GREATER MANCHESTER SPATIAL FRAMEWORK

DRAFT TOPIC PAPER 2

LOW CARBON

Rapid Transformation to a low carbon economy

August 2010

OVERVIEW

The Greater Manchester Strategy identifies a rapid transformation to a low carbon economy as one of its key strategic priorities, and its delivery is central to the pursuit of GM's vision.

'By 2020, the Manchester city region will have pioneered a new model for sustainable economic growth based around a more connected, talented and greener city region where the prosperity secured is enjoyed by the many and not the few'[i].

Three elements of this vision aim for:

- Sustainable economic growth;
- A greener city region;
- Where prosperity is enjoyed by the many and not the few.

In order to address the challenge posed by climate change, and the potential opportunities, we need to consider three key components:

1) To rapidly reduce carbon emissions, by 30-50% between now and 2020
2) To prioritise the transition to a low carbon economy,
3) To adapt to the inevitable and increasing consequences of a changing climate

Rapid transformation of the built environment is needed to provide the spatial and environmental conditions necessary for a secure and sustainable low carbon society

Manchester is already a global location of choice for commercial property investors, however if it is to maintain this role it will need to respond to occupiers seeking climate-adapted, productive and inspiring buildings. It will need to be a place where the commercial property sector and public authorities work openly and collaboratively to achieve optimal levels of resource efficiency and adaptability.

The spatial context of these priorities is significant, and the following sections provide an outline evidence base and key principles that are suggested for the development of a GM Spatial Framework. These have been structured according to the key considerations, policy and investment measures available to the GM Community

At the end of each section, we set out a series of proposed principles that can be used to help shape spatial investments, policies and priorities.

Strategic Issues:

The volume of new development brought forward through conventional development market conditions is unlikely to be sufficient to stimulate and finance the deployment of energy generation and distribution infrastructure.

Intervention in the existing built environment across commercial and domestic building stock and key infrastructure is needed at a scale not seen for the last 50 years.

A solely market led approach to development is incompatible with the delivery of carbon reduction targets, and could increase the risks to new and existing communities associated with a changing climate.

New mechanisms and a reprioritisation of strategic planning processes will be needed to consciously plan, invest in and deliver the infrastructure necessary for a low carbon economy.

Low carbon, climate resilient infrastructure is increasingly recognised as a core attribute of world class cities.

GM will not achieve its carbon reduction targets by seeking to prioritise particular technologies or focussing on a single issue. A wide range of activities will need to be pursued in parallel to create the integrated system needed to support carbon reduction.

Urban conurbation and increasing urban density presents the best opportunity to achieve carbon reduction targets provided the locations are supported by low carbon transport and energy infrastructure.

Identifying tightly defined spatial locations to co-locate energy generation, demand reduction, retrofit, low carbon transport and green infrastructure pilots presents the best prospect for stimulating behaviour change

Supply chain development and support is critical to the achievement of carbon reduction targets, and fundamental to the achievement of a low carbon economy. Market failure in the supply chain for low carbon built environment technologies and services will prevent the successful delivery of Quality Places.

1 LAND USE AND ALLOCATION

1.1 Masterplanning at a scale across the travel to work area can deliver significant reductions in carbon emissions, and reduce the need to invest in increased infrastructure.

1.2 All new development should be located in areas already well served with public transport, or where planned provision is agreed. The transport network in place now will not change fundamentally, although the proposals in the Greater Manchester Transport Fund will further enhance our provision. Uses that generate significant travel demand should be located in places that are easily accessible by public transport, thus limiting the need for further increases in unsustainable levels of car-based travel.

1.4 The development of land adjacent to, or served by low carbon energy opportunities, such as existing heat energy sources should be prioritised. Land needs to be explicitly allocated for energy generation and distribution, water catchment and flood risk management, and other low carbon priorities.

1.5 New development must take advantage of existing assets and facilities; co-locating housing, employment, services, entertainment, retail, health facilities to enable people to make most journeys by foot, cycle or public transport. In the case of Greater Manchester this means a strong focus on our existing settlements, particularly urban centres.

2 ENERGY GENERATION AND DISTRIBUTION:

Greater Manchester's land presents significant opportunities for locating low carbon technologies.

The development of specific land allocations for energy generation may release the potential for micro and macro generation schemes and accelerate the pace at which the development community can bring forward low carbon energy schemes.
This will be of particular importance for authorities with substantial green space, or brownfield land which is not strategically aligned with existing commercial or domestic building development priorities.
Similarly, a planned approach to distribution infrastructure deployment and the identification and agreement on locations for future substation and similar technologies may enable a more planned approach and even distribution of new infrastructure financing. Land allocation to support the production of biomass may also be appropriate, both as a main crop and by-product.

Prioritising the development of land adjacent to, or served by low carbon energy opportunities, such as existing heat energy sources will also make a significant contribution towards a low carbon economy.

An integrated approach which combines strategic planning, spatial considerations and implementation priorities is needed if GM is to achieve a secure, low carbon energy future. A multisectoral, democratically accountable GM Energy Group has been put in place to develop this. The Group is responsible, on behalf of AGMA Executive, for strategic oversight, challenge and championing of energy issues within the city region. As part of this, they will:

- Influence the plans and programmes of utility providers and other organisations where they impact the energy performance of the city region
- Seek to align investments and plans at all level with the strategic priorities and low carbon goals outlined in the Greater Manchester Strategy
- Influence energy related national and international policies, legislation and programmes in order to deliver a secure low carbon future for the city region
- Represent Greater Manchester in interfacing with government departments and energy companies.
- Identify and develop solutions to energy challenges facing Greater Manchester
- Broker agreement at strategic level to resolve apparent barriers to delivery of low carbon energy systems
- Align their resources and influence to support the delivery of the Greater Manchester Strategy and its priorities.

2.1 Smartgrids, Electricity and Heat Networks

It is accepted and was the basis for GM's Decentralised Energy study[1] that without planned infrastructure investment, development will be constrained beyond 2013 in meeting regulatory and aspirational carbon reduction targets. This work has been integrated into a study into Sustainable Energy Action Planning for Greater Manchester, published in July 2010.

[1] " Decentralised and Zero Carbon Energy Planning Study " Urbed et al 2010

One of the key outcomes of existing studies has been to demonstrate that we will achieve the greatest sub-regional reduction of CO_2 emissions if we work jointly and integrate our activities (for example retrofit, energy supply, smart grids, finance framework). The study concluded that rather than looking at individual sites, zero carbon can be achieved more cost effectively by allowing developers to contribute to lower cost infrastructure opportunities at local, district or City Region scale. It is essential that wherever the opportunity exists new development be used as a catalyst to enable the retrofitting of energy efficiency improvements and low or zero carbon infrastructure to the existing building stock.

Using heat as an example; heat for homes, businesses and industrial processes accounts for around 47% of the UK's CO_2 emissions. Research has demonstrated that where district heating networks achieve high penetration levels in the built up area, the carbon abatement costs of district heating options can be better than the most cost-effective standalone renewable technologies such as air and ground sources heat pumps and solar panels.

Enough heat is wasted in centralised power stations to replace the gas used by every gas boiler in every home in the UK. When power is generated locally heat that would normally be wasted can be used – by offices, homes and schools. By using this waste heat and reducing the distances that power must travel to reach the end consumer, over 80% of the energy content of each unit of fuel is used.

With centralised generation this figure is on average 37%. This results in carbon emission savings of up to 30% (up to 60% compared to coal-fired power stations). The reduction in primary energy usage from decentralised energy provision also improves fuel security.

By using renewable fuel sources, such as waste wood or waste left after recycling, to power local decentralised energy plants larger carbon reductions can be made. Heat networks are the only way to capture the otherwise wasted heat and squeeze the maximum energy out of these renewable fuel sources. Cooling networks could also deliver low carbon air-conditioning to the regional centre's workplaces. This presents the opportunity for public and private sectors to work in partnership to deliver these carbon savings.

A transition from fossil fuel based large-scale energy sources to more distributed, intermittent supplies will necessitate a new role for the network in supporting and informing more active user management of energy demands.

Delivering this approach will require both economies of scale and economies of concentration. In practice this means more installations and activities within specific geographical areas, for example new development and retrofitting of public sector, domestic and commercial buildings. The LCEA programme has identified a number of spatial pilots which present opportunities across these activities. However, it will also be necessary to identify cross cutting portfolios of projects across the conurbation if inward investment is to be optimised.

The main strategic priorities for investment identified by GM's Decentralised Energy Study include:

- Ship Canal growth corridor: Development of a heat pipeline route from Carrington power station to the Regional Centre;
- Regional Centre heating network: Development of a district heating network for the Regional Centre, supplied by CHP using gas and biomass, and deep geothermal;
- Eight sub-regional centres: Development of district heating networks in and around each of the eight centres, including the use of energy from waste (Bolton), landfill gas (Bury) and biogas (Oldham);

Smartgrid opportunities have also been identified at two locations in Greater Manchester, and by 2020, existing pilots will need to have informed the role out of extensive smartgrid infrastructure across GM.

A major transformation of private and freight transport will be needed for GM to meet mid and long term carbon reduction targets. This can only be achieved by shifting from direct use of fossil fuels by vehicles to electric charging. The deployment of an effective network of e-charging points will need to be informed by the spatial development priorities of the city region, and be closely aligned with the deployment of national e infrastructure and smartgrids.

Principles:

New developments should be encouraged to support the development of, and connect to heat networks and smartgrids.

Neighbourhood regeneration schemes should consider the viability of smartgrid deployment and heat network deployment as a routine component of planning.

Standards to ensure that building and energy centre technologies are compatible with smartgrids and heat and power distribution and management schemes could accelerate the deployment of smart networks.

Active integration of energy availability considerations into masterplanning, land allocation and development control is needed.

A planned approach to development of, and investment in a portfolio of energy distribution and smartgrid projects will enhance the ability of GM to achieve a low carbon economy.

The development of GM wide smartgrid and heat network plans will accelerate the transition to a low carbon economy

The energy distribution and utilisation needs of transport infrastructure should be actively planned for and deployed as part of all development and infrastructure deployment schemes.

Prioritising local supply chains will provide a significant stimulus to low carbon growth

2.2 ENERGY GENERATION

In addition to the deployment of microgeneration associated with new development, and national work to reduce the carbon emissions associated with national grid energy,

Greater Manchester will need to identify and bring forward large scale energy generation schemes if it is to meet its low carbon goals. The obvious opportunities for this include:

- Biomass (wood, waste derived fuel) and anaerobic digestion
- Wind Energy

Selecting locations for such infrastructure can be controversial and although some use can be made of national instruments to invest in and benefit from generation infrastructure located outside Greater Manchester, a coherent framework for commercial energy developers seeking to operate within Greater Manchester could accelerate the deployment of low carbon energy generation while making a significant contribution to the local economy. A framework should seek to secure local community benefit and amenity associated with new development.

Incentives and drivers to shift away from the use of fossil fuels unless accompanied by both heat and emissions capture will also need to be put in place.

Principles:

Barriers to large scheme deployment can be overcome via early identification and designation of specific sites
Energy generation, heat and renewable energy source locations need to be explicitly mapped and allocated to encourage inward investment, based upon the findings of existing studies such as the Decentralised Energy Plan.

New financial and investment frameworks will need to be put in place to secure their deployment

Adopting a 'yes if' rather than 'no unless' approach to the development control process for energy generation

3. Improving the Performance of Existing Buildings and Infrastructure

3.1 The majority of the buildings that will exist in 2050 (the target date by which an 80% reduction in carbon emissions will have been achieved) are already standing today. Whilst the majority of national policy and regulation focuses on development standards for new buildings, the GMSP must emphasise the need to overcome the carbon-intensity of the existing built environment as a matter of priority. This is not to neglect the need to pursue higher standards in new development across the conurbation, but it is a recognition that existing stock represents the largest opportunity for emissions reductions, as well as the largest technical and economic challenge.

3.2 LCEA

Greater Manchester has developed a major programme to stimulate its economy via the delivery of a prioritised programme of activity to address barriers, and practically deploy retrofit programmes across the commercial, public sector and domestic built environment. This comprises a range of enabling programmes to resolve market failure and stimulate economic growth, including:

- WP1 Residential Retrofit

A capital delivery programme to pioneer approaches in tackling the challenging issues presented by the existing housing stock. Greater Manchester aspires to become a world leader in this field through delivering interventions at volume and the programme will encompass; hard-to-treat properties, microgeneration technologies and innovative and effective financing products. At completion, this work programme seeks to have delivered a range of projects aimed at existing housing, resulting in low carbon households at scale

- WP2 Non-residential Retrofit
A capital programme that will establish the investment and delivery vehicles necessary to make the low carbon retro-fitting of public and privately owned non-residential buildings across Greater Manchester an attractive proposition for owners and occupiers. Whilst it is envisaged that a number of retrofitting projects will be identified and implemented under the programme, the key purpose will be to create the catalyst needed for the mainstream delivery of low-carbon retrofitting across the public and commercial.

In addition to the LCEA, active enforcement of measures such as building regulation and control will present a significant opportunity to ensure that national policy measures to improve the existing built environment are delivered in practise.

The transition to low carbon energy infrastructure has the potential to increase inequalities, particularly for people on low incomes living in homes with energy efficient building fabric, and small businesses with small margins in older building stock. It will be important to ensure that targeted measures are in place to support vulnerable households and businesses during this transition.

Principles

Regeneration programmes will not achieve their intended impact if they do not also ensure that communities have been prepared for a low carbon future in the context of a changing climate.

Energy and climate adaptation plans should be prepared as a standard component of all masterplanning and regeneration frameworks

Building regulations should be communicated and enforced throughout the property supply chain

New developments should be seen as an opportunity to deliver hubs for local heat and energy networks which penetrate into the existing built environment.

Opportunities to develop and grow local low carbon supply chains should be harnessed and existing businesses need a range of information, incentives and drivers to make changes to their building fabric, energy use patterns and business models.

Advice and support schemes aiming to improve building fabric including market renewal measures should be integrated in order to enable property owners to receive consistent, accurate advice.

Property ownership transactions, and property upgrades present a key opportunity to secure significant upgrade of the building fabric and energy systems, so opportunities to fully implement policies and regulations should be targeted at these opportunities

4 NEW DEVELOPMENT

4.1 Whilst new development traditionally forms a small element of the overall building stock the scale of growth planned in GM is more significant than most other UK cities – giving us the opportunity to lead the way in low carbon developments. The public sector, through planning and regulatory processes exerts considerable influence over the nature and form of development and we need to optimise the design and performance of all new development coming forward in the city region.

4.2 From 2016 (residential) and 2019 (commercial) new development is required to be zero carbon. We are looking to deliver this is three ways; through careful location of development particularly in relation to public transport provision, achieving the highest levels of sustainability in new buildings and the provision of low carbon energy by on/off site renewable energy supply.

4.3 The LCEA's WP 3 aims to support low carbon innovation and stimulate the low carbon technologies and services sector via the identification and provision of support to a small number of iconic new developments. It will follow these developments through their delivery process to identify and implement carbon reduction and local supply chain and employment growth opportunities.

Principles:

Consistent standards should be put in place to ensure that new development:
- Uses minimal energy to meet its needs in construction and use:
- Is made from materials which support sustainable consumption and growth
- Optimises the use of onsite and local energy and heat generation and networks to meet its energy needs
- Reduces the need for energy through design features that provide passive heating, light and cooling (including building fabric, shape, orientation and street layout).
- Contributes to the wider low carbon energy balance of Greater Manchester
- Is resilient to the effects of a changing climate, and improves the resilience of existing adjacent communities
- Meets specific building energy use standards, in use as well as design
- Is designed and includes amenities to support low carbon transport choices including public transport, car share and e vehicles.

Public sector schemes and investments, and the market leverage of desirable locations should both be seen as prime opportunities to deliver exemplar low carbon developments

Regeneration schemes and masterplans should set explicit carbon reduction objectives on an integrated, area wide basis, including the establishment of expected carbon performance targets, and regeneration schemes should be accountable for the delivery of energy and low carbon components of their scheme.

An integrated 'total carbon footprint' approach should be taken to determining the viability of new developments which extends to transport, consumer and employment related impacts.

New development should be directed towards areas with good existing public transport infrastructure and access to low carbon energy and heat sources.

5 ADAPTING TO A CHANGING CLIMATE

5.1 Global carbon emissions are continuing to rise rapidly posing significant, potentially catastrophic, risks to global and local climates, economies and societies. Greater Manchester can expect to experience climate trends characterised by:

hotter, drier summers;
warmer, wetter winters; and
an increase in the frequency and intensity of extreme weather events.

This will necessitate significant change to our existing built environment and a changed approach to new development. While many of the measures needed, such as increased green cover and improved insulation, are consistent with carbon reduction, there are also some important tensions which need to be managed. The most obvious, and potentially the most severe, relates to the heightening of flood risk and urban heat island effects by increasing development densities in a bid to increase resource and energy efficiency. This is a particular issue in the Regional Centre where there is a deficit of green infrastructure both in terms of quantity and functionality, and where certain locations are at significant risk of surface water flooding during intense rainfall events.

5.2 The predicted growth of the Manchester city region places greater responsibility on us to manage our natural resources in an efficient and sustainable way. Whilst the city region is heavily urbanised, its areas of open space both formal and informal are essential to its character and its ability to function as a place in which people choose to live and work.

5.3 Green Infrastructure (GI) is a relatively new term that is used to describe a planned and managed network of natural environment components and green spaces that intersperse and connect our key centres, urban neighbourhoods and rural fringe and which broadly consists of:

- Open spaces (parks, woodlands, informal open spaces, nature reserves, water bodies, accessible countryside, the natural elements of historic sites, built conservation areas and civic spaces);
- Linkages (river corridors and canals, pathways, cycle routes and greenways); and
- Networks of "urban green" (the collective resource of private gardens, pocket parks, street trees, verges and green roofs). Spatially this is expressed at the city regional scale as the river valley and canal corridors.

GI helps deliver Greater Manchester's intended brand as a vibrant and ambitious city noted for the quality of life, quality of environment and quality of place. Such a brand is critical if GM is to sustain its competitiveness against other European city regions. Our

own research[2] (TEP, 2008 / 2010), concluded that GI can deliver eight growth support functions:

Managing flood risk and climate change adaptation

Preserving ecological assets

Allowing for sustainable movement

Generating a sense of place

Managing river and canal corridors

Creating a positive image and setting for growth

Supporting regeneration

Supporting community health and enjoyment

In many respects, there are strong synergies mitigation and adaptation objectives. For example, increasing tree and greenspace cover to reduce energy demand in buildings will also deliver important adaptation functions such as reducing peak surface water run-off in periods of intense rainfall.

Research by the University of Manchester[3] has shown that:

• increasing the green space cover in urban areas by 10 per cent reduces surface runoff by almost 5 per cent

• increasing tree cover in urban areas by 10 per cent reduces surface water run-off by almost 6 per cent

Principles for resilience and adaptation

- avoid locating development in areas of climate risk
- maximise use of extensive and intensive green roofs, as an integral component of a SUDS system
- prioritise strategic interventions in line with GM Green Infrastructure Framework
- agree suitable standards for adaptability benchmarks across different property classes
- additional land may need to be identified and allocated for green cover and water management, particularly in urban centres
- maximise interconnectivity between separate infrastructure systems (e.g. use of greenspace for food production and biomass fuel supply; use of SUDS for building cooling).
- Develop and deliver integrated climate adaptation and carbon reduction retrofit schemes

[2] "Towards a Green Infrastructure for Greater Manchester" TEP 2008

[3] "Adapting cities for climate change:the role of green infrastructure" S.Gill, J. Handley, R.Ennos, S.Pauleit

[i] AGMA, 2009, ‘Prosperity for all: The Greater Manchester Strategy’.