and there will be more informal education.

The Sustainable Communities Bill makes provision for services, including for socially excluded groups, to be able to reflect local needs more accurately. An increased level of income generation locally can be used for community regeneration, local job creation and local services. In the coming decades there are likely to be strong local rural and urban communities, and creation of local employment opportunities specifically related to climate change (e.g. installation of insulation in the short term, as well as local energy generation technologies and services). Links between rural and urban areas will strengthen, e.g. through greater availability of locally-grown food.

The powerful economic pressures on councils sometimes can lead to an apparent loss of direction in which the interests of local people become secondary to gaining revenue. A case in point is Chester, the county town of Cheshire, the centre of which has no cinema, concert hall or theatre, but instead a multitude of

bars and dance clubs, the result being virtually a no-go area on Friday and Saturday evenings for most residents except clubbers and the police who have to monitor them. This situation must be close to the opposite of what an engaged community should be. In terms of local regeneration the Council could take the Odeon cinema, currently standing idle, into community ownership, to show old films rather than blockbusters, and sell food and non-alcoholic drinks. This would bring OAPs, students, young parents and others into the City centre during the day and evening and provide a service where none exists.

Working patterns are likely to become more flexible as energy becomes less available, with more people working from home or in localised office buildings and workshops. Buildings will be well insulated, reducing fuel poverty and demands for heat and cooling, which are particularly important for older people. Public transport, with increased reliance upon rail, and possibly water, will reflect the importance of local social bonds as travel becomes less necessary. As costs involved in travel and transport of goods rise, the importance of local businesses and amenities is likely to grow, leading in turn to a revitalisation of local employment e.g. small industry, Post Offices, pubs and shops. This relates especially to the re-inclusion of rural and suburban communities in economic life, and benefits an aging population. There will be additional effects on family patterns, and extended families are likely to become more important as the facility for cheap travel is reduced. Experiments in communal living and working will probably develop. For example, existing tower blocks could be re-developed with separate floors for working, private accommodation and communal facilities. Increased social bonds are likely to lead to a decrease in crime and disorder, freeing up local expenditure ([Papworth 2006](#)).

Many aspects of this vision are captured by the term 'Co-production' ([Stephens et al. 2008](#)), a concept referring to the mutually supportive relationship that can develop between service providers and their clients for the benefit of both, and the unrecognised social and economic benefits to society that accrue from personal, unpaid, relationships in society i.e. the so-called 'core economy' ([Stephens et al. 2008](#)). Service users are encouraged to take personal responsibility for their needs by being given opportunities for personal growth and development and are treated as assets rather than burdens on an overstretched system. Public agencies become catalysts and facilitators rather than just providers. By devolving real responsibility, leadership and authority to users, self-organisation and empowerment rather than direction from above is encouraged.

Key steps

Many of the areas described above are covered in other areas of this document. However there are many small facilitating actions that will significantly encourage community action.

- The council can actively encourage low carbon action at a community level

through parish councils, low carbon action groups and forums. Already there are groups in Ashton Hayes, Blacon, Broken Cross (Northwich), Upton and Tarporley, Tarvin, Tattenhall, Westminster and Whitley backed by community-based groups such as the [Low Carbon Communities Network](#) and academic initiatives such as [CRed](#). The Council should help facilitate the sharing of information and contacts among such groups by providing meeting places and start-up advice. It should benefit from their use as means to consult on areas such as public transport, cycle and pedestrian facilities, and low carbon energy generation. Incentives such as small grants or discounts for active participation by communities ought to be considered. It is important that such groups are open and democratic. The Council can help provide access to advice on structures to ensure that groups are inclusive and well governed;

- Localisation of initiatives such as energy and transport are described in [Section 1](#) and [Section 2](#). In addition, the council has a role in facilitation, while local companies can actively engage in information sessions for local communities and schools. As communities develop to be sustainable as has begun in Ashton Hayes (rural) and Blacon (urban; [Appendix 3](#)), they should provide test beds and case studies from which others can learn (e.g. in the use of low carbon and energy generation technologies);
- Volunteering improves mental health and community cohesion. The Council can build on the volunteering organisations already present in the area and learn from their experiences. The Council can help in providing on-line information on the skills needed and how to get involved;
- The central importance of viable and interactive democratic communities for attainment of health, well-being and social inclusion objectives should be a core part of schooling and all forms of education. Suitable 'Quality of Life Indicators' ([NEF 2009](#)) can be determined locally. The Council is in prime position to facilitate this in line with the practices of 'community schools' in other authorities. School curricular activities can involve working in social projects such as in old people's homes, community gardens, and similar situations, which lead to tangible benefits for education as well as for the Authority and the charity sector. Provision of adult education, sport and social activities can be made at day school premises, which otherwise may be empty in the evenings, bringing more adults into education and assisting with government 'widening participation' objectives. This in turn can enhance parental support and involvement with their children's education;
- Increased community and individual activities should occur in an environment where experimentation and initiative are encouraged. Examples of how the Council can facilitate this are:
 - supporting allotments infrastructure and management associations, providing flexible contracts and encouraging diversity in plots;
 - supporting initiatives to engage people in food production such as in community farms or within the urban environment.

- supporting small local businesses through allocations in planning strategies for small workshops;
 - supporting market stalls, as well as in training opportunities and market research, perhaps using the government's proposed revenue-neutral incentive scheme;
 - further encouraging recycling via tax rebates;
 - providing information to all householders on local re-use schemes such as the Blacon Furniture Project, Freecycle or eBay;
 - encouraging walking and cycling to school by making roads safer, developing walking and cycling groups, and cycle training;
- The Sustainable Environmental Education Network ([SEEN](#)) was established in Chester some years ago and the new authority should be encouraged to embrace its principles and adopt it at an appropriately larger scale. It succeeds by putting schoolchildren in touch with local environmental issues as described to them by professionals and organisations who are charged with solving the challenges in real life. It allows the children to understand the issues and propose their own solutions. This gives a potentially lifelong encouragement to children to engage positively with their environment and it works exceptionally well to bring their parents attention to the subject.

Achieving the vision: Engaged communities

VISION	APPROACH	FIRST STEPS	KEY PLAYERS
<p>Social inclusion</p> <p>CW&C has low levels of social exclusion, low levels of isolation, high levels of well-being, and high levels of community participation and pride.</p>	<p>Development of localised neighbourhood management through use of Parish and Town Councils, area forums and community groups and networks.</p> <p>Local determination of service provision.</p> <p>Promotion of volunteering.</p>	<p>Establish locally-determined Quality of Life indicators.</p> <p>Identify needs locally.</p> <p>Establish a baseline inventory of community groups and initiatives and an on-going directory of volunteering opportunities.</p> <p>Promote and support community groups and initiatives, linking them with schools and the local neighbourhood management network.</p>	<p>Community Management Boards;</p> <p>CW&C;</p> <p>Devolved budgets;</p> <p>Western Cheshire Primary Care Trust;</p> <p>Third sector;</p> <p>Job Centre Plus;</p> <p>University of Chester.</p>
<p>Low carbon communities</p> <p>CW&C is an area where everyone has the opportunity to be part of a cohesive low-carbon community (Section 5).</p>	<p>An all-sector approach to supporting low carbon community groups.</p>	<p>Commission a review of best practice examples of successful multi-sector support initiatives.</p> <p>Disseminate and promote best practice findings to encourage wide and participatory uptake.</p>	<p>CW&C;</p> <p>Third sector organisations;</p> <p>University of Chester;</p> <p>Colleges;</p> <p>Private sector;</p> <p>Low Carbon Communities Network;</p> <p>Cheshire and Warrington Sustainability Alliance</p>
<p>Physical infrastructure</p> <p>The low carbon lifestyle is built-in to West Cheshire's infrastructure.</p>	<p>Modify the physical environment to reduce embedded carbon emissions and to promote low carbon living.</p>	<p>Draw up plans for enhancing allotment sites, low carbon community meeting areas and other community facilities.</p> <p>Conduct a feasibility study into the creation of collection and distribution centres for locally-</p>	<p>CW&C;</p> <p>Western Cheshire Primary Care Trust;</p> <p>Food producers,</p>

		<p>produced food, and frequent, reliable low-carbon food transport systems between rural and urban areas.</p> <p>Increase provision for safe cycling and walking routes within communities, and improve public transport (Section 2).</p>	<p>wholesalers and retailers; Third sector organisations; Transport providers; Waste organisations.</p>
<p>Education and awareness raising</p> <p>Good energy sense is learnt at an early age and is inherent in schooling, further education, and business courses.</p> <p>Householders, landlords and businesses are well-informed and well-advised on energy issues.</p>	<p>Ensure issues of sustainability are given equal weight to the three Rs and equal importance to health and safety i.e. they underpin all decisions in school, college and university strategies.</p> <p>Include energy and sustainability as core parts of business and economic strategies.</p> <p>Provide practical and positive messages of good energy advice to all householders and businesses.</p>	<p>Review the sustainability elements of all subjects in schools and further education, and amend them to include energy and sustainability aspects of each subject.</p> <p>Define minimum standards for environmental and social sustainability in education and require statements of compliance from all educational institutions.</p> <p>Review and design an advice programme for food production, local democracy, and energy use throughout the area.</p>	<p>CW&C; Media; Education establishments; Energy Saving Trust Advice Centre & Energy Projects Plus; Businesses; Third sector.</p>

Section 5. Low Carbon Economy – *integrated, sustainability focus, carbon accounting*

Overview

The need for an environmentally sustainable economy has been widely advocated and its economic benefits identified, not least by ([Stern](#) 2006) and ([Turner](#) 2007). Sustainability should become a fundamental criterion for economic decisions, equal in fact to profitability. It is anticipated that a carbon free or low carbon energy and transportation replacement for fossil fuels will not be as widely available in 2050 as fossil fuel-based technologies are now. Therefore, despite increased energy efficiencies, more accessible and amenable public transport and a growing use of alternative transport (walking, cycling), the emphasis will be on finding ways to reduce use of fossil fuel, including by reducing imports and on shorter supply chains within a more integrated and inter-dependent local economy where goods and services are provided from sources as locally as possible. The need for this is illustrated by present import and export patterns. For example the UK imports 64,000 and exports 32,000 tonnes (t) of poultry annually to and from the Netherlands. It also imports and exports from the Netherlands respectively 240,000 t and 195,000 t of pork, 125,000 t and 102,000 t of lamb and 126 million t and 270 million t of milk ([Lucas](#) 2001). In 2006, the UK sent 21 t of mineral water to Australia and brought 20 t back. We exported 900 t of full-fat milk powder to Germany and imported 800 t from Germany. The large, two-way traffic of beer between Spain and the UK is similarly closely balanced ([Simms and Johnson](#) 2007). Shorter supply chains will bring about local diversification of employment and services, with longer distance transportation bringing in largely what cannot be provided locally.

Accounting for carbon use will become integral to a low-carbon economy. Within a global framework such as Contraction and Convergence ([Meyer](#) 2000), carbon trading and rationing is likely to be essential ([DTQ](#) 2004), perhaps using a carbon swipe card for purchases.

Central to local economies is the re-circulation of money. In situations where there is a high proportion of independent local businesses compared with national and multinational companies, wealth generated locally circulates repeatedly within the local area, increasing total wealth. It continues to increase wealth locally until it leaves the local economy and enters the global economy. Economists call this effect the 'local multiplier', and it is of key importance in creating a buffer between the local economy of Cheshire West and Chester and the globalised economies that have shown considerable volatility in response to external and often remote forces. Here again, the Sustainable Communities Bill can be put to useful effect.

In the CW&C area, there are a number of large employers at risk from the

impacts of climate change, with consequent risks to the local economy, as well as substantial numbers of commuters moving across, into and out of the sub-region every day (CWEA 2009). With the rising costs of fuel and transport, we envisage a greater proportion of locally-based, small companies generating income that will remain in circulation locally, funding community regeneration, local services and further local job creation. This will provide opportunities for local financial investment through the development of new private and social enterprises. There will be creation of local employment opportunities specifically related to climate change adaptation and mitigation. Locally-based credit systems will be more popular, providing opportunities for community businesses and local re-investment.

The use of locally generated renewable energy from small and large-scale projects will be integral. This area is dealt with separately in [Section 1](#).

Reliance upon the internet for business will grow, and video conferencing rather than reliance upon individual travel will be commonplace. Working patterns will be more flexible with more people working near home. There will be more local goods and services with a stronger local supply chain based around transportation and distribution hubs, and rural communities will each have local retail and distribution services on a coordinated basis. The area will capitalise on its reputation for innovation supported by local training and education in new skills (e.g. energy efficiency and renewable energy technologies), and there will be more local manufacture and assembly. The probable decline of current forms of tourism because of travel costs might be alleviated by development of more local tourism.

More and repeat use will be made of local natural resources e.g. for food production, coppicing for wood and energy crops, and timber and reed production. A local carbon offsetting scheme can be developed. While waste will be minimised, there will be a growth in repair workshops and an increase in manual jobs. Landfill sites, once methane emissions are successfully managed, will be mined for valuable materials ([Hogland *et al.* 2004](#)) and reuse and remanufacture of materials which currently go to waste will increase significantly. Farming will be for local needs mostly, with export remaining important but less so. There may be new opportunities e.g. local fish culture. A greatly increased proportion of the workforce is likely to be involved in food production ([Wright 2008](#)).

Adapting Cheshire's economy in the next few years will not only reduce carbon emissions but increase sustainability, making it strong enough to withstand many of the effects of the changing climate. It will create jobs that will be needed to prepare society for the coming changes, e.g. energy efficient housing, renewable energy and locally produced materials. It will encourage industries able to survive the constraints and seize the opportunities presented by the impacts of climate change, and these will especially benefit the poor. As illustrated by the [New Economics Foundation \(NEF 2009\)](#), the poorest in society will be most affected by a decline in the economy owing to climate change as well as price

hikes in energy, food and transport. Thus by creating a low carbon economy, CW&C can make great inroads into tackling both poverty and climate change. Likewise the TUC has called for a just transition to a low carbon economy to safeguard jobs. One scenario predicts 50,000 job cuts in the steel industry and 8,000 in the cement industry due to environmental legislation (both significant for CW&C). These could be replaced by new low-carbon manufacturing jobs. Germany already has 249,000 people employed in the renewable energy sector, with a turnover of 24 billion Euros compared with the UK position where 7,000 employees generate a turnover of 360 million Euros ([Just Transition 2008](#)).

Since Cheshire West and Chester is intimately linked to the world economy, there are limits to the ability of local communities and the council to manage local economies; however, it is feasible that this position may change decisively if the globalised economy meets continuing and insurmountable challenges.

The Gross Value Added per head (i.e. the contribution to the economy of each individual) in Cheshire and Warrington is higher than the national average, but the area has an ageing population (see [Cheshire and Warrington Economic Forecasts](#)). In addition, the Gross Value Added per head across the north-west as a whole is below average, with significant levels of unemployment and low productivity. Although the economy has begun to grow in the North West, without adaptation the danger is that climate change will bring about a serious decline. Local authorities have certain 'levers' that can be used to influence and direct the local economy. These are:

- Education and training
- Public financial support
- Attracting inward investment.
- Providing infrastructure (measures for energy and transport are covered in [Section 1](#) and [Section 2](#))
- Provision of incentives
- Public procurement

Key steps

Most of the aims of the [Northwest Regional Economic Strategy](#) and the targets for Cheshire and Warrington can be achieved whilst adapting to a low carbon economy. For example:

- Reducing unemployment can be driven by training and education in low-carbon skills such as energy efficient building, installation of renewables or waste reduction and recycling. Training should focus on deprived areas;
- Targeted financial support and attracting private investment to create the required numbers of new companies in low carbon technologies and skills;
- Improving the productivity per head of population by reducing waste in

businesses, improving the energy efficiency of their buildings and reducing transport distances;

- Creating long-term sustainable jobs and companies in new technology fields to attract younger employees to the area ([CWEA 2009](#)).

There are some notable exceptions, e.g. rather than increasing the motorway capacity, CW&C should enhance rail links and bus networks (see [Section 2](#)). As well as reducing carbon emissions, this will enable the poorest to access jobs.

- Ensure that CW&C procurement policy prioritises purchase of materials with low carbon footprints in both embodied carbon and energy consumption. Wherever possible local products should be selected. Other government bodies, private organisations and community organisations should be encouraged to do likewise;
- Establish a new reduced local business rate for businesses that invest in energy efficiency, renewable energy and sustainable resource practices. Build on existing energy and advice from national organisations such as the [Carbon Trust](#) and [WRAP](#) to provide comprehensive advice to business;
- Focus public financial support for businesses concerned with low carbon technologies and services as well as more traditional business operating in a low carbon manner, and focus on local markets. Target deprived areas such as Blacon and areas of Ellesmere Port. The assistance should also include business advice and mentoring;
- Communities, business and the Council can establish prizes for 'green companies' and establish a list of local sustainable companies;
- In the interests of social cohesion and a low carbon economy, a regulatory and planning framework could be developed to support locally-owned businesses and their employees as a defence against the unequal power of monopolies;
- CW&C has a high adoption of broadband. The Council can build on this to encourage the development of new communications technologies in conjunction with local businesses;
- Establish training programmes at all levels in low carbon manufacturing and services. This should be targeted particularly at deprived areas and segments of the population at risk of unemployment, such as ethnic minorities and single parents or those transferring out of polluting industries. There should also be a focus on ensuring that a significant proportion of those with higher education qualifications have qualifications related to building a low carbon economy. This should be linked to a College of Sustainable Construction Knowledge and Skills as described in Section 6.

Achieving the vision: Low carbon economy

VISION	APPROACH	FIRST STEPS	KEY PLAYERS
<p>Education and Training</p> <p>The CW&C area is characterised by a high proportion of its population having skills appropriate to the functioning of a low carbon economy.</p>	<p>Stimulation of both the provision and the uptake of training and education in e.g. building insulation, low carbon energy technologies, production and processing of natural resources, and the reuse and recycling of materials.</p>	<p>Carry out a detailed review of existing and required skills and knowledge.</p> <p>Encourage and support the provision of education and training at all levels of the education sector and provide incentives for the uptake of opportunities such as apprenticeships, bursaries, and work placements.</p> <p>Support the establishment of a College of Sustainable Construction Knowledge and Skills.</p>	<p>CW&C; Schools; FE Colleges; University of Chester; Chamber of Commerce; Local businesses; Cheshire and Warrington Social Enterprise Partnership (CWSEP).</p>
<p>Public Financial Support and Inward Investment</p> <p>CW&C is recognised for the high standards of sustainability that it encourages through its funding support programmes, which attract additional inward investment.</p> <p>A significant proportion of turnover in the area's economy comes directly from the development and production of low carbon technologies and the provision of low carbon services.</p>	<p>Proactive support for all aspects of the low carbon sector via funding instruments and the attraction of private-sector inward investment.</p>	<p>Define the categories of activity that are regarded as specific to developing a low carbon economy (Carbon Trust definitions could form a useful basis).</p> <p>Set up a panel to develop specific funding programmes with the NWDA and CWEA, aimed at new companies and projects, or the development of products in the low carbon economy.</p> <p>Apply minimum standards for energy efficiency and resource management for companies, and projects supported by CWEA & CW&C.</p> <p>Support and publicise incubator sites for low carbon businesses.</p>	<p>Chambers of Commerce; CW&C; Cheshire and Warrington Economic Alliance (CWEA); NWDA; EU; CWSEP.</p>

<p>Providing Infrastructure and Incentives</p> <p>The infrastructure within CW&C is designed to facilitate the low carbon economy, which is further encouraged through the targeted application of regulations and incentives.</p>	<p>Guidance of infrastructural development using the principles of sustainability.</p> <p>Encouragement of increasing levels of sustainability throughout all sectors of the economy, achieved through the phased introduction of standards, themselves applied via funding and support instruments.</p> <p>Institution of a system of positive incentives and rewards for low carbon and sustainable businesses and activities.</p>	<p>Plan new and adapt existing developments to minimise transport distances and maximise interactions among related and co-dependent sectors of the economy e.g. via 'green' business parks and communications technologies.</p> <p>Develop and apply standards to support programmes covering energy efficiency of buildings, reuse and recycling of materials and sustainable sourcing of resources.</p> <p>Introduce a new, reduced local business rate for businesses that invest in energy efficiency, renewable energy and sustainable resource practices.</p> <p>Develop 'green company' prizes and a green company list for the area.</p>	<p>CW&C (economic development, planning and building control); Private developers; Chambers of Commerce; CWEA; CWSEP.</p>
<p>Public Procurement</p> <p>CW&C is recognised for the sustainability of its procurement policies</p>	<p>Establishment and application of rigorous procurement policies characterised by high standards of sustainability throughout all areas of activity.</p>	<p>Prioritise the purchase of goods and services with low carbon footprints (in terms of both energy consumption and embodied carbon) and encourage other businesses and organisations to do likewise.</p>	<p>CW&C (all departments); Local businesses and organisations.</p>

Section 6. Development and the built environment – *mixed tenure & use, affordable, adaptable and energy efficient*

Overview

The built environment is where we live; it goes to the core of who we think we are, and we are very interested in how it looks and works. According to [Girardet \(1999\)](#), people want clean air and water, healthy food and good housing, quality education, a vibrant culture, good health care, satisfying employment or occupation, safety in public places, supportive relationships, equal opportunities, freedom of expression, and to meet the requirements of the young, old and disabled people. Increasingly, as resource costs rise and the effects of climate change become more evident, we will need innovations in architecture, buildings construction and standards, integral energy generation, local structure plans, and urban planning that prioritises accessibility over transport, all of which will contribute to the closer integration of the built and human environments. Gone are the days when we could consider separately building design and choice of materials, transport distances, and energy use, and we are likely to see an increasing return to the use of local stone, wood and other natural materials for building rather than specialist materials manufactured and imported from far away. That is not to say that building design need be constrained by these materials, but design will not be able to rely on high embodied energy in construction without specific need. High transport costs will mean that transport infrastructure is almost certain to evolve to cater for a different balance of vehicle types to that seen today.

There is one condition above all that should underpin the local mitigation and adaptation responses to climate change in the built environment. Unless there is some dramatic, unpredictable calamity or a radical and unforeseen demographic change in the population of Cheshire West and Chester then, by extrapolation from historic rates of construction, something like 80% of structures and 90% of the entire spatial infrastructure of the area at the target date of 2050 is already in existence today. National regulatory measures will inevitably have impacts on building industry performance in terms of compliance in new construction. So the major local challenges for Cheshire West and Chester will be [i] to encourage the conditions for moderation or adaptation of its existing building stock by reinforcing and supplementing national measures and [ii] researching and evolving improvements to spatial infrastructure.

The following steps illustrate a potential strategy to address constructively the local manifestations of the global crises, and outline the efforts we can make to mitigate our contributions to them.

Key Steps

- Assessment of the urban and rural geography of Cheshire West and Chester, its assets and particular characteristics in a geographic context. This can include the production of a spatial urban design strategy for sustainable living in the area;
- Mechanisms for achieving change include:
 - Measures – barriers (proscriptive legislation), hurdles (prescriptive legislation) or incentives (economic and other inducements);
 - Market transformation (the local interpretation of national or global trends);
 - Behavioural change;
- All three of these have particular characteristics at a local level and it would be sensible for the new Authority to consider generic strategies to encourage each one, particularly in the field of development and the built environment;
- Development planning should consider the particular local sustainability strategies and agencies (as distinct from central government measures and legislation) that can bring about change e.g. Local Development Framework and development control; educational initiatives; trade association initiatives; retail outlet programmes; school programmes etc. Formulation of communication strategies and means of dissemination e.g. Local Strategic Partnership (LSP), Primary Care Trust (PCT), large retailers such as Tesco, Sainsbury's, petrol companies etc. A sound knowledge of baseline information and the promotional value of surveys can be used to formulate locally relevant planning policy;
- Low energy or eco show houses with low embodied energy, insulation strategies, built-in renewables, future-proofing measures including charging bays for electric cars, energy metering with real-time transport information capability etc. can be provided as part of a region-wide education and information service to the public, architects, developers and service industry personnel. This can form part of a general awareness-raising and motivational strategy to kick start the inception of sustainable planning and building programmes across Cheshire West and Chester. It will be important to adopt best practice for energy conservation;
- Commercial buildings to be retrofitted with insulation and low-energy heating controls according to current best practice for energy efficiency and conservation. Active and passive renewable energy to be integral to building and refurbishment design and a condition of planning consent;
- There is great potential for working with local housing associations and community groups to set up group schemes to, for instance, externally

insulate rows of terraced housing (where external rather than internal fabric insulation is appropriate). There also should be opportunities for the conservatory market to include solar and photovoltaic installations. There already exists the technology to apply these sensitively to listed buildings and those in conservation areas;

- There are many opportunities for planning to influence the sustainability of new development, covering issues such as short parking bays, remote parking, cycleways, 'no car ownership' developments with car pools, planned-in waste heat mains, recycling facilities, community combined heat and power (CHP) schemes, charging bays etc. We stress the importance of the Building for Life guidance published by the Commission for Architecture and the Built Environment, the Green Building Council, and the House Builders Federation;
- It is essential to design-in sustainable urban drainage systems (SUDS) in order to separate industrial from domestic wastes, and to allow the drainage of rainwater to the ground, perhaps using wetlands. Building can be designed to capture water from roofs for re-use on the premises, thus saving on treatment and transport costs. All but drinking water could be provided by these 'grey water sources'. The council should engage with local water companies to achieve innovative water saving measures in building design (see [Section 10](#));
- Development should be encouraged that has designed-in flexibility to respond to a variety of potential energy-generating or conserving technologies that are likely to emerge strongly in the next decades. It runs counter to experience that we can predict accurately which technologies will be pre-eminent in the next decades. The only thing we can say with some certainty is that electricity will continue to power our world and that its primary fuel supplies will include less fossil fuel and more renewables, probably from a wide spectrum of sources);
- Although the following are likely to arise via national regulatory measures, it is worth noting that institutional, commercial and industrial buildings could be at the forefront of the introduction of low-energy and environment-friendly design. With immediate effect, new guidelines can require energy, embodied energy and environmental performance reports, which should be used to evaluate construction and running impacts on the environment. Stricter environmental criteria can incur additional costs in construction, but these are typically outweighed many times by the gains in lower running costs and wider environmental impacts;
- One potentially significant local development that could spearhead all our efforts in this direction is the creation of a College of Sustainable Construction Knowledge and Skills (such as that announced for London by Boris Johnson in March, 2009). This could, given appropriate ambition and resources, be an autonomous institution, but more likely and practical

would be that it is a new faculty developed under the auspices of either the University or a college of Further Education or both. A strong candidate for its location would be Blacon. Traditionally, Blacon is home to an extraordinarily rich resource of skilled construction workers and it would both build on this craft tradition and provide valuable local employment, short journey travel and widening scope to Blacon's economy.

Whilst commercial development should be funded by business, the establishment of a fund for 'green developments' as described in [Section 1](#) could help finance community actions and measures to improve the existing building stock. Pump priming of the fund could be from a mixture of local business, energy suppliers, council and grant funding. The funding could be in the form of zero or low interest loans with a variety of pay back schemes as appropriate. For example a proportion of the savings on energy bills could be returned to the fund or the loan repaid when the building is sold.

Achieving the vision: Development and the built environment

VISION	APPROACH	FIRST STEPS	KEY PLAYERS
<p>Market transformation</p> <p>CW&C has developed strategies that have resulted in the convergence of consumer demand and behaviour with the supply of both sustainable new construction and services connected with sustainable refurbishment.</p>	<p>Support the establishment of beacon buildings in key neighbourhoods and commercial districts.</p> <p>Establish energy advice centres in key locations.</p>	<p>Start by establishing a <i>Beacon Energy Advice Centre</i> at the heart of a neighbourhood in the County (this could be attached to a school, a library, sports centre or similar public building).</p> <p>Follow through with a programme of further exemplars.</p>	<p>CW&C; Carbon Trust; Building bodies e.g. Blacon Community Trust Chester Civic Trust Energy Saving Trust SEEN</p>
<p>Knowledge and skills</p> <p>A highly-trained local building trade workforce, skilled in every facet of sustainable construction, both new-build and retrofitting, and supported by a depth of equivalent professional knowledge and skills (at both applied and research levels) has transformed the built environment of West Cheshire to exemplary standards of environmental sustainability.</p>	<p>Conduct a detailed review into the depth of existing skills and knowledge amongst construction professionals and tradesmen in communities in the CW&C area.</p> <p>Audit existing provision of education for construction.</p> <p>Ensure appropriate provision by Colleges of FE and the University of Chester.</p>	<p>Establish a <i>Sustainable Community Knowledge and Skills Council</i> for the area. Charge it to research and develop a <i>Sustainable Environmental Education Strategy</i></p>	<p>University of Chester; West Cheshire College; CW&C; Building bodies e.g. British Property Federation (BPF) House Builders Federation (HBF) Royal Institute of British Architects (RIBA) Royal Institute of Chartered Surveyors (RICS) SEEN</p>

<p>Housing</p> <p>All housing stock (in the public and private sectors) has been upgraded to the highest practical levels of insulation and lowest use of non-renewable resources.</p>	<p>Compile an audit of all existing housing stock.</p> <p>Establish a strategy of support and encouragement for both public and private sector new-build and refurbishment that complements emerging national regulations.</p>	<p>Establish a <i>2050 Green Housing Council</i> for the area and charge it to research and develop an action plan.</p> <p>Seek to sponsor or support low-energy refurbishment of detached, semi-detached and terraced exemplar buildings in key neighbourhoods through the CW&C area.</p>	<p>CW&C; HBF; Housing Associations; Home Communities Agency (HCA).</p>
<p>Commercial, industrial, institutional and leisure infrastructure</p> <p>All existing and new buildings have been brought to the highest practical levels of insulation and lowest use of non-renewable resources.</p>	<p>Compilation of an audit of all existing building assets.</p> <p>Establishment of a strategy of support and encouragement for both public and private sector new-build and refurbishments that complements the emerging national regulation.</p>	<p>Establish a <i>2050 Green Commercial Buildings Council</i> for the area and charge it to research and develop an action plan.</p>	<p>CW&C; RICS; BPF.</p>

Section 7. Natural Resources – *maximise the production and sustainability of ecosystem services*

Overview

Natural resources include the sun, wind, rain, and the physical environment, all of which have interactions with ecosystems. Renewable energy resources have been dealt with in [Section 1](#). Ecosystems are the unnoticed and forgotten basis of our existence. They exist in a vast range of sites, including such places as a neglected roof in Eastgate Street, Chester, the weedy edge of a car park in Kelsall, an area of woodland in Frodsham, and the Dee estuary. What defines them is the presence of a variety of species of microbes, plants, animals and fungi, including their interactions among themselves and with the external environment. Ecological quality largely reveals an inverse relationship with the degree of impact by human society. Natural functioning comprises direct and indirect, discrete and diffuse processes that have a variety of influences on our lives and environment. This has been encapsulated in the term 'green infrastructure', defined by the government in Planning Policy Statement 12 as, "A network of multi-functional green space, both new and existing, both rural and urban, which supports the natural and ecological processes and is integral to the health and quality of life of sustainable communities".

In using natural resources, society should bear in mind that exploitation can have impacts on their future provision of services to society. This is particularly the case with habitat destruction and degradation ([NENW 2008](#); [NWEPRSS 2008](#)). Examples include the loss of native species because of invasions by exotic species such as Japanese knotweed or the harlequin ladybird, or loss of the functions of water cleaning and storage owing to loss or degradation of a woodland or wetland that previously provided the services.

Increased transport costs seem destined to reduce the availability by increasing the price of imported goods, especially those travelling great distances. This should make home grown materials more valued. The use of trees for timber and other plants such as flax, hemp, and reeds etc. as substitutes for various materials currently in use will be increasingly viable in buildings, textile manufacture and other uses. Trees, in particular will be permanently in short supply unless sufficient land is made available to grow them. As well as providing timber and useful fibres, they can also supply foods such as fruit, nuts, and sap (sugars), can enhance biodiversity of plants, fungi, invertebrates, herptiles, mammals and birds, contribute to carbon sequestration and storage, and provide an educational and recreation resource. Additionally, their properties of soil development, water retention and contaminant removal contribute to water treatment and flooding control, and they can be used in the treatment of waste water for nutrient and pathogen removal. These benefits are examples of ecosystem services, which are becoming more recognised as socially

and economically valuable ([Smith *et al.* 2008](#); [Econet](#)). Valuation of ecosystem services is very complex, involving indirect benefits that are often not measurable using conventional economic methods, e.g. calculation of theoretical economic losses or costs of alternative provision in the absence of the ecosystem service ([Defra 2008b](#)).

In the management of natural resources, opportunities should be sought for obtaining maximum benefit from ecosystem services by using both human and ecological criteria in multiple use environmental management e.g. an ecosystem approach ([Defra 2008c](#)).

Key steps

- Identify sites of land and woodland potentially available for re-naturalising;
- Identify intertidal and perimarine wetlands;
- Assess their functions and potentials to provide ecosystem services, considering proximity, access, topography and soil, water catchment;
- Plan to optimise biodiversity, particularly in maintaining isolation of target areas, and providing connecting vegetated corridors between sites ([Damschen *et al.* 2006](#));
- Earmark sites for potential use in co-ordinated landscape planning, incorporating multiple use where appropriate;
- Identify sources of potential environmental degradation e.g. farm practices, industrial discharges;
- Address issues through education and, where necessary, legislation;
- Ensure public involvement and access;
- Engineering issues e.g. re-instate floodplains, block drains, and open drains.

Achieving the vision: Natural resources

VISION	APPROACH	FIRST STEPS	KEY PLAYERS
<p>Conservation and utilisation of resources</p> <p>We conserve our resource capital and fully utilise our resource income by making full use of ecosystems and the services provided naturally by them to maximise well-being and economic benefits.</p> <p>Full use is made of solar, wind and water resources (Section 1) and the area is substantially self-reliant in timber and tree crop production. This contributes to carbon sequestration, support for pollinating species, and enhanced biological diversity.</p> <p>The area enjoys increased tourism, amenity and recreational value, and economic, environmental and social benefits from flood protection (Section 10).</p>	<p>Use an ecosystems approach to re-visualise the energy contributions from the sun, wind, rain and landscape as functional parts of the human environment. This requires the protection of ecosystem health and the recognition and use of ecosystem services.</p> <p>Evaluate natural resources holistically as providers of raw materials, food and services, as well as sequesters of atmospheric carbon and receivers of managed quantities of organic waste materials.</p>	<p>Across the whole CW&C area, conduct environmental audits of land use, and compare these with societal needs.</p> <p>Conduct feasibility studies of potential sites for timber and textiles production, water cleaning, floodwater storage and waste treatment.</p> <p>The overlying criteria for these studies should be multiple use for the local community, and enhanced biodiversity.</p> <p>Establish inclusive review panels in all communities to determine ways of maximising and using natural resources locally whilst maintaining ecosystem integrity.</p>	<p>CW&C; Land owners; Wildlife and nature groups; Environment Agency; Water companies; Local businesses; Community groups; University of Chester.</p>

Section 8. Open Space – *local leisure, biodiversity*

Overview

Open space is a capital resource but its wise use can promote substantial income. It can be depleted by development and returned to the community by restoration, but the total amount cannot increase. The use of open space is dependent on proximity to specific types of development and resources e.g. housing, industry, communities, or minerals, and on scale i.e. the amount of space available in one place. Commercial value aside, a single piece of land situated within a settlement will have a different functional value than a similar sized piece of land in the adjacent countryside e.g. the former might play a key role as a community space and have thousands of visitors passing through it per year, whereas the latter may receive the attentions of merely a tractor on very few occasions over the same period, yet only the rural situation might contribute directly to the local economy. This highlights the pitfalls of making quick-to-calculate economic valuations whilst failing to account for indirect contributions to the economy. A key example of the latter is the contribution of pleasant open spaces to the mental well-being of the residents and users of the space, which can have significant positive effects ([Maller et al. 2006](#); [Dines and Cattell 2006](#); [SDC 2007](#)). The health benefits of open space, social contact with others, and contact with nature are fully reviewed by the Sustainable Development Commission ([SDC 2008](#)).

The potential uses to which open spaces can be put are thus varied, scale dependent, and site-specific, and before any planning for future use is done, it will be important to make available a thorough inventory of all parcels of land, big and small, in Cheshire West and Chester.

Environmental changes will probably make big demands on open space within and around settlements, but the changing nature of land use is likely to allow multiple uses of land so that different policy objectives can be attained in the same area. What immediately comes to mind is a recreational area for relaxation and sports, combined with an orchard of fruit and nut trees, timber crops and vegetables. Such an area would be an educational and aesthetic resource at the same time. Similarly, open space is valuable for use as flood buffering at coastal and river floodplain sites, a role that does not exclude the area from other uses. *The North West of England Plan, Regional Spatial Strategy to 2021* (Policy EM 3) aims to place 'green infrastructure in the heart of communities as 'multi-purpose open space networks' ([NWEPRSS 2008](#)).

Open spaces within settlements are there as resources for the people who live in the immediate vicinity, and the management of them should be in local control rather than imposed from a central political authority. Central to the successful and sustainable use of such places is the ability to meet and discuss

management plans and projects, and provision for this should be given by making available meeting places for local communities at a minimum density, perhaps one meeting place per 1,000 residents. Local control can also reduce maintenance costs through e.g. the establishment of wildflower meadows and open woodland at the expense of monoculture grassland ([Landlife 2004](#)), and through participation by the local community in maintaining open spaces for the benefit of the community.

Key steps

- Increasing the economic benefit gained from open space whilst increasing amenity value e.g. developing multiple uses and encouraging health benefits and feelings of well-being. It can also increase biodiversity, provide an educational resource, and enhance the public's appreciation and experience of nature (see [Section 4](#)).
- Public gardens can be opened up to multiple uses such as sitting and relaxing, playing games, small-scale sport, gardening and growing food as part of their overall function.
- There are significant benefits to be gained from interconnection of sites using vegetated corridors ([Damschen et al. 2006](#)), perhaps incorporating their use as public walkways and cycleways.
- Provision of allotments ought to reflect the demand for them while addressing issues of proximity and security. More allotment sites of appropriate size close to areas of housing and including meeting rooms and facilities will provide a more comprehensive community resource and a force for community cohesion. This will require active engagement by the council, working with existing allotment holders (see [Section 9](#)).
- Cemeteries can be made more biodiverse, and include provision for 'green' burials, i.e. where the site is allowed to return to natural vegetation after burials have been made, rather than undergo management to control weeds. This need not exclude provision for peaceful contemplation, indeed it may enhance it.

Achieving the vision: Open space			
VISION	APPROACH	FIRST STEPS	KEY PLAYERS
<p>Multiple use and connectivity</p> <p>There is wide community participation in the multiple use of open spaces within communities, which encourage improved recreation and amenity value for health and fitness, and provide venues for meetings and community events.</p> <p>Increased biodiversity results from greater connections among open spaces, and from 'green burial' sites, which also reduce atmospheric pollution and carbon emissions, and have valuable educational and mental well-being benefits.</p>	<p>To reclaim areas of open space into community life by incorporating human and biodiversity needs into planning decision-making.</p> <p>Make local open spaces functional, beautiful and relevant to the daily lives of the communities where they exist.</p>	<p>Replace direct services maintenance with private contracts that can manage areas of open space in multiple use with the participation of and to the optimal benefit of the immediate local community.</p> <p>With the participation of local community groups, identify areas within communities where tree crops, vegetables and textiles can be grown.</p> <p>Provide meeting spaces in all local communities and engage with community groups to develop management plans for selected open spaces in communities across West Cheshire.</p>	<p>CW&C; Community groups; Landowners; Local businesses.</p>

Section 9. Food and Farming – *local food production and supply*

Overview

In the present globalised world of international food markets, it is self evident that the price of food will increase as energy costs rise. Modern industrial agriculture is heavily dependent on oil for field machinery, processing, transport, fertiliser and pesticides, and on gas for fertiliser. It is estimated that about ten times the energy found in a food item itself has been invested in growing it ([Pfeiffer 2006](#)). In addition, food miles are a well known factor in the energy embodied in the food we are offered at supermarkets. With the onset of climate change and oil depletion, the proportion of food imported from overseas is bound to reduce significantly, and fresh (air freighted) food, if it features at all, will be a minor component. Contributory to this are the direct effects of climate change, which include a 10% reduction in crop yield for each 1° C rise in temperature ([Peng et al. 2004](#)). This means there is a very high probability of absolute shortages ([Battisti et al. 2009](#)). The constraints imposed by reduced oil availability and increased price will be felt not only in transportation of food across the globe. The very industrialised basis of modern food production, already the subject of much criticism ([Lang 1999](#)) is now increasingly in jeopardy.

Meeting the new challenges posed by environmental and economic change will mean development of local markets for food grown in Cheshire and surrounding districts at the expense of internationally traded, out of season food. This will involve production in the commercial sector and informally. The expenditure necessary for fuel, chemicals, imports and infrastructure today can be replaced in large part by local food production jobs tomorrow. Local markets will provide secure jobs, greater variety of food for field and plate, better public health, and greater levels of involvement in food production. Most importantly, provision of fresh food can lend itself to healthy lifestyles and better public health. What it will not do is prop up the global market for food production and supply. Nowhere is seen a better example of the inadequacies of 'the market' than in food production. It exists primarily to support international trade rather than food security, and total reliance on it is shown to be both naïve and simplistic ([Lang 1999](#)). Local production for local consumption can be both practical and economic. The introduction of sustainable food production in the UK is now both essential and urgent, a fact that has been recognised in a recent Chatham House document ([Ambler-Edwards et al. 2009](#)).

Farms and market gardens can have a social role, where the public are involved in growing and running the business. For example, local farms and small-holdings on the outskirts of towns and villages can be the subject of community farming and community-supported agriculture (CSA), where the public are customers and workers together. The CSA movement brings community

involvement, health benefits, social cohesion and fresh food grown according to demand and season. A positive culture of healthy, locally-grown, food would be a key contributor to improved lifestyles and health generally, in contrast to the vast range of high fat, salt and sugar foods that presently drives a range of modern health problems such as cancers, diabetes, depression and heart disease.

It is highly probable that farms will diversify by increasing the range of foods grown, partly to reflect local market demands but also to accommodate seasonal foods and the availability of new crops, which will be added as the climate changes.

Key steps

- Examine costs and benefits of local supply from diversification versus specialism of output for export;
- Study what is and what could be grown locally, including crops not usually grown in the area that may be viable as climate changes, to assess gaps in local food provision and the requirements of customers;
- Facilitate the establishment of local markets in all towns and villages in Cheshire West and Chester to sell local produce, indicating source and miles travelled;
- Study the role and efficiency of farm to customer infrastructure, wholesalers, shops, direct sales, and CSA, and invest in a new integrated system to increase local self-sufficiency in food;
- Investigate the capacity, numbers, total area, distribution and accessibility of allotments, and the potential for new allotments;
- Establish the potential for growing food, including tree crops and row crops, on public land such as parks and gardens, and urban green space;
- Investigate ways in which planning permission for new build housing can incorporate minimum garden size (on an individual basis or area per dwelling) to allow food production in back gardens and adjacent to groups of dwellings. This could also be achieved using matched and allocated allotment space.

Achieving the vision: Food and farming

VISION	APPROACH	FIRST STEPS	KEY PLAYERS
<p>Fresh, healthy and seasonal food</p> <p>A healthy and active population enjoys fresh, seasonal, locally-produced food, with many people involved in its production. Farms in the area encourage customer participation in planning, growing, harvesting and sales.</p> <p>The proportion of high fat, salt and sugar meals and snacks in the diet of the area's people is low, and there is a corresponding increase in general health and a reduction in obesity.</p> <p>Farm produce is augmented by crops grown in community gardens, allotments and the grounds of educational and commercial establishments, with wide benefits in health and well-being for the community.</p>	<p>General promotion of health and fitness in CW&C controlled activities.</p> <p>Encouragement of communication between farmers, local retail outlets and communities so that farmers can match their growing to local demands.</p> <p>Encouragement of food growing by children in schools, as well as in the grounds of college and university campuses and commercial companies.</p>	<p>Audit produce grown on CW&C area farms, including energy and costs expended on fertiliser and transport.</p> <p>Analyse public and commercial food buying patterns and compare with what can be grown locally.</p> <p>Insist on healthy and fresh (i.e. local) food in CW&C jurisdiction buildings.</p> <p>Encourage the introduction of CSA schemes, and facilitate and publicise farmers markets.</p>	<p>CW&C; University of Chester; Health consultants; Farmers; Community groups; Local traders.</p>
<p>Reduced vulnerability</p> <p>Trees and textile crops are widely grown for supplies of timber, tree crops, and manufacturing raw materials, giving increased amenity and biodiversity value whilst minimising pollution to water courses.</p> <p>The strategy has led to reduced health service costs and expenditure on transport and imports of chemical fertilisers and pesticides, both of which measures also reduce vulnerability to supply disruptions and price fluctuations. Carbon emissions are correspondingly low.</p>	<p>Reassess urban and suburban spaces for food and fibre production.</p> <p>Introduce 're-skilling' incentives in fields such as market gardening and manual crafts.</p>	<p>Review the potential to grow new food and fibre crops.</p> <p>Conduct a feasibility study into costs and benefits of localised production in terms of economics, carbon budgets, and practicalities.</p> <p>Instigate a 'grown in Cheshire' label scheme.</p>	<p>CW&C; University of Chester; Community groups; Businesses; Local traders.</p>

Section 10. Water and flooding – steady provision and safe management

Overview

The provision of clean water, effective sanitation and waste water treatment are key vital services for the population of Britain. The water treatment industry relies on dependable supplies of large amount of energy as well as large scale facilities for pumping and cleaning it, and is thus vulnerable to the price of oil. We were reminded of the significance of oil for the water industry by the eight-day lorry driver's oil blockade of 2000, when, among numerous other closures and cancellations of critical services, water supplies and sewage services were threatened. If we can go some way towards weaning local communities in Cheshire off this dependence to some extent, we will remove these threats in direct proportion to our efforts. The increased likelihood of droughts in summer will have direct and knock-on effects that are likely to increase water scarcity by increasing competition for water for community, industrial, agricultural and ecological uses, since abstractions from rivers and aquifers tend to reduce the quantity and quality of water available for ecosystem support and potable supply. The means to ensure continuance of adequate and clean supplies lies in ecosystem maintenance combined with efficiency of use in domestic, commercial and agricultural situations. It will pay to evaluate existing provision for stored supply in comparison with predicted demands because climate change is expected to affect both precipitation and evaporation ([Kay et al. 2006](#); [Christensen and Christensen 2007](#)).

The other side of the coin is too much water in the wrong place, the consequences of which can be dire, as we've seen in recent summers. The water that floods a town comes from upstream and goes downstream, and if peak flow from upstream is reduced, while downstream flow is greater, flooding does not occur. The flooding problem is one of capacity and, to a large degree, its causes include management and infrastructure as well as lifestyle choices.

In future, there will be two key factors in flooding by rivers: floodplains and climate change ([JAF 2006](#)). It should be remembered that, in hydrological and biological terms, a floodplain is an active part of a river. At periods of peak flow, river water naturally overflows into its floodplain; a function that was important for its formation as a flat region. This has the effect of reducing the volume of water passing downstream. As the river discharge recedes, the excess water in the floodplain trickles back into the river, hence a potential flood downstream is averted even though the total water volume is the same. This is another example of an ecosystem service. The economic value to society of ecosystem services is equal to the costs that would be incurred in the absence of the service through, for example, the erection of physical barriers to protect an area from flooding due to a burst river, and the costs involved in a clean-up operation after the water had receded.

An example is given by the proposals to alleviate flooding of the Charles River, Massachusetts, which included the building of reservoirs, walls and dykes. An alternative was to simply protect the 3,440 ha of wetlands as natural water storage areas. A US Corps of Engineers study estimated that flood damage would increase by at least \$3 million per year if 40% of the Charles River wetlands were destroyed, and by \$17 million annually if all the wetlands were lost ([Horwitz 1978](#); [Sather and Smith 1984](#)). The retained wetlands were afterwards valued at \$1,203,000 per year.

Natural ecosystems thus have the ability to reduce flow volumes and avoid flooding in downstream areas provided they are not restricted by land management practices, as commonly happens now. Building in the floodplain brings two problems: flooding of the built environment, and reduction of the floodplain's capacity to store water. Engineered channels are designed to conduct water to where it is wanted, or away from where it is not wanted. They lack the ability to store excess water, and their presence both increases flow rates in the parts of the catchment where they occur and potentially reduces the total capacity of the river system. Drains and aqueducts are built to hold water at predicted peak levels of flow in order to avoid flooding problems in a developed area. If these peak flows are exceeded, flooding results ([Beven 1986](#)).

The response can be either to build bigger drains, or reduce the peak flow. Planners can do both, but predicting the maximum necessary capacity is difficult or impossible when weather changes from climate change are still unknown. Urban flooding is frequently made worse because of rainwater flowing into drains instead of entering the ground water. Large areas of concrete or tarmac, including front gardens, and roofs that drain directly into the sewer reduce infiltration and increase flow rates thus contributing to overloading of the existing system and consequent flooding. Sustainable Urban Drainage Systems (SUDS) can be used to intercept rain water and facilitate its drainage into the soil (see also [Section 6](#)).

The third aspect of water planning is sewage control. Sewage can be treated with chemical means, natural means (using constructed wetlands) or both. The problems associated with centralised (chemical) treatment are scale, transport, energy costs, and disposal of sludge, and the problem with constructed wetlands is the large land area required if they are to be effective. The benefits of natural treatment, however, are substantial in terms of sludge reduction, energy requirements, and enhanced biodiversity.

The vision is to manage areas of land upstream for water retention by allowing rivers to flood into wetlands and woodlands, thereby providing clean water, and to provide numerous small areas to treat locally produced sewage wastes using natural processes wherever possible. Separate, often site-based, controls will continue to be needed to treat industrial wastes. The occurrence of rising groundwater poses potentially significant risks for saline intrusion into aquifers and the mobilisation of toxins leaching from landfill sites. A programme of risk

evaluation will be necessary as appropriate on a site-specific basis. There remains the difficulty of quantifying risks that will arise from the direct effects of sea level rise. The best estimate given by the [IPCC](#) (2007) was that sea level would rise by a maximum of 0.6 m in this century, but research since publication suggests that this may be a severe underestimate ([Hansen](#) 2008; [Hawkins et al.](#) 2008). A potential strategy for storm protection could be developed in the form of a tidal barrage for the Dee, which would generate large amounts of electricity while taking energy from the water, calming it. In theory, it could also incorporate a cycle route between Wirral and Wales.

Key steps

- Review maps of rivers and streams that enter or pass close to towns and villages to include vulnerabilities and potentials for local water treatment;
- Evaluate provision of floodplains for water courses, including estuaries, and correct their loss by land works where possible. Environment Agency to advise;
- Halt building in floodplains except where full provision is made for flooding, and assessments of ecosystem services and their values have been made;
- Make the likelihood of qualification for insurance cover a factor in planning approval;
- Define areas for tree planting in upstream and urban areas, and natural regeneration of perimarine wetlands and saltmarshes;
- Install sustainable urban drainage systems;
- Require rainwater harvesting in new developments and refurbishments;
- In consultation with water supply companies, investigate the possibility of large scale installation of display water meters;
- Pursue an education programme for consumers about water wastage and use. The Council can sell or facilitate the sale of water butts to householders and businesses;
- Identify areas where reedbed or other constructed wetland sewage systems could be sited;
- Investigate where flood defences could be considered with integrated electricity generation.

Achieving the vision: Water and flooding			
VISION	APPROACH	FIRST STEPS	KEY PLAYERS
<p>Use of ecosystem services</p> <p>Economic and energy costs as well as greenhouse gas emissions are reduced by optimal use of the CW&C area's ecosystems to provide valuable water and sewerage services to all communities in the CW&C area.</p> <p>Dangers from flooding and hardships from drought are avoided by sympathetic management of ecosystems and greater public awareness of water supply issues.</p> <p>The sensible management of ecosystems results in provision of clean water and treatment of sewage without unnecessary pollution or energy concerns.</p> <p>River and drainage systems in the CW&C area are managed sustainably.</p>	<p>To use hydrological and ecological knowledge to intelligently manage river and floodplain ecosystems and perimarine wetlands for flooding control and biodiversity enhancement.</p> <p>Prioritise reconnection of rivers with their floodplains and associated water bodies, and disallow development in areas subject to flooding.</p> <p>Use decentralised ecological waste water treatment systems.</p> <p>Facilitate woodland planting on cleared floodplains and downslope of wastewater treatment areas.</p> <p>Engender a culture of water as a valuable resource that needs protection from contamination and wastage.</p>	<p>Rule against planning permission for building on floodplains and coastal wetlands, or the disruption of their natural functioning.</p> <p>Presume against applications to dredge waterways or build levees, and require scientific case studies for their justification.</p> <p>Conduct feasibility studies into siting of localised sewage treatment plants using constructed wetlands.</p> <p>Require incorporation of water conservation, metering and sustainable drainage for all planning consents.</p>	<p>CW&C; Community groups; Landowners; Local businesses.</p>

Conclusion

Although faced with unprecedented changes to come in this new millennium, we are not without the means to embrace these changes, make many of them work in our favour, minimise the effects of others, and largely mitigate the impacts of yet more. We do not have to resign ourselves to being completely at the mercy of events and we cannot leave it all to international agreements and Her Majesty's Government to legislate about what we must do in our daily lives.

The measures recommended in this report, if adopted, will give the Cheshire West and Chester Authority great freedom to innovate and develop through making full use of the energy and enthusiasm that characterises modern human society. This report encapsulates the vision of what a sustainable Cheshire West and Chester can look like. It represents less the final word on the subject than it does the beginning of a new era of community-led rebuilding of sustainable living. The measures outlined in the report are intended to balance prescription for action with invitation for individuals and communities to discover new ways to achieve change. Sometimes we like to be told what to do, other times we achieve far more through a very personal level of collaboration with our neighbours, friends and family.

Critical to Cheshire West and Chester's ability to make decisions appropriate to the economic and social well-being of the area will be to 'opt-in' to the new Sustainable Communities Bill. This will give the council the capacity to instigate and facilitate change on a local level, so that local initiatives such as Transition groups and Low-carbon groups can do much of the work for hearts and minds as well as making practical advances in the fields of economic development and energy generation.

Five key principles to get started:

Democracy and Engagement: We achieve the most, and more quickly when we create ideas amongst and commit to action with our neighbours face to face. Environmental decision-making needs to be devolved as far as possible to parish and community councils, local area forums and area partnership boards.

The Built Environment: We all need to be able to actually see and experience buildings and places that work well. Every neighbourhood, business and commercial zone needs accessible *exemplar projects*. There needs to be a strategy to identify and create exemplars in every residential neighbourhood and commercial and civic zone.

Education for sustainability knowledge and skills: We need an enhanced focus on sustainable living skills and technology in our schools, colleges and university. Children can be encouraged to see what they are learning in their school curriculum translated to their own environment.

Programmes like the *Sustainable Environmental Education Network* (already successful in Chester over the last decade) need to be enhanced and supported. Colleges of further education and the university need to be encouraged to establish innovative and far-sighted *sustainable construction and environmental science courses*.

The World of Work: A *Green Building Council* could help to support transformation of the commercial, public service and institutional sectors in the area. The Council could consider founding a rolling low-carbon fund to assist new projects and businesses.

Bringing it all together and communication: A vital first step is to establish *cross-sectoral working parties* that in turn are all part of an area *Sustainable Living Forum*. This needs a *communication strategy* to ensure that all the challenges and all progress is widely understood and disseminated across the community.

The parallels between the Global Banking Crisis and Global Climate Change are striking, namely the “borrowing” of resources without checking whether there is anything viable left in the kitty. The task ahead may seem daunting if not impossible, but it is far from impossible. Hundreds of billions of pounds of public money has been allocated by the government to prop up the collapsing financial system, but a much smaller amount represents all the public investment needed to secure a safer and richer future for the people, infrastructure and environment of Britain. The need for action is growing more pressing and is seen by Sir Nicholas [Stern](#) (2009) as a way forward not only for climate change but for dealing with the global recession: “*The longer you let risks fester, the bigger the problem. This is a real, attractive opportunity. The revolution is just beginning.*” Chester West and Chester is in a good position to show other regions how this can be done.

The authors’ overall objectives for this report are to offer some defence against the worst of the environmental, social and economic challenges to come, whilst instilling a culture of sustainability into the planning of our collective future in Cheshire West and Chester. It represents the beginning of the creative process of gathering practical ideas and initiatives that will constitute the basis of a sustainable society. We therefore welcome supplementary information to this core report, especially in the form of examples where positive actions are underway elsewhere. The second edition of Vision 2050 begins here and now, and we are all its authors.

Appendix 1: Climate change advantages of Chester Cycle Demonstration Town (CDT)

– author Peter Black:

Changes to cycling levels mainly affect Carbon dioxide (CO₂)¹, the principle climate change gas, so CO₂ is the only climate change gas considered here. The main ways increased cycling levels could reduce climate change emissions are by:

- Direct substitution of a car journey with a cycle journey;
- Direct substitution of another motorised journey such as rail or bus with a cycle journey;
- Some people living near Chester may make a cycling journey in or around the city rather than driving to another location (such as an out of town Retail Park).

Assessment one – carbon dioxide savings

Defra reporting guidelines suggest the following figures:

Transport	g CO ₂ per passenger km
Bus	90
Rail	60
Car	159
cycle	0

For instance, if a 4 km car journey is replaced by a cycle ride, then the saving would be $4 \times 159 = 636\text{g CO}_2$. The transfer of a 4 km bus journey to cycle would save $4 \times 90 = 360\text{g CO}_2$.

Sustrans/Socialdata (personal communication), and the experience of the Travel Demonstration Towns indicate that a 12% reduction in car mileage can realistically be expected, and maintained from 'Smarter Choices' techniques, perhaps half of this a transfer to cycling. This gives an indication of the potential for change.

The following figures are speculative, but if, say, 6% of the 50,000 population within easy cycling distance of Chester replaced just 2 x 4 km journeys a week by cycling – a relatively conservative estimate, then CO₂ savings would be:

$$(50,000 \times 0.06) \times (2 \times 4 \times 52) \times 159 \times 10^{-6} = 198 \text{ tonnes CO}_2 \text{ per year}$$

Assessment two – qualitative assessment

The CDT bid includes a range of measures which have differing effects on modal transfer. My assessment is as follows:

Key measure within CDT bid	Climate Change Value for money	Reason
Marketing and promotion	Very High	Current marketing activity almost non-existent, but techniques are cheap and potential is high, particularly for city centre and University area
Participation and promotion	High	Includes substantial training elements for school children
Town Centre access including infrastructure	High	Many low cost measures available to make cycling in town centre more attractive
Greenway infrastructure improvements	Medium	Greenways are expensive, and tend to miss the town centre; they also cater for generated leisure rather than substituted city centre trips. Therefore, while valuable, their effect on modal shift and climate change is relatively lower.

Notes

Substitutions of journeys. While it may not seem desirable to reduce public transport patronage by choosing to cycle, this substitution can have advantages. Peak hour capacity released could allow transfers from car to public transport, or reduce the cost of overall provision. For instance, in The Hague, trams run with trailers in the winter, but in summer many passengers cycle, meaning that single trams can be run, saving energy and maintenance.

Defra transport figures. Estimated average values for the UK car fleet in 2005 travelling on average trips in the UK, using test data under real-world testing cycles and an uplift of 15% agreed with DfT to take into account real-world driving. The figure is divided by 1.3 average occupancy (need to confirm this figure for Chester).

Greenway improvements. Mickle Trafford, Deva Link Steps, Curzon Bridge improvements, New Dee Bridge and Blacon.

Appendix 2: The Oil Depletion Protocol. A plan for a sensible energy future - as drafted by Dr. Colin Campbell (See [Heinberg](#); 2006).

Whereas the passage of history has recorded an increasing pace of change, such that the demand for energy has grown rapidly in parallel with the world population over the past two hundred years since the Industrial Revolution;

Whereas the energy supply required by the population has come mainly from coal and petroleum, such resources having been formed but rarely in the geological past and being inevitably subject to depletion;

Whereas oil provides ninety percent of transport fuel, is essential to trade, and plays a critical role in the agriculture needed to feed the expanding population;

Whereas oil is unevenly distributed on the planet for well-understood geological reasons, with much being concentrated in five countries bordering the Persian Gulf;

Whereas all the major productive provinces of the world have been identified with the help of advanced technology and growing geological knowledge, it being now evident that discovery reached a peak in the 1960s, despite technological progress and a diligent search;

Whereas the past peak of discovery inevitably leads to a corresponding peak in production during the first decade of the twenty-first century, assuming no radical decline in demand;

Whereas the onset of the decline of this critical resource affects all aspects of modern life, such having grave political and geopolitical implications;

Whereas it is expedient to plan an orderly transition to the new world environment of reduced energy supply, making early provisions to avoid the waste of energy, stimulate the entry of substitute energies, and extend the life of the remaining oil;

Whereas it is desirable to meet the challenges so arising in a co-operative and equitable manner, such to address related climate change concerns, economic and financial stability, and the threats of conflicts for access to critical resources.

Now it is proposed that:

A convention of nations shall be called to consider the issue with a view to agreeing an Accord with the following objectives:

- to avoid profiteering from shortage, such that oil prices may remain in reasonable relationship with production cost;
- to allow poor countries to afford their imports;
- to avoid destabilizing financial flows arising from excessive oil prices;
- to encourage consumers to avoid waste;
- to stimulate the development of alternative energies.

Such an Accord shall have the following outline provisions:

- The world and every nation shall aim to reduce oil consumption by at least the world depletion rate.
- No country shall produce oil at above its present depletion rate.
- No country shall import at above the world depletion rate.
- The depletion rate is defined as annual production as a percent of what is left (reserves plus yet-to-find).

The preceding provisions refer to regular conventional oil, which category excludes heavy oils with cut-off of 17.5 API, deepwater oil with a cut-off of 500 meters, polar oil, gas liquids from gas fields, tar sands, oil shale, oil from coal, biofuels such as ethanol, etc.

Detailed provisions shall cover the definition of the several categories of oil, exemptions and qualifications, and the scientific procedures for the estimation of Depletion Rate.

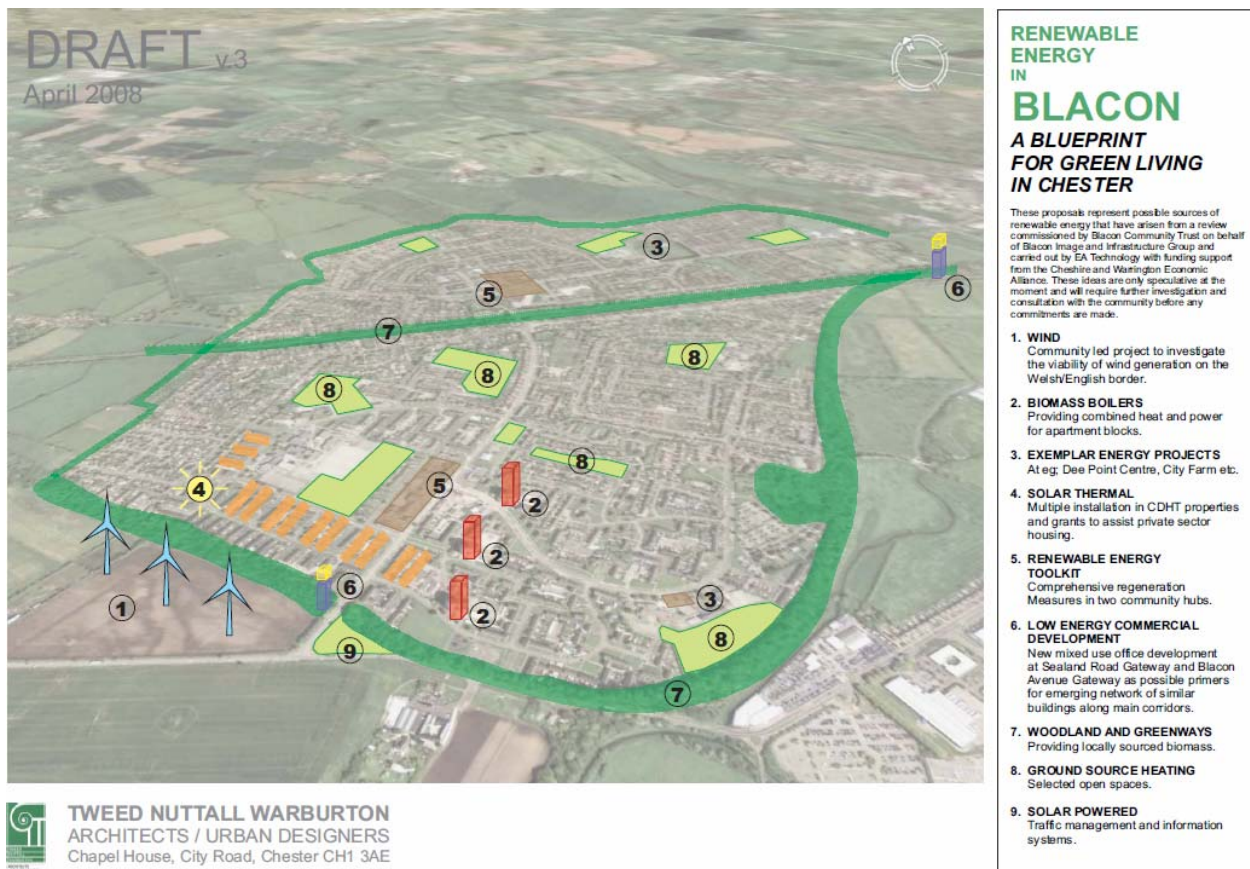
The signatory countries shall cooperate in providing information on their reserves, allowing full technical audit, such that the Depletion Rate may be accurately determined.

The signatory countries shall have the right to appeal their assessed Depletion Rate in the event of changed circumstances.

Appendix 3: Sustainable Blacon Case Study

Blacon in north-west Chester is a discrete community of 18,000 people in 5,200 households. Its location next to the border with Wales presents an ideal opportunity to develop a model sustainable urban community. Blacon is a mixed community with adjacent areas of relative affluence and significant deprivation with concerns about fuel poverty. Public, private and community organisations have established and effective working relationships with local residents, which are necessary to address long-term sustainability.

Based upon a report by EA Technology Ltd funded by Cheshire and Warrington Economic Alliance, Blacon Community Trust has identified a number of highly innovative projects to turn Blacon into a model sustainable urban community. These outline proposals have support in principle from Chester City Council.



This flagship programme focuses on:

- investing to generate heat and power at a community level to retain energy expenditure for use within the community
- improving the natural environment, green spaces of which Blacon has many
- engaging local people in reducing energy consumption
- an integrated green (cycleways and footpaths) and public transport infrastructure focussed on the Blacon Community Greenway
- developing new green social enterprises

As an example, one of these projects concerns the transformation of Blacon Parade into a sustainable community hub.

A flagship for the area, this project involves installing an energy “microgrid”, based on renewable energy technologies within the redeveloped heart of Blacon. This would allow heat and power to be shared around the mixed use (commercial, residential and community) area of approximately three hectares while selling back to and drawing from the national grid. This would be a unique development in the UK.

Further details are available from Blacon Community Trust: 01244 390344.

Background to the Chester Climate Change and Sustainability Ginger Group

Vision 2050: A Sustainable Future for Cheshire West and Chester is a product of several years collaboration between a group of environmental professionals who are in various ways actively involved in, and committed to addressing, issues of climate change and sustainability.

The launch of Chester's Sustainable Community Strategy in 2005 included a project entitled 'Carbon Neutral Chester'. John Tweed was appointed as the project's Champion by *Chester in Partnership*, Chester's Local Strategic Partnership, managed by Andrea Mageean. In early 2006, links were made with the 'Going Carbon Neutral Ashton Hayes' Project (www.goingcarbonneutral.co.uk), a community-led initiative that aims to make the Cheshire village the first carbon-neutral village in England. Important movers of the project included Roy Alexander, Mary Gillie and Ged Edwards. The initiative led to collaboration with the University of East Anglia to bring their pioneering community carbon reduction programme, *CRed* (www.cred-uk.org) to Chester, making it one of nine carbon reduction communities in the UK. Andrea Mageean was key to the launch and development of *Chester CRed*, which, has been particularly successful in achieving pledges for carbon reduction activities.

In July 2007 a district-wide debate initiated by Chester City Council looked at the need for a robust response to climate change issues. Following a presentation by climate change columnist Mark Lynas, a panel of 'local experts' including John Tweed, Tom Barker, Roy Alexander and Mary Gillie responded to challenges from the floor.

Later that year the same group, along with Peter Bulmer, who had led a similar review in Cheshire County Council during 2006/7, agreed to provide advice for a Scrutiny Review of Climate Change and Sustainable Development to be undertaken by Chester City Council. Given the finite life of the City Council and other Cheshire authorities, the group formed the 'Chester Climate Change and Sustainability Ginger Group' to provide well-researched guidance to the successor authority.

The group comprises:

Dr Andrea Mageean, an experienced local government manager with extensive experience in partnership and project management. A planner by training and with a history in academia, Andrea is particularly skilled in leading multi-agency and multi-functional teams, and in combining knowledge of current social, economic and environmental priorities with the drivers of change and the mechanisms by which it can be achieved. She currently manages Chester's Local Strategic Partnership.

Ged Edwards, Environmental Coordinator for Blacon Community Trust and

Coordinator of Cheshire Furniture Re-use Forum, an award-winning sustainable waste initiative of the third sector and Cheshire Waste Partnership. With over 20 years experience in social and community work, Ged has recently conducted research on motivation and barriers to participation in community carbon reduction programmes, having developed innovative approaches for areas with high levels of deprivation.

John Tweed, an architect and urban designer for thirty years specialising in education, housing and urban design. John is a founder member and chairman of the Chester Sustainable Environmental Education Network, a member of the Chester Rural Economy Group, spokesman for the REG on the Chester in Partnership Steering Group, and champion for the 'carbon neutral' project in the Community Plan. He sees himself as an 'energyholic' seeking useful models of sustainable living and working.

Dr Mary Gillie, an engineering consultant at EA Technology working in the field of renewable energy, energy efficiency and the distribution of power. She is increasingly interested in the interactions among the human needs for heat, power and transport, and the 21st Century society. A physicist and engineer by training, Mary is keen that the public has a basic knowledge of how our power is generated and used, so that we can all play our part in reducing total carbon emissions.

Peter Bulmer, an environmental scientist and landscape manager by training, who has over twenty years experience in successful environmental project delivery. He chairs Chester's Environmental Forum and the Mersey-Dee Alliance Transport & Accessibility Group, and is a member of the Mersey-Dee Alliance Sustainability Group and Chester in Partnership. Peter manages the Environmental Management Team, and leads the climate change agenda at the County, working with both new Unitary Councils.

Prof Roy Alexander, a geographer and academic, whose research at the University of Chester includes environmental processes, climate change, and sustainability. He has edited two books and published numerous research articles. Alex is a member of the steering group for [CRed](#) in Chester, technical director of Ashton Hayes Going Carbon Neutral where he oversees data collection and analysis, and project manager for a feasibility study of rural micro-grids, which uses the village as a test-bed.

Dr Tom Barker, an ecologist at the University of Liverpool, who works on lake and wetland ecosystem integrity and services, functional indicators of ecosystem health, carbon sequestration and storage in soils, and human-environment interactions, including waste management. Tom worked at The Centre for Alternative Technology for five years, where he was editor of *Clean Slate*. He is co-editor of *The Wetlands Handbook*, and associate editor of the political journal *Fourth World Review*.

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