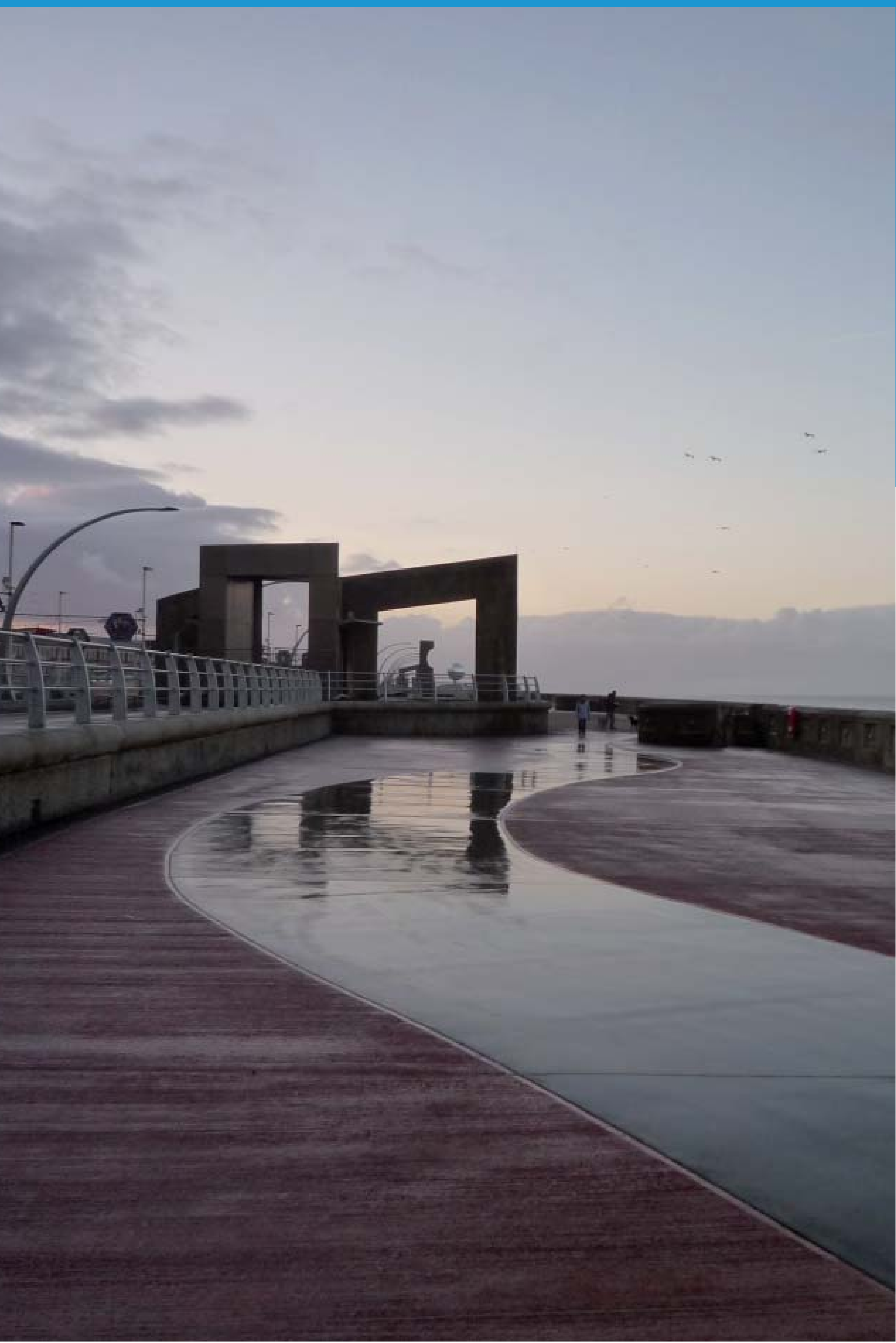

Climate Change and Renewable Energy Study

Blackpool Borough Council

February 2010

Executive Summary

SCOPE OF THE STUDY

AECOM have been appointed by Blackpool Borough Council to develop an evidence base to inform the development of CO_2 reduction and renewable energy policies to be included in the Core Strategy and supporting documents for the authority and to provide wider advice to the Council of the future potential for appropriate energy developments.

This study forms an evidence base to support the requirements of the Supplement to PPS1 on Climate Change, which states:

"Planning authorities should have an evidence-based understanding of the local feasibility and potential for renewable and low carbon technologies, including micro-generation, to supply new development in their area."

This has been done by developing an understanding of the current situation and expected growth in Blackpool, reviewing policy direction and analysing the area's energy resource potential.

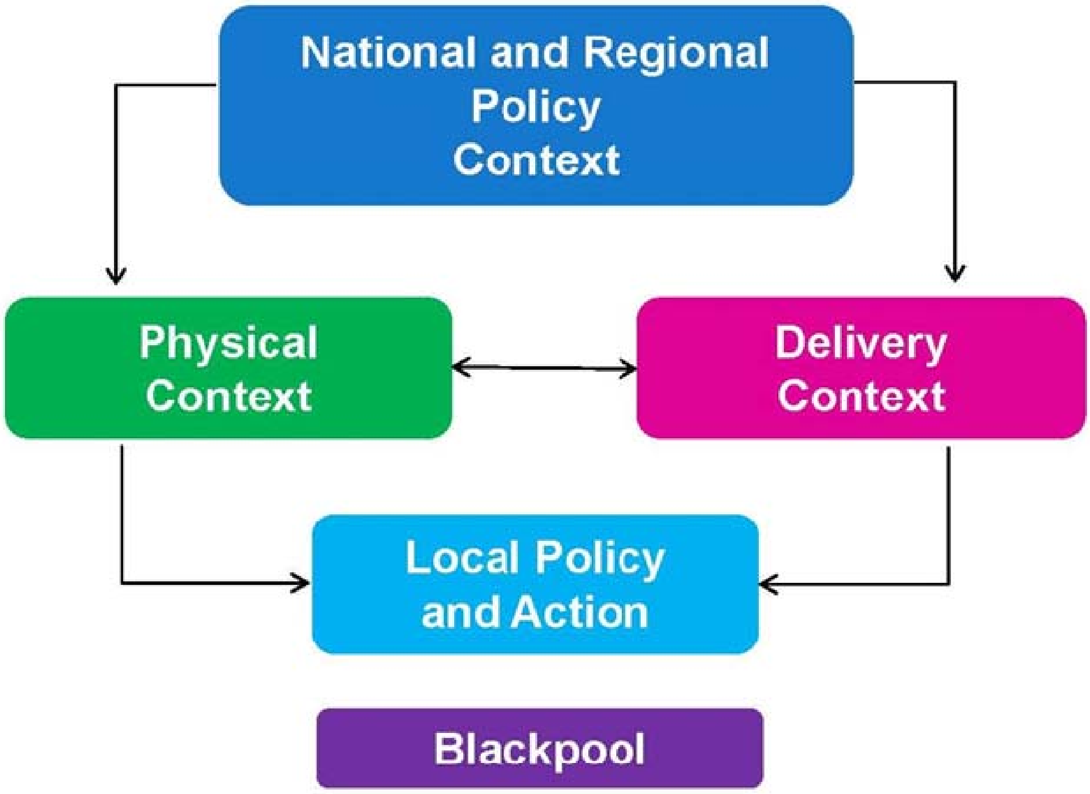

Figure E1: Policy Development Process

POLICY CONTEXT

National policy in this area sets out very challenging targets for reduction of CO_2 emissions, the accelerated installation of renewable and low carbon technologies and sustainable design of new development. These drivers are reinforced by targets and policy at a regional level, though to some extent regional targets are out-of-date due to recent advances in National policy. The local planning documents and emerging Core Strategy of the LPA provides a useful framework for the implementation of policy relating to building related CO_2 emissions. This study is being conducted at a stage where it can directly recommend policy for inclusion in the Core Strategy.

Progress of the Blackpool Core Strategy has necessitated the urban focus on the deliverable opportunities and potential of the Blackpool Local Authority Area. However, the study should be considered within the wider context of the Fylde Coast Sub-Region, where there are further renewable energy opportunities. The Fylde Coast Multi-Area Agreement (MAA) emphasises the need to seize the opportunity to create a low carbon economy and use this to help in delivering accelerated economic growth across the sub-region. It will be essential that the potential in terms of other renewable energies are all fully investigated.

The Supplement to PPS1 requires LPAs to investigate the potential for the inclusion of renewable and low carbon technologies in their LPA area, and to identify opportunities to exceed LPA area-wide targets on strategic sites where there is good potential for additional CO_2 reductions. Therefore LPAs need to both consider policies on an area-wide scale and policies for specific sites where additional opportunities exist for additional CO_2 reductions.

Over the period of the Core Strategy, expected changes in Building Regulations will significantly decrease CO_2 emissions from new development, therefore removing some emphasis in this role from planning authorities. The changes to Building Regulations are likely to create demand for 'Allowable Solutions' which involve the development of solutions outside of the site boundary that can further reduce CO_2 emissions associated with new development. LPAs are likely to need to play a role in coordinating and delivering effective Allowable Solutions. Planning authorities are also able to influence the improvement of existing buildings, and support the delivery of community-wide and stand-alone renewable and low carbon infrastructure that isn't related to new development.

PHYSICAL CONTEXT: ENERGY DEMAND FROM THE BUILT ENVIRONMENT

- **Current Performance of Existing Buildings**

To effectively reduce carbon associated with energy use, it is important to firstly understand the current and evolving energy demand profile of the LPA area. The table below compares the average residential electricity and gas demand for the LPA area with the average for the North West and Britain. The following figures also show the spatial distribution of electricity and gas demand.

Table E1: Gas and Electricity consumption per residential consumer (DECC, 2006)

	Blackpool	Northwest	Great Britain
	Residential kWh	Residential kWh	Residential kWh
Electricity	4,485	4,279	4,457
Gas	18,373	18,657	18,241

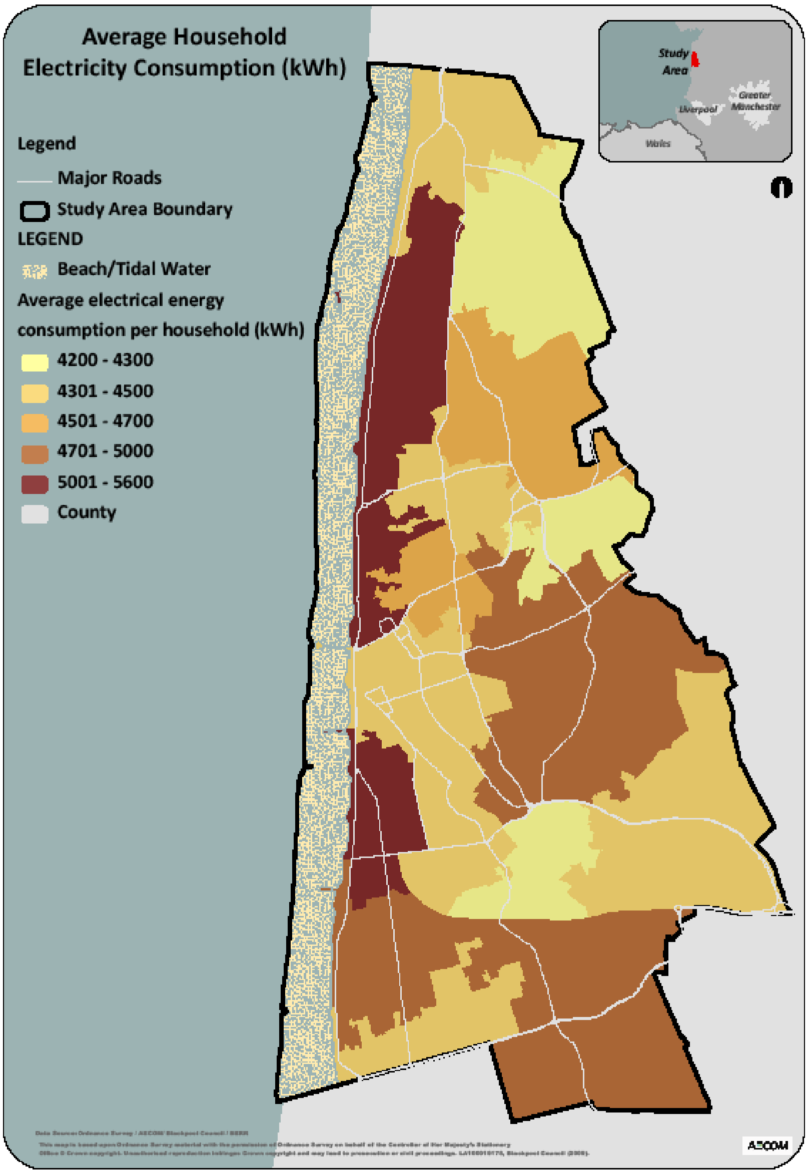

Figure E2: Electricity Consumption per Household in Blackpool

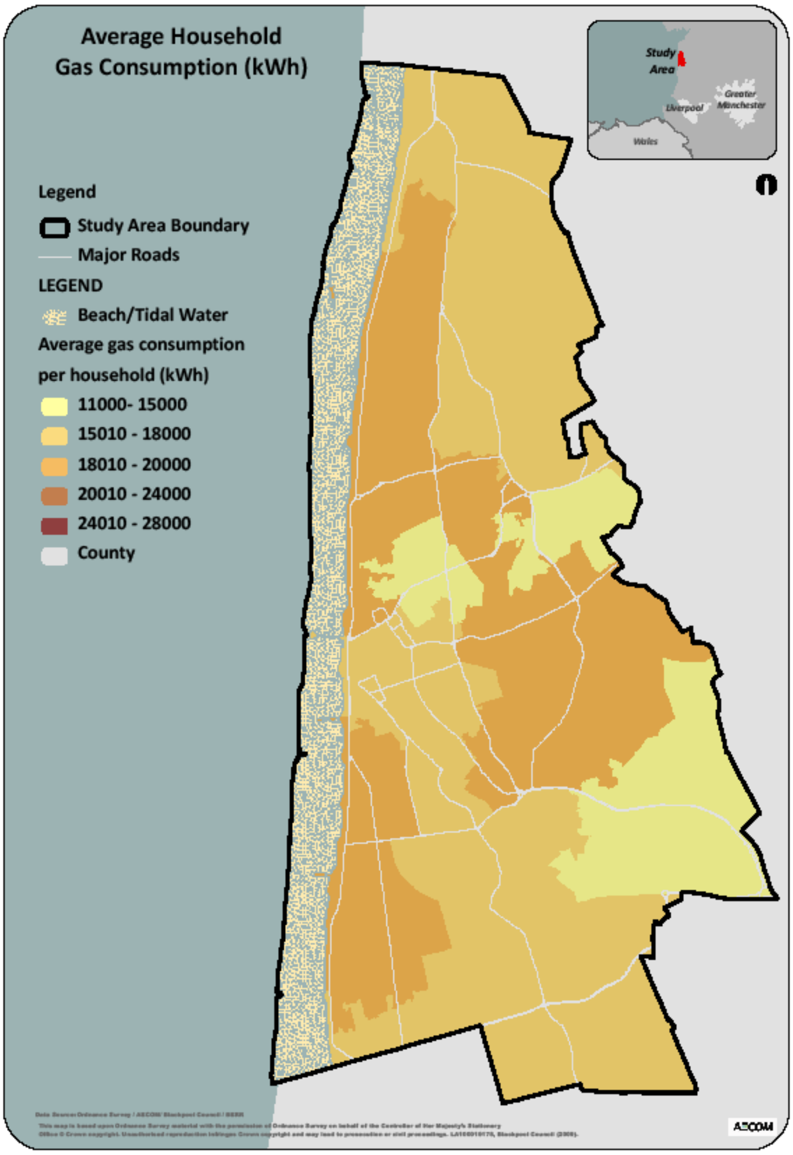

Figure E3: Gas consumption per household in Blackpool

Blackpool has a low carbon profile. The predominant reason for this is the urban nature of the area, with higher proportions of terraced housing and flats, which naturally have lower energy demands. However, the average Standard Assessment Procedure (SAP) rating of Blackpool homes is 49, compared to an England average of 46. Whilst dwelling stock in Blackpool is older on average than the UK average, the SAP rating is similar to the UK average. This is due to:

- The predominance of high density, terraced and semi-detached housing (which has lower heat loss due to adjoining walls between dwellings). This will compensate for the older nature of the buildings and associated low levels of insulation in these properties.
- A majority of dwellings in Blackpool are connected to mains gas which is a low carbon fuel compared to fuel oil, LPG or coal.
- There are however a large number of households who do not have central heating (19.5%, 2001 Census, ONS). These households are more likely to use electric heating which is a high carbon fuel.
- Due to the urban nature of Blackpool, consumption of fuel oil and petroleum products which are high carbon fuels is very low.

Hence there is significant potential to improve existing stock. Possibilities to improve the carbon performance of Existing Homes include:

- Improved insulation (walls, roof, windows) and reducing draughts (draft excluders).
- Upgrading of boilers to more efficient condensing types.
- Fitting more efficient lighting.
- Installation of micro generation (photovoltaic, solar hot water).

- Connection to low carbon heat networks.

LPAs play a key role in increasing energy efficiency of existing buildings, through coordination and promotion of initiatives. Existing buildings make up the bulk of the future energy demand, and hence efforts must be made to reduce energy demand of existing stock. Existing non-residential buildings often receive less focus than existing homes. LPAs should support initiatives to increase energy efficiency in non-residential buildings in their area, particularly large energy users. The figure below compares the energy demand for residential and non-residential buildings.

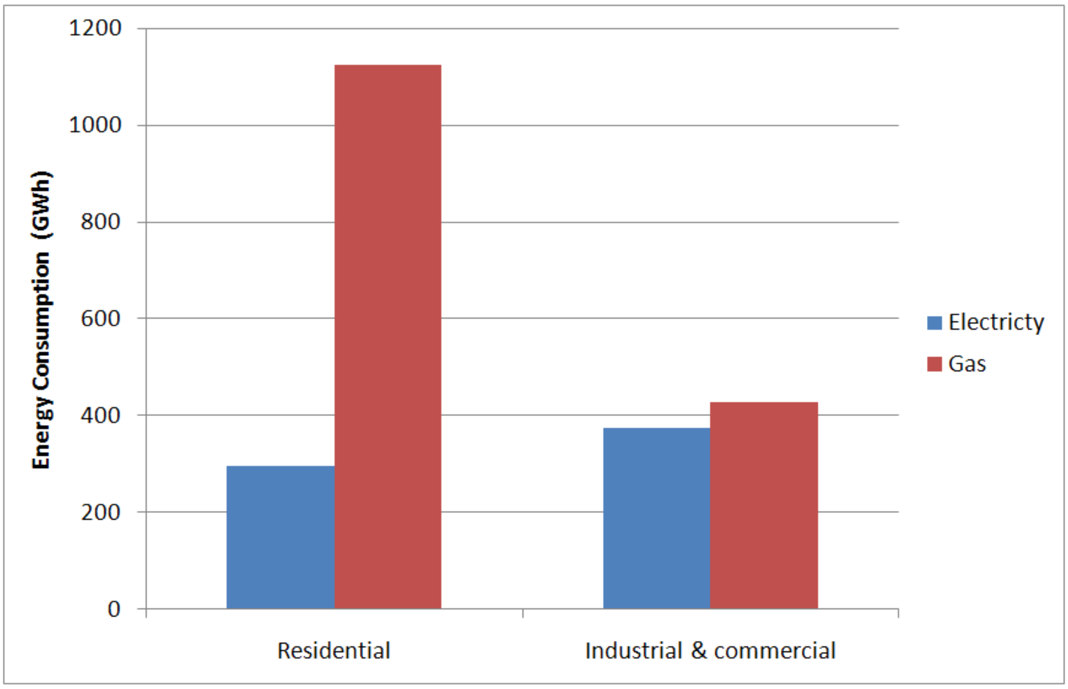

Figure E4: The electricity and gas demand of the LPA area, showing residential and non-residential breakdown.

- **Future Performance of Existing Buildings**

As part of this study, the likely increase in energy performance of existing buildings over the period of the emerging Core Strategy is considered. Through both national and local drivers, it is expected that the heat demand of existing buildings will decrease significantly, due to a range of relatively simple and cost-effective measures that can be applied to building structures. However, electricity demand is expected to remain fairly static, if not increasing slightly, due to additional demand from new technologies and appliances. The graph below shows the modelled make-up of energy demand from existing buildings over the period of the Core Strategy.

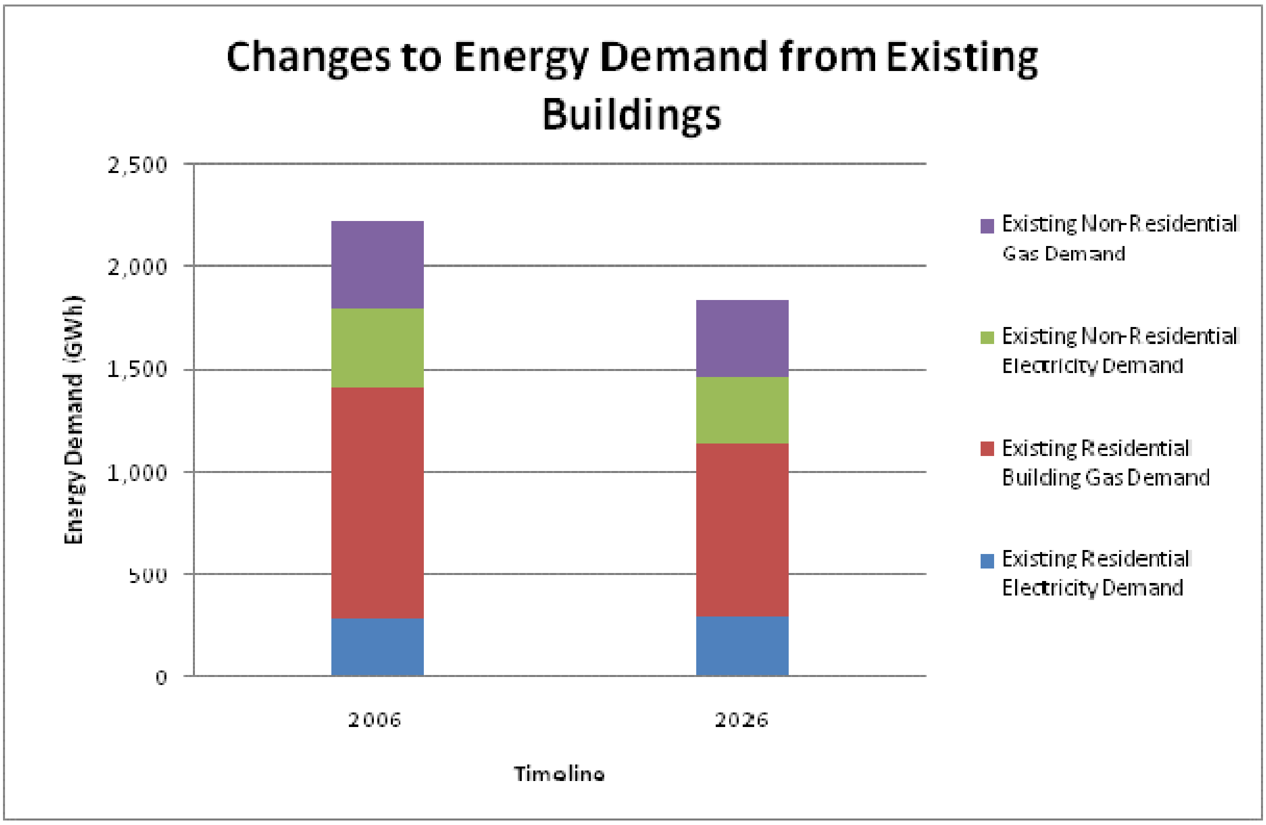

Figure E5: Expected change in electricity and gas demand over Core Strategy period under 'business as usual' energy efficiency measures

- **Energy Demands of New Buildings**

Significant growth is expected in Blackpool over the period of the Core Strategy. This study has modelled the likely energy demand of new buildings over time to complete an overall profile of evolving energy demand over time. New development will be subject to emerging Building Regulations that are likely to enforce increasing levels of energy efficiency and carbon reduction. The energy demands from new development compared with those of existing buildings are shown in the graph below.

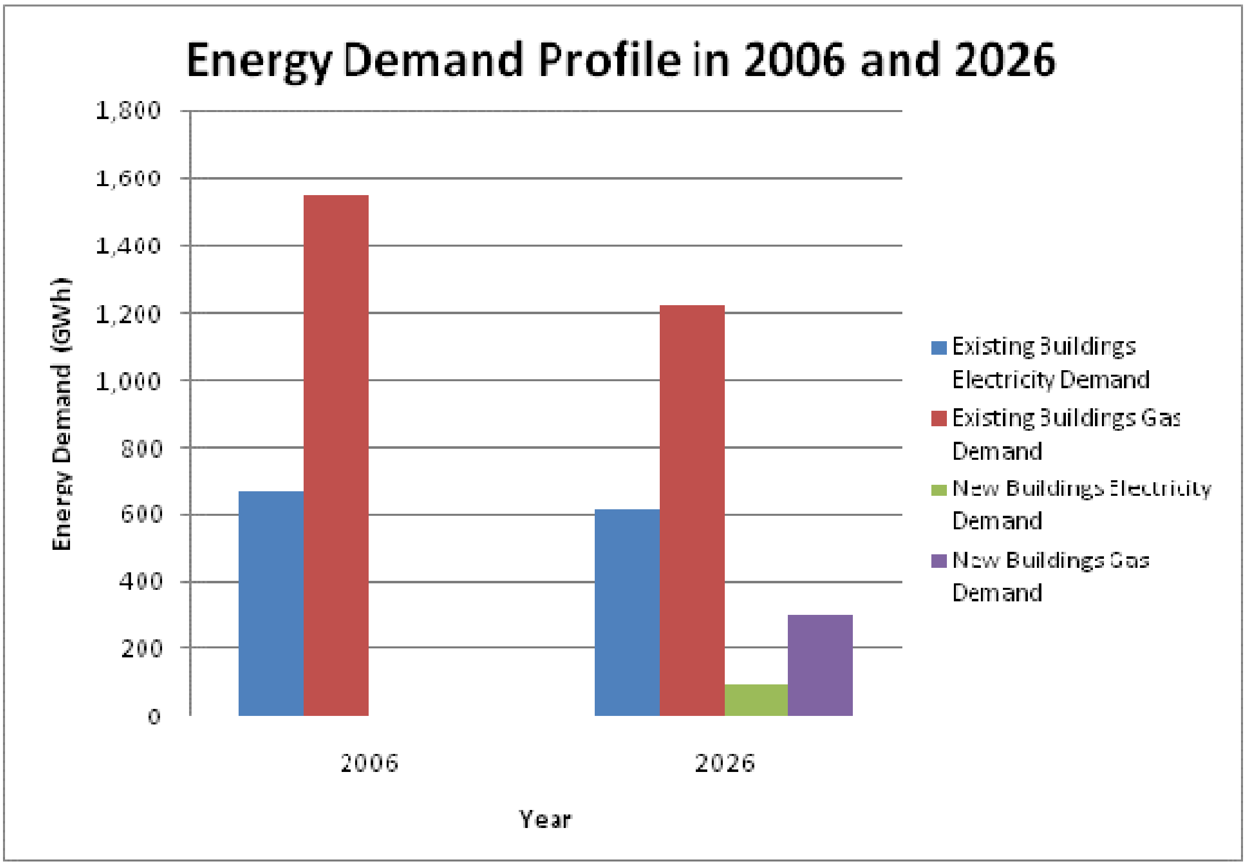

Figure E6: Comparison of energy demand from existing and new buildings(kWh)

- **Key Emerging Considerations for the LPAs**

An understanding of the current and future energy demand profile of Blackpool highlights a number of considerations for the LPAs:

- It is important to realise the scale of energy demand in order to both set planning targets and measure planning targets for renewable energy delivery based on a percentage of demand. Current and future energy demands have been calculated in this chapter for use in policy and delivery.
- The Council plays a key role in increasing energy efficiency of existing buildings. Existing buildings make up the bulk of the future energy demand, and hence efforts must be made to reduce energy demand of existing stock.
- Existing non-residential buildings often receive less focus than existing homes. The Council should support initiatives to increase energy efficiency in non-residential buildings in their area, particularly large energy users.
- The capacity of electricity distribution networks should be considered in the planning of large-scale low carbon and renewable electricity proposals.

PHYSICAL CONTEXT: RENEWABLE AND LOW CARBON POTENTIAL

Complementary to an understanding of energy demand levels and locations, is an understanding of the potential for the local generation of renewable and low carbon potential. This helps to identify key opportunities and also highlight delivery mechanisms.

- **Existing Renewable and Low Carbon Energy Generation in Blackpool**

Details of the current known renewable and low carbon installations in Blackpool are shown in the table below. The Council has proactively encouraged installation of renewable energy showcases, including photovoltaic array and small wind turbines at the Solaris Centre, which also gives educational material on energy efficiency and low carbon living. The Council have also installed small scale wind turbines on a section of the promenade. These initiatives should be commended for their educational and leadership benefits to show Blackpool is proactive in reducing its emissions. In terms of overall carbon reduction however, the current installations are modest and make a limited impact on the overall reduction of Blackpool's carbon emissions.

- **Potential Sources of Renewable and Low Carbon Energy**

This study assesses the scale of potential from different renewable energy sources in Blackpool. The table below summarises the key renewable energy sources identified.

Source	Contractor	Location	Installed Capacity (MW)	Status
Wind Power	Blackpool Council	Blackpool Promenade	0.045	Operational
Wind Power	Solaris	Solaris Centre	0.012	Operational
Wind power	Holy Family	Private	Unknown - Small scale	Planned
Photovoltaic Array	Solaris	Solaris Centre	0.018	Operational
Combined Heat and Power	Solaris	Solaris Centre	0.055	Operational
Combined Heat and Power	Blackpool Council	Sandcastle Complex	Unknown - Medium Scale	Planned
Combined Heat and Power	Blackpool Council	Homes for Elderly	Unknown - Small Scale	Planned

Table E2: Known existing low carbon and renewable energy installations in Blackpool

The potential for renewable and low carbon energy generation across Blackpool has both wide scope and scale of potential. The promenade areas along the beach are able to support development of wind energy. The urban centre has significant potential for the installation of district heating systems, fed by combined heat and power, along with building integrated micro-generation alongside both existing and new development.

The CO_2 savings that can be achieved through improvement of existing buildings are very substantial and this should be a priority for change in Blackpool. However, the delivery mechanisms will have to be put in place to drive substantial change to existing buildings in Blackpool.

The Low Carbon Buildings Programme (managed by DECC) will keep a record of grant-funded renewable installations in the Local Authority area in order to monitor uptake of installations.

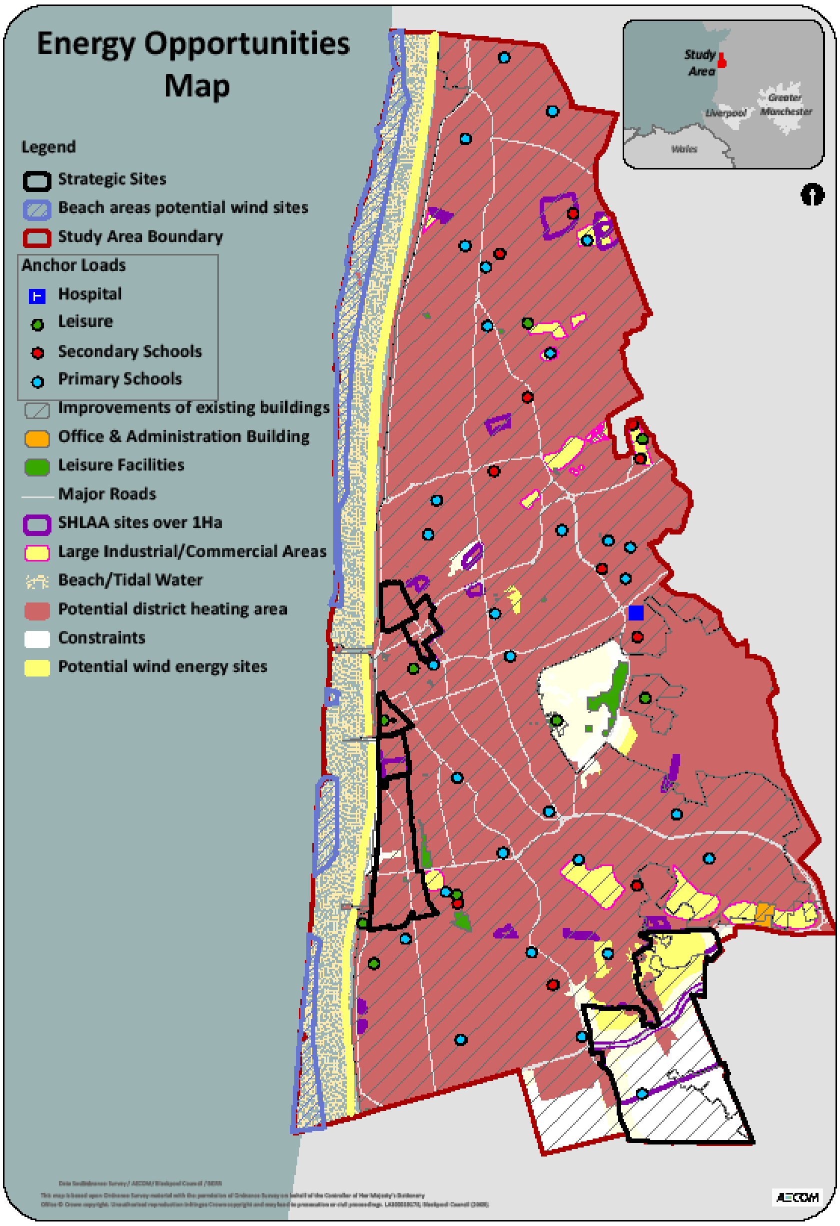

Figure E7: Energy Opportunities Plan for North Hampshire

Using the scale of potential for the varying renewable and low carbon resources in the Blackpool LPA area, suitable overall targets for renewable energy generation have been recommended. In alignment with national targets, a 12% target for renewable heat by 2020 has been applied to the Blackpool LPA. Modelling undertaken for this study shows that this is achievable due to the strong potential for district heating in urban areas along with biomass supply or geothermal. The North West Plan sets a target of 20% of electricity from renewable sources by 2020 and whilst supply of 20% of electricity from renewable sources will be challenging in Blackpool, there is sufficient potential to meet the target if Combined Heat and Power can be delivered to a substantial proportion of the Borough (10-15% of viable areas) and fed by a renewable supply of heat such as biomass or geothermal. Significant contributions can also be achieved through delivery of wind power and micro-generation associated with both existing and new development.

- **Key Emerging Considerations for the LPAs**

The consideration of resource potential has highlighted several key opportunities for the LPA:

- There are considerable renewable and low carbon resource opportunities, particularly surrounding low carbon heat in Blackpool;
- All opportunities are delivery dependant – resource potential in itself does not contribute to targets, therefore focus should be on enabling delivery; and
- An Energy Opportunity Map (EOM) has been produced as a planning resource which will allow assessment and prioritisation of delivery of opportunities.

DELIVERY CONTEXT IN BLACKPOOL

To ensure that opportunities are delivered, the LPA plays an essential role. Delivery opportunities relate to three broad energy opportunities; existing development, new development and strategic community-wide interventions:

- Existing development:
  - Delivering improvements through energy efficiency;
  - Delivering fuel switches away from high-carbon sources; and
  - Delivering on-site low carbon and renewable energy technologies;
- New development:
  - Delivering energy efficient new development;
  - Delivering on-site low carbon and renewable energy technologies;
  - Delivering increased on-site carbon reductions or near-site generation; and
  - Delivering allowable solutions off-site.
- Strategic community-wide interventions:
  - Delivering decentralised low carbon and renewable energy through
    - private investment;
    - community investment;
    - public sector; or
    - a combination of the above in partnership.
  - Delivering low carbon resource supply chains.

The role and influence of the LPA in the delivery of the energy opportunities associated with each varies, as shown in the figure below. The nature of planning for energy at the local level is such that the planning process cannot deliver the opportunities alone; it will require a collaborative approach between local authority departments, the Local Strategic Partnership (LSPs), private developers and communities.

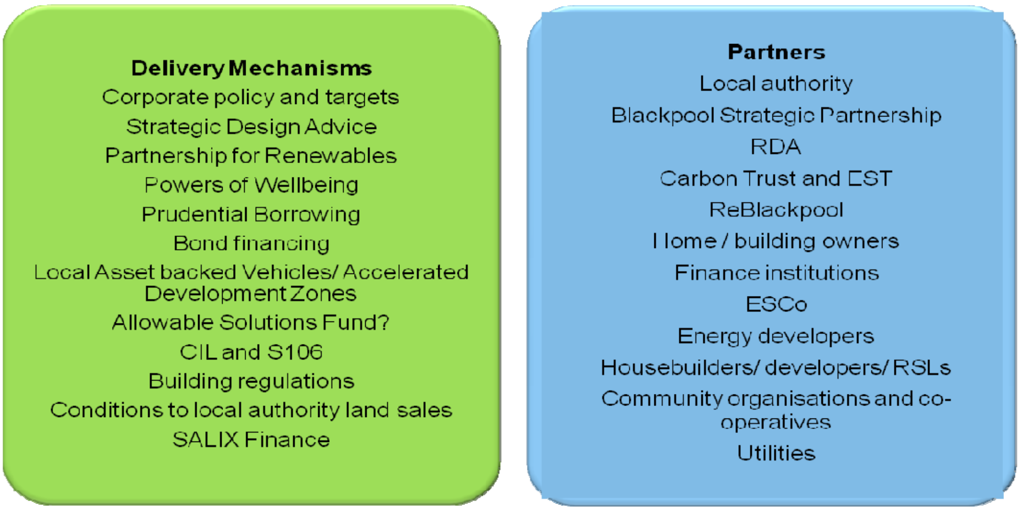

Figure E8: Overview of delivery mechanisms, partners and planning policy for energy opportunities in Blackpool

- **Delivering carbon reduction in existing buildings**

Improving the energy performance of existing buildings should be undertaken in three ways:

- Increase the uptake of energy efficiency measures with concentrated funding and a programme of improvement. The LPA can encourage higher energy efficiency in existing buildings by working with partner organisations to distribute and focus funding.
- Home improvement measures such as loft, cavity and solid wall insulation, double glazing and boiler replacement should be heavily promoted across the Borough, as these are the least efficient areas on a per home basis.
- Installing micro-generation technologies to a large proportion of existing properties. Delivery of low carbon and renewable technologies within existing buildings and communities cannot be required by planning, but can be encouraged by the LPA.
- The Council has already set an example by installing example micro-generation technologies in Blackpool and supporting the Solaris Centre. Further initiatives could be taken through pro-active community education and leadership of the council by installing significant installations on their own buildings.

- **Delivering carbon efficient new development**

Carbon efficient new development will be delivered through a combination of energy efficiency measures and development driven renewable and low carbon energy infrastructure in-line with the Government's commitment to zero carbon development in 2016. A proportion of carbon reduction is likely to be met 'on-site' with the remaining carbon reduction potentially being picked up through a range of 'allowable solutions'. As part of the allowable solutions, developers can look for opportunities to reduce carbon further either on-site or off-site. The scope and governance of allowable solutions is yet to be confirmed by Government, however, LPAs are in a unique position to both encourage maximum carbon reduction associated with new development through planning and to coordinate and highlight priority opportunities for delivery of allowable solutions.

The key opportunities for the LPA in Blackpool are:

- Setting local planning policies for new development that capitalise on local opportunities for carbon reduction.
- Requiring specific investigations and targets on strategic sites where significant carbon reduction opportunities exist (six strategic sites have been considered as part of this study).
- Using spatial planning to locate and design new development areas that optimise potential for carbon reduction and integration of renewable or low carbon energy generation.
- Leading, partnering or coordinating the development of key renewable and low carbon energy generation opportunities associated with 'allowable solutions' funding.
- Introducing a planning and a delivery mechanism that prioritises delivery of energy opportunities through spending of money raised through a Community Infrastructure Levy (CIL). The CIL is expected to commence in April 2010 and unlike Section 106 contributions can be used 'to support the development of an area' rather than to support the specific development for which planning permission is being sought.

- **Delivering Strategic Community-Wide Interventions**

Two key delivery areas were considered on a strategic level within this study to aid the prioritisation of delivery across Blackpool:

- Delivery of district heating schemes;
- Delivery of community-owned wind power schemes.

The figure below shows the location of high energy demand facilities such as hospitals, leisure centres and schools. The location of such facilities is key, as district heating schemes often need an 'anchor load' or consistent energy user to operate efficiently. Therefore areas around these anchor loads are priorities for development. In Blackpool these anchor loads are Blackpool Victoria Hospital, Industrial and Commercial buildings, the Pleasure Beach, local Authority buildings and schools.

The figure below highlights the key areas where district heating schemes are likely to be deliverable in Blackpool. There is significant opportunity for carbon reduction through the installation of district heating, and delivery of some of these opportunities is essential to Blackpool's contribution to mitigation of climate change. The LPA should consider how these can be enabled through leadership from the LPA or private sector energy services companies (ESCos). There are various funding and ownership models that have been delivered, and the most suitable opportunities for Blackpool should be given urgent consideration by the LPA.

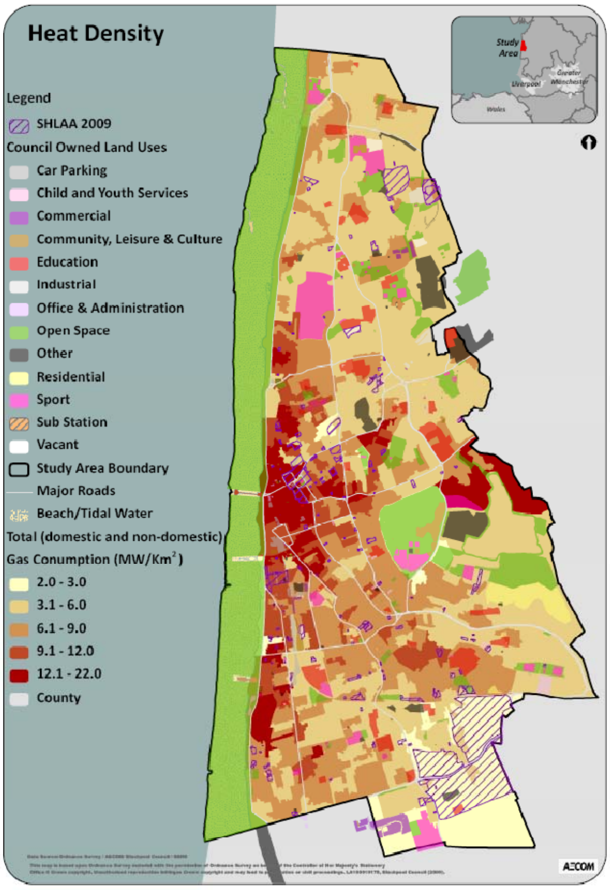

Figure E9: District heating priority areas

There is currently very limited development of wind energy in Blackpool. Local communities can both assist in delivery of significant installations and reap considerable benefits from the revenue associated with local renewable energy generation. The figure below prioritises areas where, in planning terms, the development of community sponsored wind schemes is most favourable. The LPA should support the delivery of appropriate wind developments across Blackpool by encouraging community wind schemes.

Few wind opportunity areas identified in the Energy Opportunities Map (EOM) are likely to be attractive to commercial developers. Project finance options include the issuing of bonds to residents and businesses. Returns on investments would be based on energy sales, ROCs and the feed-in-tariff. Further community incentives could include discounts on Council tax. These kind of delivery approaches will be challenging. Therefore, to ensure sufficient expertise and resource is devoted to making local authority-led delivery initiative a success it is recommended that a local authority-led delivery vehicle, such as an ESCo, partnership or joint venture, be considered. The types of ESCo are discussed in more detail in section 6.4.

For all potential wind sites the Council and its partners should identify delivery opportunities, considering available financial mechanisms, publically owned land, community involvement and ownership and the role of schools.

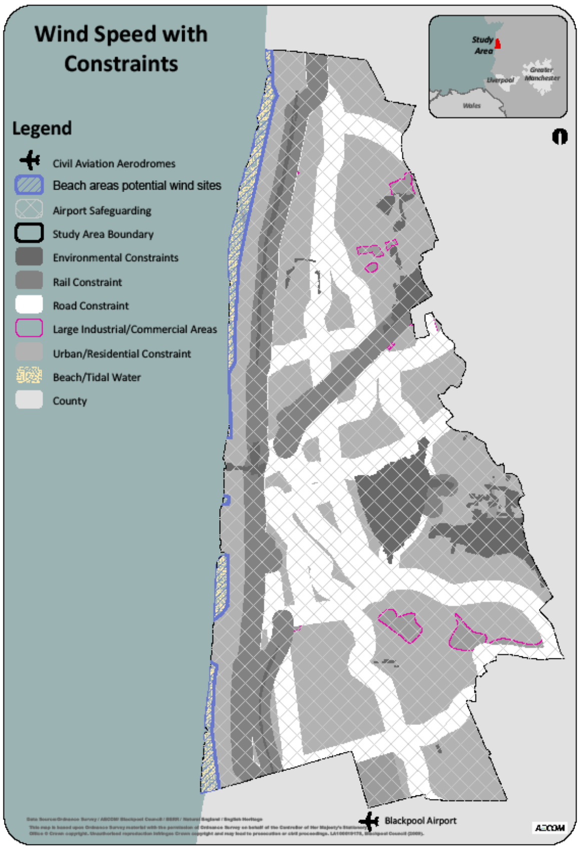

Figure E10: Community wind priority areas

Delivery and Funding Mechanisms

There are a wide range of delivery mechanisms that can be employed to support planning for energy. Not all will be suitable for Blackpool and mix is likely to be needed to encompass all of the energy opportunities. This report provides the context for making those decisions. Further work, discussions and advice will be needed to make them happen.

We have set out below clear requirements for further investigation and leadership, to ensure this work is taken forward.

As a first step we recommend that Blackpool Council explores further the potential for using Carbon Trust Low Carbon Building Strategic Design Advice money to undertake the following next steps:

Leadership and skills

- The Council must take strategic leadership role together with ReBlackpool and Blackpool Strategic Partnership to ensure the necessary political and stakeholder buy-in.
- It must develop skills across the Council and its partners.

Priority actions and projects

- The Council needs to set out a clear framework which gives relative certainty. Action should be prioritised on strategic sites, council and public sector property and assets, such as Victoria Hospital. Oversize energy generation should be considered on new development sites and in public sector and council owned schemes to supply excess heat/energy to surrounding developments.
- The Council should work with the other local authorities in the Fylde Coast sub-region to develop opportunities for energy from sewage, waste, hydropower, larger wind energy and biomass energy that would provide deliverable opportunities in the wider sub-region, in line with the Fylde Coast MAA which recognises key wider opportunities for renewable energy technologies.

- Initiatives in energy efficiency priority areas should focus on home improvement measures such as loft, cavity and solid wall insulation, double glazing and boiler replacement.
- The Council should work with eligible partners to develop a micro-generation retrofit strategy based on the opportunities presented by the LCBP.
- A set of priority district heating schemes should be drawn up by the Council and its partners and further feasibility work carried out. This should be based on factors such as financing options, planning, phasing and type of development. Options for designation as a district heating priority area include:
    - South Beach AAP. Concerns over financial viability means that alternative delivery mechanisms should be explored.
    - Central Drive, Talbot Road and Church Street along with the promenade would be key corridors for heat mains. These are likely to require strategic interventions to ensure opportunities are not lost.
    - The tramway along the promenade.
- Should the Council agree to lead installation of a district heating network then it is recommended that they explore the option of establishing an LDO in order to add certainty to the development process and potentially speed up delivery.
- For all potential wind sites the Council and its partners should identify delivery opportunities, considering available financial mechanisms, publically owned land, community involvement and ownership and the role of schools.
- Opportunities for biomass, biofuels and biogas should be explored with partners in neighbouring authorities.
- Geothermal potential should be explored with a view to incorporating the technology as part of a wider district heating and CHP network.
- The Council and its partners should undertake further work to explore the role for the local authority to link housing development to energy supply delivery.

Delivery vehicles and funding

- The Council and its partners need to establish an appropriate form of delivery vehicle or vehicles to pursue the key energy efficiency and supply opportunities. Further work will be needed to understand what is suitable for Blackpool but will need to consider ESCo, partnerships and joint ventures.
- Funding mechanisms should be identified and applied first to priority schemes, co-ordinated through the appropriate delivery vehicle. These could include:
    - Delivery of whole house and street-by-street energy efficiency improvements and retrofit of micro-generation technologies.
    - Setting up a carbon buyout fund, possibly using the CIL, to pay for large or small wind turbines off-site in the wind opportunity areas. Further work will need to be undertaken to establish the extent of the opportunity, considering issues such as land ownership.
    - Developing a plan to deliver allowable solutions to ensure funding from new development is directed towards the best solutions in a coordinated way.

Communities are likely to play a crucial role in the delivery of energy infrastructure. However, to be successful further work will be needed to explore how communities function within Blackpool.

There are a number of potential delivery options explored in this report including:

- Setting up an Energy Company
- Community Infrastructure Levy (CIL)
    - Local Development Orders (LDO):
- Delivery of micro-generation technologies
    - Householder or business purchase
    - Householder or business hire purchase
    - Householder or business rental
- Sources of funding for public bodies
    - UK Green Stimulus Package Pre-Budget Report 2008
    - Salix Finance
    - Low Carbon Buildings Programme – Phase 2
    - Carbon Emission Reduction Target (CERT)
    - The Community Energy Saving Programme
    - Renewables Obligation Certificates (ROCs)
    - Feed-in tariffs
    - EDF Renewable Energy Fund
    - Intelligent Energy Europe

Key to delivering an effective area-based low carbon and renewable energy strategy is successfully drawing on all of the available opportunities. This includes the Comprehensive Area Assessment (CAA) process, which recognises the fact that no single organisation can be responsible for meeting local needs. Alongside the opportunities for a local delivery vehicle are shorter-term Local Area Agreements (LAA) and National Indicators.

LPA AREA-WIDE POLICY RECOMMENDATIONS

Based on the policy, physical and delivery context in Blackpool, the following eleven policy options recommendations have been made for application on an LPA area-wide scale.

Policy Options:

1. Extensions to Existing Homes

Any changes to existing domestic dwellings should include reasonable improvements to the energy performance of the existing dwelling. This is in addition to the requirements under Part L of the Building Regulations for the changes for which planning permission is sought. Improvements should include loft and cavity wall insulation, draught-proofing, improved heating controls and replacement boilers.

A checklist could be included as part of this process in order to identify which measures are appropriate to each home. In the case where the building already includes key energy efficiency measures, no improvements need to be made. The total cost should be no more than 10% of the total build cost.

2. Conversions

Any Conversions to existing buildings should include improvements such as loft and cavity wall insulation, draught-proofing, improved heating controls and replacement boilers.

It should be encouraged that any requirements for new boilers should result in the property instead connecting to the existing or planned decentralised heat and/or power scheme. If the conversion is likely to take the form a substantial structural re-building of the property, then any changes will need to comply with Part L of the Building Regulations as a minimum.

Policy Options:

3. Additional Increment on Building Regulations

In order to contribute to the delivery of the Energy Opportunities Plan, all new buildings in Blackpool should be subject to either a Community Infrastructure Levy, charged at £100 per tonne of CO_2 per building emitted over a 30 year period (or a one-off payment of £3,000 per tonne of CO_2 per building); or

Aim to achieve a 15% reduction in residual CO2 emissions in all buildings after Building Regulations Part L compliance has been demonstrated. This can be achieved through "carbon compliance", i.e. a combination of energy efficiency measures, incorporation of on-site low carbon and renewable technologies and directly connected heat (not necessarily on-site).

Planning approval should then be conditional on the provision at the design stage and on completion of design and as-built Building Control Compliance documentation clearly showing the Target Emission Rate (TER) and Dwelling Emission Rate (DER) / Building Emission Rate (BER).

A reduction in emissions should be provided either on site, as part of CIL or as part of a carbon buyout fund which would be used in the event of CIL not being established as a requirement.

4. Efficient Design and Integration of New Development

All new development should, where possible, be located and designed in a way in which advantage can be taken of opportunities for decentralised, low and zero carbon energy.

All new development should catalyse improvements for energy efficiency and increase supplies of decentralised, low-carbon energy in existing buildings.

All new development should, where appropriate, be required to connect to existing or planned decentralised heat and/or power schemes.

Policy Options:

5. Sustainable Design and Construction

New residential developments in Blackpool are required to meet full 'Code for Sustainable Homes' standards or equivalent. These requirements will not come into effect until successive updates to Part L of the Building Regulations become mandatory:

Code level 3 or above, will be required for all new homes once updates to Part L come into effect (currently scheduled for April 2010).

Code level 4 or above, will be required for all new homes once updates to Part L come into effect (currently scheduled for 2013).

All new non-residential developments in Blackpool over 1000 square metres gross floor area should aim to achieve the BREEAM "Very Good" standard or equivalent, with immediate effect (relevant versions of BREEAM are available covering offices, retail, industrial, education and healthcare).

If this policy option is to be applied it should require submission of final Code certificates and post-construction BREEAM certificates, as appropriate.

6. Design, Layout and Location

All new developments should ensure buildings are designed to be warmed by the sun, orientating buildings to maximise sunlight and daylight and using natural lighting and ventilation to reduce carbon emissions.

The council should support the design or location of buildings to enable people to get access to amenities with fewer or shorter car journeys. In addition the council should support development which makes efficient use of land with good access to public transport to reduce travel and therefore carbon emissions.

Policy Options:

7. Strategic Sites – Energy Strategies

Within Blackpool it is considers that the following strategic areas will have a major role to play in achieving an increase in decentralised, low carbon and renewable energy:

Marton Moss (as part of the M55 Hub)

Talbot Gateway

Foxhall

South Beach AAP area

North Beach AAP area

Central Station Site

An energy strategy, including phasing requirements, should be developed for the entire site and surrounding area. This will guide the development of low carbon infrastructure in a coordinated way, and ensure that individual developments on the site can be taken forward in a carbon and cost-efficient manner. All energy strategies should include feasibility assessment for district heating and CHP.

8. Strategic Sites – Carbon Reduction Targets

The following strategic sites should be required to achieve additional on-site carbon reductions (relative to TER) according to the scale of potential, as follows:

- **Marton Moss (as part of the M55 Hub): 100%**
- **Talbot Gateway: 100% for domestic properties; 44% for commercial properties**
- **Foxhall: 100% for houses; 44% for apartments**
- **South Beach AAP area: 44%**
- **North Beach AAP area: 25%**
- **Central Station site: 44%**
- **Rigby Road Educational Facility: 100% for domestic properties; 44% for commercial properties**

Calculations showing the achievement of the required carbon reduction should be provided to the Council using the standard methods outlined in Building Regulations.

Policy Option:

9. Renewable Energy

Blackpool demonstrates significant potential for inclusion of district heating and micro-generation and should aim to meet at least the national heat target of 12% or above.

Blackpool should assist in the delivery of its portion of the 20% electricity from renewables by 2020 using its potential for combined heat and power, wind energy and micro-renewables.

Applications for low carbon and renewable energy installations should generally be supported in the area. The area is seeking new renewable energy generation capacity to deliver an appropriate contribution towards the UK Government's binding renewable energy target. Therefore:

At least 142GWh of renewable electricity by 2020 (approximately 20% of total electricity demand in Blackpool).

At least 189GWh of renewable heat by 2020 (approximately 12% of total heat demand in Blackpool).

Policy Option

10. Delivering the Energy Opportunities Map

Decentralised, low carbon and renewable energy is a priority for the Council. Planning applications for new development in Blackpool will need to demonstrate how they contribute to delivery of the 'Energy Opportunities Map'.

Policy Options

11. Priority areas

The Council will favourably consider applications for development which will support the following energy priority areas:

DISTRICT HEATING PRIORITY AREA

The Energy Opportunities Map (EOM) highlights the favourable areas for district heating networks. These areas should be considered by the delivery body as priority areas for installing district heating systems.

The Council will support the delivery of district heating in these areas and will work with all relevant stakeholders, which may include residents, private sector partners, utilities companies, neighbouring authorities and other public sector bodies, as appropriate, to bring forward more detailed proposals for district heating in these areas.

Development within the priority area should install the secondary elements of a district heating network (i.e. from the wider network to properties), unless it can be shown not to be viable or feasible, and work closely with the ESCo to ensure compatibility of systems. Should development come forward prior to a district heating network being in place, developers should provide a containerised energy centre to provide temporary supply. Where appropriate, applicants may be required to provide land, buildings and/or equipment for an energy centre to serve proposed or multiple developments.

New residential and commercial development should be designed to maximise the opportunities to accommodate a district heating solution, considering: density; mix of use; layout; and phasing.

Where applicants demonstrate that connection to a district heating network is not feasible or viable they should contribute financially to the Carbon Buyout Fund/CIL.

WIND POWER PRIORITY AREAS

The Energy Opportunities Map (EOM) highlights potential favourable locations for wind turbines.

The council will look favourably on the addition of new wind turbines at the medium or large scale as part of any redevelopment of industrial parks, commercial areas or public realm located a suitable distance from residential areas. The location of wind turbines in these areas should not be to the detriment of local wildlife. Applications would be encouraged from community groups and individuals in priority areas.

STRATEGIC SITE ANALYSIS

Seven strategic sites have been tested in further detail to determine whether advanced carbon reduction targets can be set through policy in accordance with the PPS1 supplement.

Marton Moss (as part of M55 Hub)
Talbot Gateway
Foxhall
South Beach AAP area

North Beach AAP area

Central Station site

Rigby Road site

STRATEGIC SITES

Marton Moss (as part of the M55 Hub)

The M55 Hub is expected to see large development with a particular focus towards residential buildings. Areas of low density housing should make use of high standards of energy efficiency with microgeneration technologies and a number of large community wind turbines where feasible. Higher density areas should be feasible for heat networks which would ideally be supplied by biomass CHP where a reliable biomass supply can be sourced. Where insufficient biomass can be established, gas CHP should be used to supplement the heat requirement for this network. Microgeneration technologies such as PV should also be installed on south-facing roofs where possible.

Predominant Technology	Supplementary Technologies	Site Aggregate CO_2 Reduction of Building Regulation Part L	Indicative % Cost Uplift
Biomass/Gas CHP Heat Network	Roof-mounted PV. Community Wind Turbines.	Microgeneration / community wind turbine areas: Zero Carbon Gas CHP areas: 98% Biomass CHP areas: Zero Carbon	Microgeneration / community wind turbine areas: 29% Gas CHP areas: 40% Biomass CHP areas: 39%

Talbot Gateway

The diversified daily demands that will result from the proposed mixed use development at Talbot Gateway make this site ideally suited to a heat network. Limited access for biomass deliveries makes gas CHP the most likely technology to serve this network, while Council ownership of a significant proportion of the land creates an opportunity for Blackpool Council to develop anchor loads for a low carbon heat network. Microgeneration technologies (in particular PV) should be used in conjunction with a low carbon heat network to achieve higher standards of CO_2 emissions savings.

Predominant Technology	Supplementary Technologies	Site Aggregate CO_2 Reduction of Building Regulation Part L	Indicative % Cost Uplift
Gas CHP Heat Network	Potential to extend heat network to buildings beyond the site 'red line' for Talbot Gateway (e.g. North Beach). Roof-mounted PV.	56%	25%

Foxhall

Foxhall's reliance on tourism has resulted in the dilapidation of many sub-regions in the area over recent years. The aim for Foxhall is to revive a number of the existing traditional guesthouses while developing new residential properties in the sub-region known as Residential South. This residential development is likely to account for the majority of new development across the region and creates the greatest potential for CO_2 savings. The residential building types and densities proposed means a district heating network is likely to be feasible for these houses, with the potential to extend this network to existing properties within Foxhall and the adjacent South Beach area as well as new development at the Central Station site. Restricted access for biomass deliveries means that gas CHP is likely to be the most feasible method of supplying heat to this network.

Predominant Technology	Supplementary Technologies	Site Aggregate CO_2 Reduction of Building Regulation Part L	Indicative % Cost Uplift
Gas CHP Heat Network	Potential to extend heat network to buildings beyond the site 'red line' for Foxhall (e.g. South Beach and the Central Station site). Roof-mounted PV.	88%	38%

South Beach AAP area

The South Beach area has also suffered from the decline in Blackpool's tourism market and is looking to retain some of the higher quality holiday accommodation while converting some of these properties into residential accommodation. With the exception of some hotel/residential redevelopment on the Promenade, redevelopment works are expected to take place in small pockets of land in the area rather than as large scale redevelopment as is taking place at other areas within Blackpool. The greatest benefits for this area can therefore be achieved through using new development to drive improvements in the existing building stock. The existing building stock is targeted most effectively through improving insulation standards and connecting these buildings to heat networks developed as part of larger redevelopment works. The central location of South Beach within Blackpool makes this area most suitable for use with a gas CHP heat network. There is also the potential to connect to a 'feature renewable technology' located on or near to the Promenade which serves to generate useful electricity to the South Beach area whilst also making a statement of sustainability for the area.

Predominant Technology	Supplementary Technologies	Site Aggregate CO_2 Reduction of Building Regulation Part L	Indicative % Cost Uplift
Gas CHP Heat Network	Potential to extend heat network to buildings beyond the site 'red line' for South Beach (e.g. Foxhall and Rigby Road site). Roof-mounted PV. Feature renewable technology located on the Promenade.	32%	14%

North Beach AAP area

The North Beach area has also suffered from the decline in Blackpool's tourism market and is hoping to benefit from the large scale redevelopment at the adjacent Talbot gateway site. This large-scale development at Talbot Gateway is then expected to drive smaller redevelopment within the North Beach area. The heat network expected to be constructed at Talbot Gateway could feasibly be extended into the North Beach region to serve renovated properties along High Street. As further redevelopment takes place on the Promenade and along General Street, an additional community network could be developed here. Energy efficiency improvements are likely to be crucial in minimising associated CO_2 emissions from existing residential properties and should be maximised as a priority.

Predominant Technology	Supplementary Technologies	Site Aggregate CO_2 Reduction of Building Regulation Part L	Indicative % Cost Uplift
Gas CHP Heat Network (Extension of Talbot Gateway heat network)	Creation of new heat network serving the Promenade and General Street areas. Roof-mounted PV.	29%	21%

Central Station site

The Central Station site is expected to see large scale development consisting of mixed leisure, retail and conference facilities including a large leisure attraction which is expected to be an indoor skiing facility. The proposed uses on this site create diversified demand patterns and a high demand for heat, making a district heating network a feasible opportunity. Heat rejected from the skiing facility could also be recovered and used to contribute to the district heat network as well as using absorption cooling where required to help smooth the annual demand for heat and increase the viability of a district heating network. This heat demand would then be best served by a gas CHP system that could maximise on the potential of a smooth base heat demand.

Predominant Technology	Supplementary Technologies	Site Aggregate CO_2 Reduction of Building Regulation Part L	Indicative % Cost Uplift
Gas CHP Heat Network (creation of new heat network serving Promenade attractions and main snow dome leisure area)	Extension of network to adjacent Foxhall site. Roof-mounted PV, in particular on south-facing sloped roof of snow dome. Roof-mounted wind turbines on tallest structures. Promenade 'renewable energy feature' – likely to be wind or tidal solution. Free-cooling from seawater pumping system in Sea Life Centre building.	39%	11%

Rigby Road site

The Rigby Road site is predominantly occupied by the Illuminations Depot and Transport Depot with a substantial area used for public car parking. Providing that LSC funding can be secured, the site is expected to see a substantial education development as part of the relocation of Blackpool & Fylde College from the current Bispham site. Development on this site is expected to consist of mainly education buildings with potentially some residential development on the outskirts. This new development is hoped to be the catalyst for redevelopment in the wider area with the possibility of extending a gas CHP heat network from the new development to existing nearby dwellings and key buildings that could serve as anchors to this extension (e.g. Revoe Primary School and Odeon Cinema). Energy efficiency improvements are also likely to be key in reducing the CO_2 emissions associated with the existing building stock in this area.

Predominant Technology	Supplementary Technologies	Site Aggregate CO_2 Reduction of Building Regulation Part L	Indicative % Cost Uplift
Gas CHP Heat Network	Extension of network to adjacent existing buildings including: Odeon Cinema, Revoe Primary School, residential properties on Lune Grove, Wyre Grove and Levens Grove. Potential recovery of waste heat from sewage pipeline running along Seasiders Way. PV on south-facing roofs.	54%	18%

Contents

1. Introduction

1.1 INTRODUCING THE STUDY

AECOM have been appointed by Blackpool Borough Council to develop an evidence base to inform the development of CO_2 reduction and renewable energy policies to be included in the Core Strategy and supporting documents for the authority and to provide wider advice to the Council of the future potential for appropriate energy developments. Figure 1 shows the local authority boundary. The character of the Local Planning Authority (LPA) area is predominantly urban, with limited open spaces or undeveloped areas. Blackpool is a coastal area, with higher density development focussed around leisure activities along the seafront and promenade. This study considers the existing and future context of the Borough and the opportunities for CO_2 reductions associated with energy use.

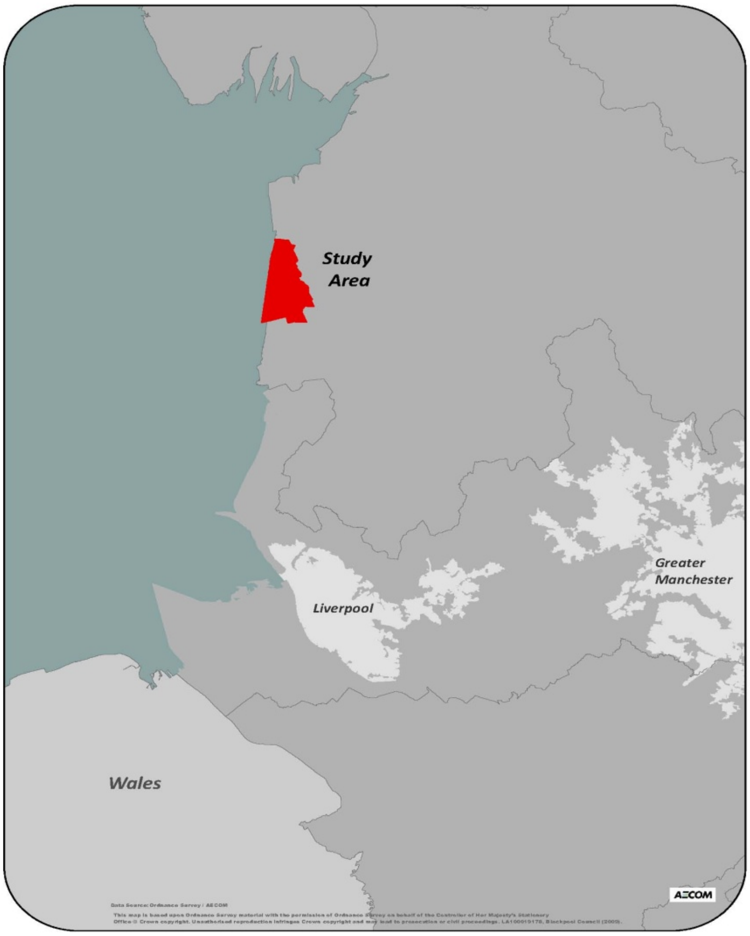

Figure 1: The study area

1.2 SCOPE OF THE STUDY

The evidence base seeks to ensure that the objectives set out in the draft Preferred Option Core Strategy (referred to from now in this report as the Core Strategy) can be delivered in a more sustainable, carbon efficient way. The development of this evidence base responds directly to requirements set out in Planning Policy Statement 1: Planning and Climate Change (Supplement to Planning Policy Statement 1). The PPS1 Supplement requires local authorities to understand the potential for incorporating renewable and low carbon technologies in their authority area:

"Planning authorities should have an evidence-based understanding of the local feasibility and potential for renewable and low-carbon technologies, including micro-generation, to supply new development in their area." – PPS1 Supplement.

Under the PPS1 Supplement Local Authorities should:

1. Along with criteria based policies, identify suitable sites for decentralised and renewable or low carbon energy;
2. Expect a proportion of energy supply for new development to be secured from decentralised and renewable or low carbon energy:
    - Set targets where necessary;
    - Where opportunities allow, bring forward development area or site-specific targets;
    - Set thresholds and development types to which the target will be applied; and
    - Ensure a clear rationale for the target and it is properly tested.

This study aims to provide a robust evidence base following PPS1 Supplement requirements to enable the delivery of CO_2 reductions associated with energy in Blackpool. Through an understanding of the current situation in Blackpool, review of policy direction and analysis of the borough's potential, this report sets out the premise and justification for policies. The report takes into consideration the availability of baseline information and the duration of growth projections in the area, therefore modelling in this study up to 2026 has been broken down into four 5 year growth phases.

This study concentrates on the potential of Blackpool Local Authority Area in particular, and specifically options which are deliverable within its urban context. However, the study should be considered within its wider context of the Fylde Coast, at the sub-regional level, where wider renewable energy opportunities exist. This is consistent with the current proposed Core Strategy text which states:

"The Fylde Coast Multi Area Agreement (MAA) recognises key wider opportunities for renewable energy technologies. Blackpool's own character and constraints lends itself to an urban focus of deliverable opportunities, but it will be essential that the potential around the M55 Hub and further afield in terms of other renewable energies are all fully investigated. This includes energy from sewage, waste, hydropower, larger off-shore and on-shore wind, and biomass energy – all of which may provide deliverable opportunities in the wider Sub-Region. The Council and its partners will pursue delivery of these key energy efficiency and supply opportunities".

This report also considers particular opportunities for strategic sites (identified due to their large scale and location) to exceed BOROUGH-wide policy requirements, as set out by the PPS1 Supplement. The scope of this study focuses on seven strategic sites:

- Marton Moss as part of M55 Hub
- Talbot Gateway
- Foxhall Regeneration Area (AAP)
- South Beach AAP
- North Beach AAP
- Central Station Site
- Rigby Road

There will be other strategic sites within Blackpool that come forward and are capable of exceeding Borough-wide targets and policy requirements. The process for identification of these sites and identification of key delivery opportunities is also discussed in this report, and should be utilised by the Council to set site specific planning policies as sites come forward.

The primary focus of this report is the development of an evidence base for policy concerning management and reduction of energy-related CO_2 emissions and the potential for renewable and low carbon technology to contribute to current and future energy requirements.

1.3 POLICY DEVELOPMENT PROCESS

The challenge of reducing CO_2 emissions and mitigating the effects of climate change is global in nature. At a National level, Government policy and targets outline the overall approach to CO_2 reduction, but in response to the PPS1 Supplement it is the responsibility of local authorities and local planning to seek to understand and capitalise on local opportunities to deliver CO_2 reduction associated with the built environment. To develop policy and targets on a local level, it is important to understand three areas of context; policy context, physical context and delivery context. While the policy context is consistent on a national level, the local response needs to be tailored according to regional and local policy context, the physical constraints and opportunities of a local area and the market and delivery opportunities available. A tailored local evidence base enables a direct and meaningful application of national aspirations for CO_2 reduction.

Figure 2 below demonstrates the policy development process. This process has been used to structure this evidence base report.

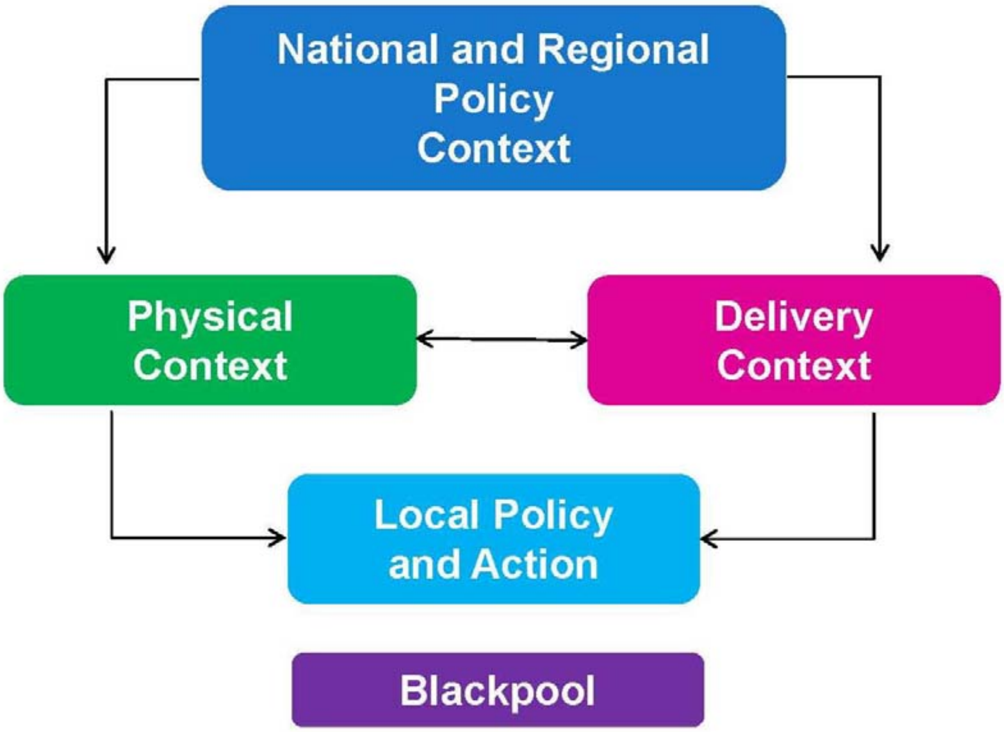

Figure 2: Policy Development Process

1.4 THREE ENERGY OPPORTUNITIES

While it is essential to recognise opportunities and constraints on a local level, it is also important to relate these to the various mechanisms and scales of intervention. The scope and influence of change can be understood as three energy opportunities:

1. Existing Development: The potential to improve performance of existing buildings, through both energy efficiency and inclusion of on-site low carbon and renewable technologies.
2. New Development: The potential to deliver CO_2 efficient buildings on new development sites along with on-site low carbon and renewable technologies.
3. Strategic Community Wide Interventions: Considering the existing and new built environment together in the wider environmental context and the opportunities this brings for development of low carbon energy systems and interventions on a strategic scale.

Figure 3: Three types of energy opportunity

Figure 3 demonstrates the three energy opportunities that are referred to and utilised in the structure of this report. The influence of planning and of Local Planning Authorities (LPAs) on these three opportunities differs in scope and scale, but policy options can be applied to affect all of these opportunities. Figure 4 shows the scope of influence of LPAs against the three types of energy opportunities. Through spatial planning, LPAs play an important role in realising the strategic opportunities at a larger scale, and utilising this wider vision to inform opportunities at a site scale. For example, on a site by site basis, certain low carbon technologies such as district heating may not be viable, but in the wider context, these can become viable when linking to existing areas and neighbouring development sites. LPAs play a key role in identifying and coordinating these opportunities. The wider LPA context also provides a scale of opportunity for utilisation of low carbon and renewable energy resources and infrastructure in landscapes and open spaces as well as the built environment. This wider context informs the level of natural resource available for utilisation either through independent or development-driven delivery of infrastructure, including levels of fuel resource available, such as biomass and waste for energy production, and viability of renewable resource utilisation, such as wind speeds and solar intensity.

Figure 4: LPA influence on the three types of energy opportunities

1.5 REPORT STRUCTURE

The rest of this report is set out as follows:

- **Chapter 2: Policy Context** – reviews the relevant national, regional and local policy drivers and opportunities.
- **Chapter 3: Physical Context: Energy Demand from the Built Environment** – examines the current and future physical context of the LPA area, considering the state of existing buildings, expected growth and new development and the overall LPA-wide energy demand profile.
- **Chapter 4**: **Physical Context: Low Carbon and Renewable Energy Potential** – considers the renewable and low carbon resource potential at a site and borough scale.
- **Chapter 5: Delivery Context: Strategic Site Analysis** - Analyses the potential of seven strategic development sites across the Borough to achieve higher energy and CO_2 targets in accordance with the PPS1 Supplement.
- **Chapter 6: Delivery Context: Borough-Wide** – considers delivery partners and mechanisms for CO_2 reduction across Blackpool for every type of energy opportunity.
- **Chapter 7: Policy Options** – gathers together evidence from the previous chapters to consider policy options for the Borough.

2. Policy Context

2.1 INTRODUCTION TO THIS CHAPTER

Policies regarding renewable energy and CO_2 reduction are rapidly evolving as our understanding of the challenge of climate change becomes clearer and appropriate responses are established at different administrative levels and through varying mechanisms. This, along with the multifaceted nature of energy uses, generation methods and fuel sources, makes for a complicated policy context where approach and importantly targets are not necessarily consistent or compatible. Below is an outline of the key national policy, which with recent publications is at the forefront of renewable energy and CO_2 reduction policy, followed by discussion of how regional policy and local policies currently relate. At the end of this section, we explore the assessment mechanisms of Code for Sustainable Homes and BREEAM, which are available to planners for use within policy targets and requirements to assist in the assessment of sustainable construction integration in new development, including CO_2 reduction.

2.2 NATIONAL POLICY

The challenge of climate change, and the need to reduce greenhouse gases and stabilise carbon dioxide in the atmosphere to 450ppm (parts per million) has intensified in recent years. At the international level, the UK is a signatory of the Kyoto Protocol, which sets out an agreement between the 37 industrialised nations signed up (all bar the USA) to collectively reduce greenhouse gas emissions by 5.7% on 1990 levels. The EU agreed to an 8% reduction. The Kyoto Protocol was due to be updated, as outlined by the Bali Roadmap 2007, at the 2009 United Nations Climate Change Conference in Copenhagen. During the conference several nations put forward actions they were prepared to take. The EU proposed a 30% reduction in emission on 1990 levels, however expectation for agreement on legally binding carbon reduction targets were not met. As talks broke down, a collection of nations led by the US presented the Copenhagen Accord which recognises the scientific case for keeping temperature rises below 2°C, but does not contain commitments for reduced emissions that would be necessary to achieve that aim. The Accord was formally ‘taken note of’ but not adopted. The UK Government, however, is committed to reducing greenhouse gas emissions by 80% from 1990 levels by 2050, and at least 34% by 2020, through the **Climate Change Act**. The Act is supported by the **UK Low Carbon Transition Plan**, a National strategy for climate and energy, which sets out the Government’s approach to meeting their CO2 reduction commitments. As building related CO2 emissions currently account for approximately 25% of all CO2 emissions, improving efficiency and supplying buildings with low and zero carbon is a priority. Furthermore, it is predicted that around two thirds of the current housing stock will remain in 2050, highlighting the importance of improving the existing housing stock as well ensuring new building are highly efficient. The Transition Plan includes commitments to reducing greenhouse gas emissions from existing housing stock by 29% on 2008 levels by 2020 and by 13% for places of work.

A crucial part of our strategy to reduce CO_2 emissions is a step-change in the resources used to generate electricity and heat, through a switch away from gas and coal, to a much higher reliance on renewable energy. Installations of renewable and low carbon energy infrastructure will need to be both significant and wide-spread, with every local authority area looking to utilise opportunities. The UK is currently committed to meeting carbon reduction targets set out by the European Commission in the **EU Renewable Energy Target** which requires a 20% reduction in CO_2 associated with electricity, heating and transport through conversion to renewable energy sources. As the UK’s portion of this target, it is expected to supply 15% of its energy from renewable sources.

The translation of this target across to the various energy generation areas is not equal in portion, and is instead related to the opportunities and delivery constraints associated with each. Accordingly, the following proportions of renewable energy supply are expected for the three sectors:

- 30% of electricity
- 12% of heat
- 10% of transport.

This study is concerned with the use of electricity and heat in the built environment, and excludes the use of renewable energy for transport.

Traditionally, drivers and targets for renewable energy have focussed on electricity supply. We are now seeing an expansion in focus to consider heat supply as well. **The Draft Heat and Energy Saving Strategy** (2009) aims to ensure that emissions from all existing buildings are approaching zero by 2050. Proposed mechanisms for achieving this include a new focus on district heating in suitable communities, and removing barriers to the development of heat networks, encouragement of combined heat and power and better use of surplus heat through carbon pricing mechanisms. Alongside the drivers for CO_2 reduction and the inclusion of renewables, there are also targets and strategies in place to encourage the inclusion of Combined Heat and Power (CHP) schemes in new and existing neighbourhoods. In 2000 the Government set a new target to achieve at least 10,000 MWe of installed Good Quality CHP capacity by 2010. In support of this target, the Government has set a target to source at least 15% of electricity for use on the Government Estate from Good Quality CHP by 2010. The Government released a 'combined heat and power strategy to 2010' in April 2004 which encourages a rapid increase in the implementation of CHP. Local authorities play a key supporting role in the implementation of CHP.

Planning Policy Statement 1: **Delivering Sustainable Development** (PPS1) (2005) places an emphasis on promoting more sustainable development, with a **supplement to PPS1 on climate change** released in December 2007. It advised planning authorities to provide a framework to encourage low carbon and renewable energy generation in their local development documents and confirmed that there are situations where it is appropriate for LPA to expect higher standards than building regulations. Paragraphs 31-33 explain that the local circumstances that warrant higher standards must be clearly demonstrated, such that there are clear opportunities for low carbon developments or that without requirements, development would be unacceptable for the proposed location. Paragraph 32 suggests that local requirements should focus on the development area or site-specific opportunities and that the requirement should be in terms of achievement of nationally described standards such as the Code for Sustainable Homes. Paragraph 33 requires that decentralised energy or other sustainable requirements should be set out in a DPD. Care must also be taken to demonstrate that the requirements are viable, will not impact on the supply and pace of housing development and will not inhibit the provision of affordable housing. The consideration of targets both on a LPA-wide scale and for strategic sites is the focus of this study.

The Government has also announced its intention for **Building Regulations** to require that the dwelling emission rate (DER) of new residential development to be 25% better than Target Emissions Rate (TER) in 2010, 44% better in 2013 and meeting a zero carbon target by 2016, with non-residential development expected to meet the zero carbon target by 2019. The enforcement of CO_2 reductions through building regulations, removes the emphasis somewhat from planning. Previously stand-alone policies for CO_2 reduction, such as 'Merton-style rules' for inclusion of certain percentages of renewable energy supply, have been used for new development, but such policies are likely to be superseded by proposals for changes to Building Regulations to some extent. However, LPAs can still require sites to go beyond Building Regulations where suitable.

The proposed residential Building Regulations correspond to the DER targets set out in the energy section of the Code for Sustainable Homes for levels 3 (25% reduction) and level 4 (44% reduction), however the definition of zero carbon is likely to differ from the level 6 of the Code (the Code is discussed in greater detail in the section at the end of this chapter). It is a common misconception that full Code levels will be required under the government proposals, but in fact it is just the equivalent of the energy section of the Code that will be applied through Building Regulations. Expected changes to Building Regulations are discussed in more detail in section 2.5 below.

The Government has recently undertaken consultation on the **Definition of Zero Carbon Homes and Non-Residential Buildings**. The consultation proposes meeting part of the zero carbon requirements through offsite measures. The document suggests that between 44 and 100% of the CO_2 emissions reduction must be met onsite, and that for the remaining emissions a range of onsite and offsite solutions are possible. Currently, it is expected that developers will be required to meet a 70% reduction in TER on-site. The consultation also proposes a maximum cost per tonne of CO_2 for offsite measures, which will be published in 2009 and updated in 2012, to give developers some certainty over the costs they face.

Circular 05/2005 (Planning Obligations) states that the objective of the planning system is to deliver sustainable development and obligations are intended, among other things, to secure a contribution from a developer to compensate for loss or damage created by a development or to mitigate a development's impact.

The **Energy Act (2008)** gives power to the Secretary of State to establish or make arrangements for the administration of a scheme of financial incentives to encourage small scale low-carbon electricity generation. The holders of distribution licenses may also be required under this act to make arrangements for the distribution of electricity generated by small-scale low-carbon generation and to make a payment to small-scale low-carbon generators (or to the Gas & Electricity Markets Authority). This act also allows the Secretary of State to make regulations to establish a new scheme to facilitate and encourage renewable heat generation and to establish methods to administer and finance the scheme.

The **Planning Act (2008)** paves the way for a new planning system for approving nationally significant infrastructure projects, and introduces the concept of National Planning Statement (NPS). Twelve NPSs are envisaged including one covering renewable energy. The act also adds a duty on councils to take action on climate change within their development plans.

In addition, the Planning and Energy Act (2008) enables local planning authorities to set requirements for energy use and energy efficiency in local plans, including:

- a proportion of energy used in development in their area to be energy from renewable sources in the locality of the development;
- a proportion of energy used in development in their area to be low carbon energy from sources in the locality of the development; and
- a development in their area to comply with energy efficiency standards that exceed the energy requirements of building regulations.

2.3 REGIONAL POLICY

The **North West of England Plan (Sept 2008)** contains a suite of policies relating to climate change and renewable energy.

Prepared by the North West Regional Assembly (NWRA), the North West of England Plan is the adopted Regional Spatial Strategy (RSS) which provides the broad development framework for the North West up to 2021. The RSS identifies the scale and location of housing and job growth across the North West over the next fifteen to twenty years, establishing a broad policy framework for delivering sustainable development in the region.

Policy DP 9 states that reducing emissions and adaption to climate change is an *'urgent regional priority'*, requiring that development plans, strategies and proposals *'identify, assess and apply measures to ensure effective adaption to likely environmental, social and economic impacts of climate change'.* Policy EM 17 is concerned specifically with Renewable Energy, stating that the proportion of electricity supplied from renewable energy sources in the region should be 10% by 2010, 15% by 2015 and 20% by 2020, in accordance with the North West Sustainable Energy Strategy. Furthermore, Policy EM 15 also reaffirms the North West Sustainable Energy Strategy's commitment to doubling the region's installed CHP capacity from 866 MWe to 1.5 GW by 2010.

Under Policy EM 16, local authorities are required to ensure plans and strategies actively promote energy efficiency improvements and facilitate reductions in energy consumption. As well as driving energy efficiency, the RSS requires local authorities to promote use of decentralised and renewable / low carbon energy in new developments coming forward in the North West. Indeed, Policy EM 18 promotes the use of decentralised and renewable / low carbon energy in new developments in order to contribute to targets for renewable energy generation targets set out in the plan. Specifically, Policy EM 18 requires local planning authorities' Development Plan Documents to establish targets for decentralised and renewable / low carbon energy use in new developments, as well as criteria for determining to which developments the target will be applied. Crucially, the Policy states that these targets should be based on an *'appropriate evidence and viability assessments'.* Prior to such targets being set, the policy states that:

'new non residential developments above a threshold of 1,000m² and all residential developments comprising 10 or more units should secure at least 10% of their predicted energy requirements from decentralised and renewable or low-carbon sources, unless it can be demonstrated by the applicant, having regard to the type of development involved and its design, that this is not feasible or viable.'

The Regional Spatial Strategy sets out region-wide as well as sub-regional targets for a various forms of renewable energy generation in 2010, 2015 and 2020. The tables below set out the renewable targets established for the North West as a whole and Lancashire sub-region by energy type. The tables show cumulative totals in terms of the number of schemes).

Table 1: NWRSS Renewable Energy Targets (Region-wide)

Renewable Energy Type	Indicative Region-wide Targets for Renewable Energy in North West (including existing schemes)					
	2010		2015		2020	
	No. Schemes	Capacity (MW)	No. Schemes	Capacity (MW)	No. Schemes	Capacity (MW)
Offshore Wind Farms	3	297	4	747	5	1,347
On-shore wind farms On-shore wind clusters	35 - 51	600	44 - 62	720	44 - 62	720
Single large wind turbines	30	48	50	75	50	75
Small stand-alone wind turbines	50	1.5	75	2.25	75	2.25
Building-mounted micro-wind turbines	1,000	1	10,000	10	20,000	20
Biomass-fuelled CHP / electricity schemes	7	31.1	12	56.1	15	106.1
Biomass co-firing	2	103	0	0	0	0
Anaerobic digestion of farm biogas	5	10	10	20	15	30
Hydro Power	12	3.5	12	3.5	12	3.5
Solar photovoltaics	1,000	2	25,000	50	50,000	100
Tidal Energy	0	0	2	30	2	30
Wave Energy	0	0	0	0	1	30
Energy from Waste						
Landfill Gas	52	113.4	19	79.1	0	0
Sewage Gas	16	13.4	16	13.4	16	13.4
Thermal treatment of municipal / industrial waste	1	10.5	3	125.5	6	215.5

Table 2: NWRSS Renewable Energy Targets (Lancashire)

Renewable Energy Type	Indicative Sub Regional Targets for Renewable Energy in Lancashire (including existing schemes)					
	2010		2015		2020	
	No. Schemes	Capacity (MW)	No. Schemes	Capacity (MW)	No. Schemes	Capacity (MW)
Offshore Wind Farms	0	0	0	0	0	0
On-shore wind farms On-shore wind clusters	11 - 16	195	13 - 20	232.5	13- 20	232.5
Single large wind turbines	7	10.5	11	16.5	11	16.5
Small stand-alone wind turbines	10	0.3	15	0.45	15	0.45
Building-mounted micro-wind turbines	205	0.205	2,050	2.05	4,100	4.1
Biomass-fuelled CHP / electricity schemes	1	9	2	14	3	19
Biomass co-firing	0	0	0	0	0	0
Anaerobic digestion of farm biogas	1	2	3	6	5	10
Hydro Power	2	0.1	2	0.1	2	0.1
Solar photovoltaics	205	0.41	5,125	10.25	10,250	20.5
Tidal Energy	0	0	0	0	0	0
Wave Energy	0	0	0	0	0	0
Energy from Waste						
Landfill Gas	14	20.2	7	14.3	0	0
Sewage Gas	4	1.2	4	1.2	4	1.2
Thermal treatment of municipal / industrial waste	0	0	0	0	1	40

2.4 LOCAL POLICY

The council's LDF has a vital role in ensuring future development is delivered in a sustainable manner and reflects the growth requirements set out in the North West of England Plan. The council's Core Strategy is the most important document within the LDF. Core Strategies set out long-term visions for an area over a period of at least 15 years, as well as spatial objectives and strategic planning policies to guide development in accordance with the strategic vision and objectives.

The draft **Core Strategy Preferred Option** outlines a policy which directly relates to climate change and sustainable development.

Specific policy within the Core Strategy Preferred Option sets out the importance of **climate change and sustainable development**. The objectives include promoting the effective management of natural resources by developing sustainable energy efficient measures appropriate to Blackpool. The Council aims to encourage and embrace renewable energy technologies and sustainable energy schemes, and to ensure development proposals will minimise flood risk, minimise pollutant emission (including noise and light pollution), minimise waste generation and energy consumption and incorporate renewable energy sources in appropriate new developments.

Until such time as the Core Strategy is adopted, the **Blackpool Local Plan 2001 - 2016** (adopted June 2006) remains the statutory development plan for the borough. The Local Plan provides a planning policy framework against which the LPA determines planning applications until 2016. The plan has six key themes; quality education and training, healthy lives, safer communities, quality homes in clean and green residential areas, strong and vibrant communities and a prosperous town. As part of these themes a sustainable environment is an integral cross-cutting theme to the delivery of the themes.

The **Local Plan** chapter entitled 'Lifting Quality in the built Environment' has a clear objective *"To lift quality in the built environment by encouraging sustainable, innovative and high quality urban design in new developments and by promoting enhancements to the public realm."*

In addition, associated text refers to the need to encourage the layout of developments and the design of buildings to maximise energy efficiency and incorporate renewable energy sources where possible. Specific policy within the Local Plan relates to energy efficiency. **Policy LQ8 Energy and Resource Conservation** states that developments should be designed in a way that minimises their overall demand for resources. Proposals for development will need to take into account:

- efficient and effective use of land, including the reuse of existing buildings;
- use of environmentally friendly materials, including the re-use of construction materials and recycled aggregates;
- maximise the use of natural heat and light and minimise the use of non-renewable energy sources;
- incorporation of photovoltaic cells where possible, active solar panels and other small-scale sources of renewable energy; and
- assess potential for measures that enable the development to collect, store and recycle rainwater and the provision of storage facilities for materials to be recycled.

The 'Lifting Quality in the Built Environment' chapter also refers to Government targets to see 10% of the UK's electricity requirements being met from renewable energy generation by 2010. The strategy requires that in the next few years Blackpool will need to contribute to this target, which is most likely to be in the form of small scale renewable energy sources that can be incorporated within buildings or groups of buildings. In addition, the Council encourages new development to incorporate renewable energy technology within the proposed design.

Sustainable technologies that are encouraged include photovoltaic cells and small wind turbines on some non-residential buildings. The strategy does however state that the potential for large-scale renewable energy development, such as wind farms, is more limited in Blackpool because of the Borough's tightly drawn administrative boundaries.

2.5 BUILDING REGULATIONS AND THE TRAJECTORY TO ZERO CARBON

The **Building Regulations** first started to turn its focus towards reducing CO_2 emissions in the 2002 revision to Part L (Conservation of Fuel and Power). Further revisions to Part L in 2006 brought the UK Building Regulations in line with the EU's Energy Performance of Buildings Directive (EPBD), introducing amongst other things the requirement for Energy Performance Certificates (EPCs).

The current 2006 Building Regulations Part L requires that CO_2 emissions calculated for a new development should be equal to or less than a Target Emission Rate. This is generally in the region of 20% lower than CO_2 emissions from a building which complies with the 2002 Building Regulations, depending on the specific building type.

Following consultation, the Government's **Building a Greener Future: Policy Statement** announced in July 2007 that all new homes will be zero carbon from 2016. In the Budget 2008, the Government also announced its ambition that all new non-residential buildings should be zero carbon from 2019 (with earlier targets for schools and other public buildings). The Government has also indicated that non-residential buildings will be required to be zero carbon by 2019, again implemented through the Building Regulations.

The **Definition of Zero Carbon Homes and Non-Residential Buildings** consultation in 2009 sought to clarify the definition of zero carbon that will be applied to new homes and buildings through proposed changes to the Building Regulations. A statement by John Healey, Minister for Housing and Planning, in July 2009 confirmed the policy to require all new homes to be zero carbon by 2016 and set out the proposals which will be taken forward to implement this policy. This addressed the concern that the original definition, which followed the definition of Code for Sustainable Homes Level 6, would not be feasible or viable on many sites.

Prior to the introduction of the zero carbon requirement, the following intermediary step changes are proposed to the requirements of Part L of the Building Regulations for dwellings:

- 2010: 25% improvement in regulated emissions (relative to 2006 levels). This is expected to broadly correspond to the energy and CO2 element of Level 3 of the Code for Sustainable Homes. The changes are being discussed as part of a current government consultation.
- 2013: 44% improvement in regulated emissions (relative to 2006 levels), corresponding to Code Level 4
- 2016: Zero carbon in terms of both regulated and unregulated emissions

The figure below illustrates the planned changes in the Building Regulations requirements for dwelling emission rates. One of the key points is that the requirements in 2010 and 2013 will only apply to the emissions that are currently regulated, which are associated with energy use for fixed building services (heating, ventilation, cooling and lighting) inside the dwelling. From 2016, the requirements will apply to all emissions associated with energy use in the dwelling, including cooking and other appliances.

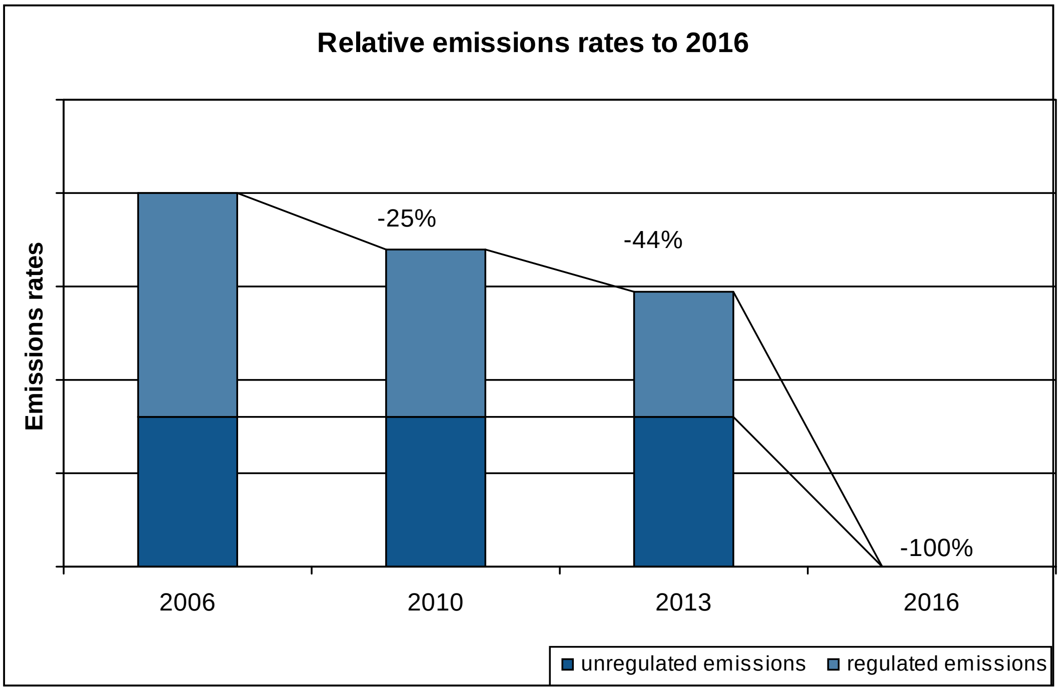

Figure 5: Incremental changes to Building Regulations Part L requirements for dwelling emission rates

The Government has published a hierarchy for how CO2 emissions should be reduced to achieve the zero carbon emissions standard, as in the figure below.

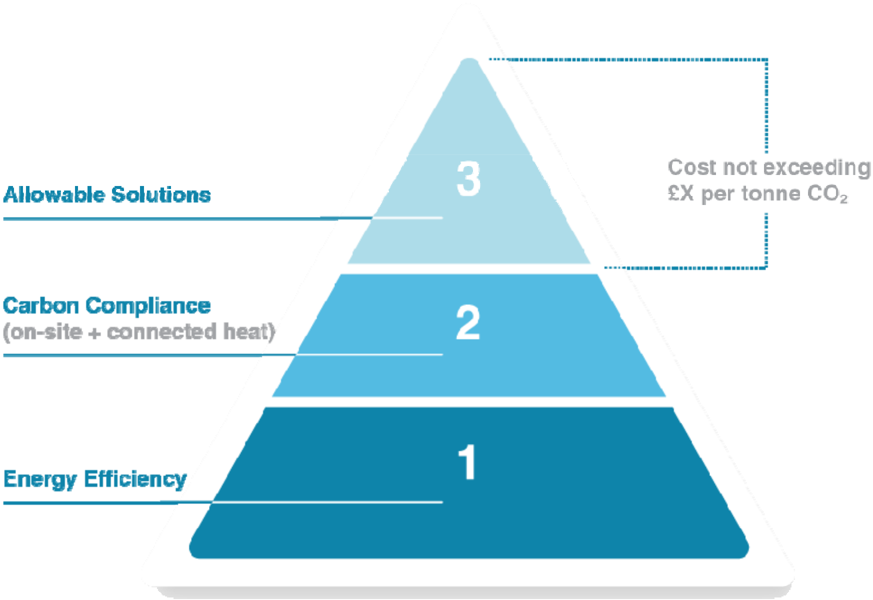

Figure 6: The Government's hierarchy for reducing CO_2 emissions

Developments will not be required to achieve zero carbon emissions entirely within the site boundary. There will be a minimum requirement for emissions savings through energy efficient design of the building services and building fabric; the amount is to be determined by the Government by the end of 2009. Further measures will be required to achieve "carbon compliance" on-site, bringing the regulated emissions savings on-site up to a 70% on TER. These can include building integrated renewable energy, additional energy efficiency features and connection to a heat network.

The residual CO_2 emissions beyond carbon compliance are to be dealt with through "allowable solutions". Likely allowable solutions include:

- Further CO_2 reductions on site;
- Energy efficient appliances;
- Advanced forms of building control system which reduce the level of energy use in the home;
- Exports of low carbon or renewable heat from the development to other developments; or
- Investments in low and zero carbon community heat infrastructure.

Other allowable solutions remain under consideration. A Government announcement was expected at the end of 2009. This has not happened yet.

Currently, it is undecided who will coordinate and deliver allowable solutions, though LPAs are expected to play a role and should account for the effect of allowable solutions in planning.

2.6 CODE FOR SUSTAINABLE HOMES

The Code for Sustainable Homes (CfSH, The Code), developed by BRE and supported by the Department of Communities and Local Government (DCLG), sets out a national rating system to assess the sustainability of new residential development, replacing the previous system 'Ecohomes'. The CfSH consists of a number of mandatory elements which can be combined with a range of voluntary credits to achieve a credit level rating of between 1 and 6 covering nine sustainability criteria including CO_2 reduction, water, ecology, waste, materials, management and pollution. If the mandatory elements for a particular level are not reached, irrespective of the number of voluntary credits, then that code level cannot be achieved. This means that to achieve a full code rating, a range of sustainability issues will have to be incorporated into the building and site design.

Table 3: Performance required to meet Code levels.

	Minimum entry requirements		
Code Levels	**Energy** Improvement over TER	**Water** litres/person/day	**Total points** score out of 100
Level 1 (★)	10%	120	36
Level 2 (★★)	18%	120	48
Level 3 (★★★)	25%	105	57
Level 4 (★★★★)	44%	105	68
Level 5 (★★★★★)	100%	80	84
Level 6 (★★★★★★)	Zero Carbon	80	90

The PPS1 Supplement states that planning authorities should specify requirements for sustainable buildings "in terms of achievement of nationally described sustainable buildings standards, for example in the case of housing by expecting identified housing proposals to be delivered at a specific level of the Code for Sustainable Homes". Where such local requirements go beyond national requirements including the Building Regulations, the evidence base must justify this based on local circumstances.

Since May 2008 it has been compulsory for new homes to have a CfSH rating. There is currently no national minimum requirement for the rating that they achieve, however proposed changes to the Building Regulations are expected to reflect the requirements of the Code for energy. However, residential developments supported by Homes and Communities Agency funding are currently required to achieve Code level 3, expected to rise to Code level 4 from 2010.

2.6.1 COST IMPLICATIONS OF THE CODE FOR SUSTAINABLE HOMES

The graphs below show the predicted % increase over the base build cost to deliver Code targets 4, 5 and 6, broken down by the assessment category areas for a flat and a house. The graphs exclude the costs associated with credits ENE 1, 2 and 7 which are assumed to be covered in the costs discussed in the following Chapters to deliver the mandatory energy requirements.

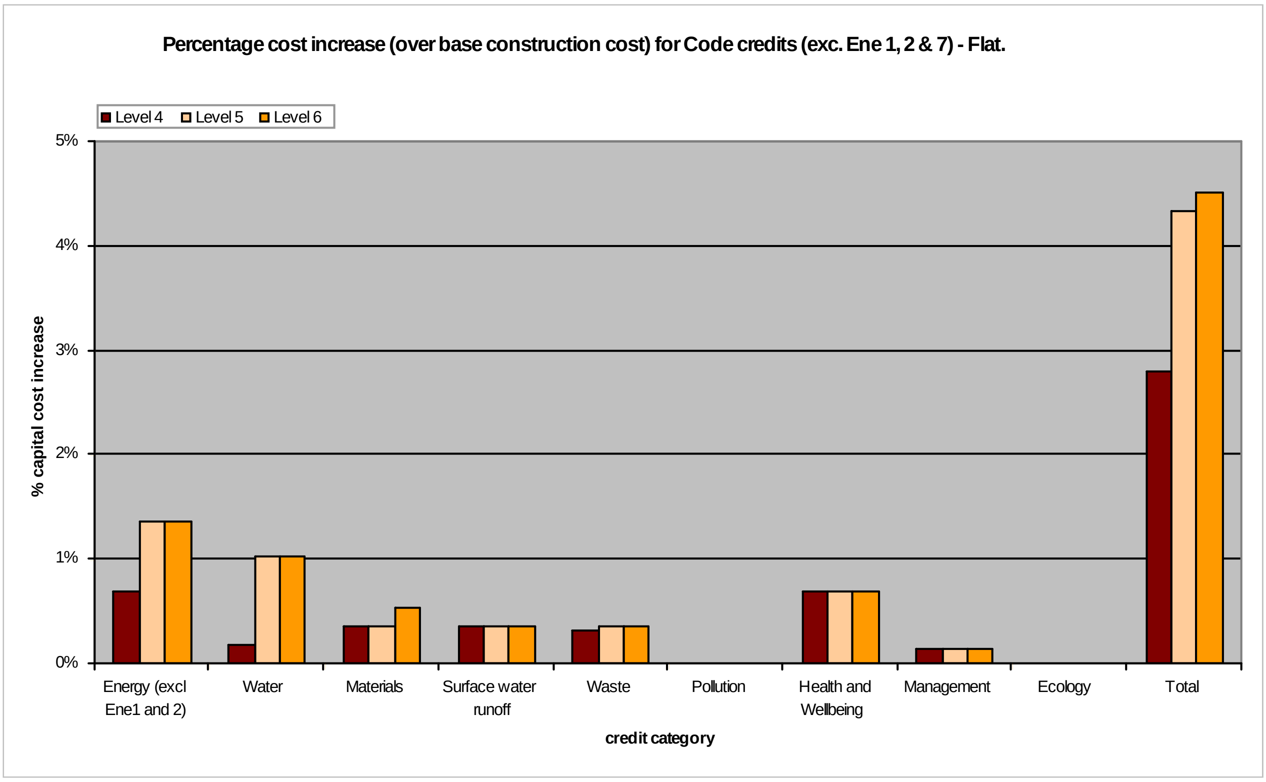

Figure 7: Costs (over base construction cost) for delivering Code credits as required to levels 4, 5 & 6 for a flat

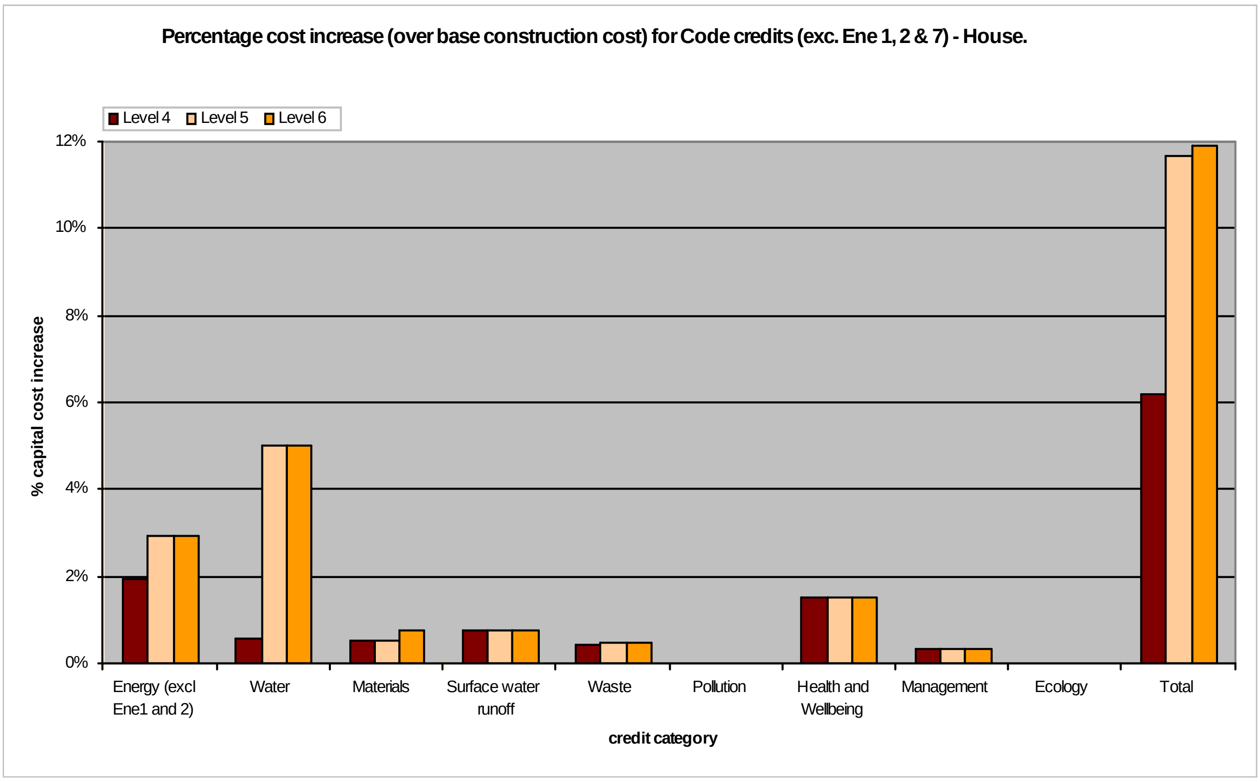

Figure 8: Costs (over base construction cost) for delivering Code credits as required to levels 4, 5 & 6 for a house

Costs are taken from a Cyril Sweett report produced for Communities Local Government (DCLG) entitled: *Cost analysis of the Code for Sustainable Homes, November 2007*. These costs were predicted, and are not yet fully supported by the development industry. Only a few real Code assessments have been completed so there is not yet sufficient final cost data to establish robust cost benchmarks.

Predicted costs show that costs associated with meeting advanced 'Code for Sustainable Homes' levels are relatively modest for most elements. However a 'jump' in cost is evident upon an increase from Code Level 4 to Code Level 5/6 due to the requirements to meet higher levels of water efficiency through water recycling measures.

2.7 BREEAM

BREEAM (Building Research Establishment Environmental Assessment Method) is a voluntary assessment scheme which aims to help developers minimise the adverse effects of new non-residential buildings on the environment. Like the Code for Sustainable Homes, BREEAM allows the environmental implications of a new building to be assessed at the design stage by independent assessors to provide an easy to understand comparison with other similar buildings. It therefore provides a consistent and independent assessment tool which can be used in planning. An overall rating of the building's performance is given using the terms Pass, Good, Very Good, Excellent, or – new for BREEAM 2008 - Outstanding. The rating is determined from the total number of BREEAM criteria met, multiplied by their respective environmental weighting.

BREEAM was initially launched in 1990 as an environmental assessment methodology aimed specifically at office buildings (BREEAM Offices). Since then versions of the assessment have been developed for numerous other building types including schools, industrial, retail and healthcare. At the basic level the schemes for non residential buildings are all fairly similar in their approach and contain similar credit compliance criteria. Credits are typically grouped in to the following categories:

- Management
- Health and Well Being
- Energy
- Transport
- Water
- Materials and Waste
- Land Use and Ecology
- Pollution

Buildings which do not fall neatly under one of the established BREEAM schemes are able to be assessed using a bespoke methodology. In policy terms BREEAM is useful as it provides a single assessment method which covers a number of key topics relating to sustainable construction.

A properly conducted BREEAM assessment can influence design both in terms of the masterplanning process and detailed architectural and mechanical and electrical specifications.

2.7.1 COST IMPLICATIONS OF BREEAM STANDARDS

The figure below shows the % increase on the base build cost to deliver Good, Very Good and Excellent ratings under BREEAM Offices (2004) and BREEAM Schools. Both costing exercises were led by the BRE Trust. They were supported by Cyril Sweett for the Office costing exercise (Putting a price on sustainability, BRE Trust and Cyril Sweett, 2005) and Faithful & Gould for the Schools work (Putting a price on sustainable schools, BRE Trust and Faithful & Gould, 2008). The costs shown in the figure below under 'school' are for a secondary school block of 3,116m^2.

We are not aware of any published cost data on meeting BREEAM office targets since 2004, certainly none is yet available showing the costs of delivering BREEAM Offices 2008, which contains a number of fairly significant changes, compared with earlier BREEAM versions.

Companies can claim both Enhanced Capital Allowances (ECA) and Carbon Trust grants to help them invest in Combined Heat and Power, renewables and other low and zero carbon technologies.

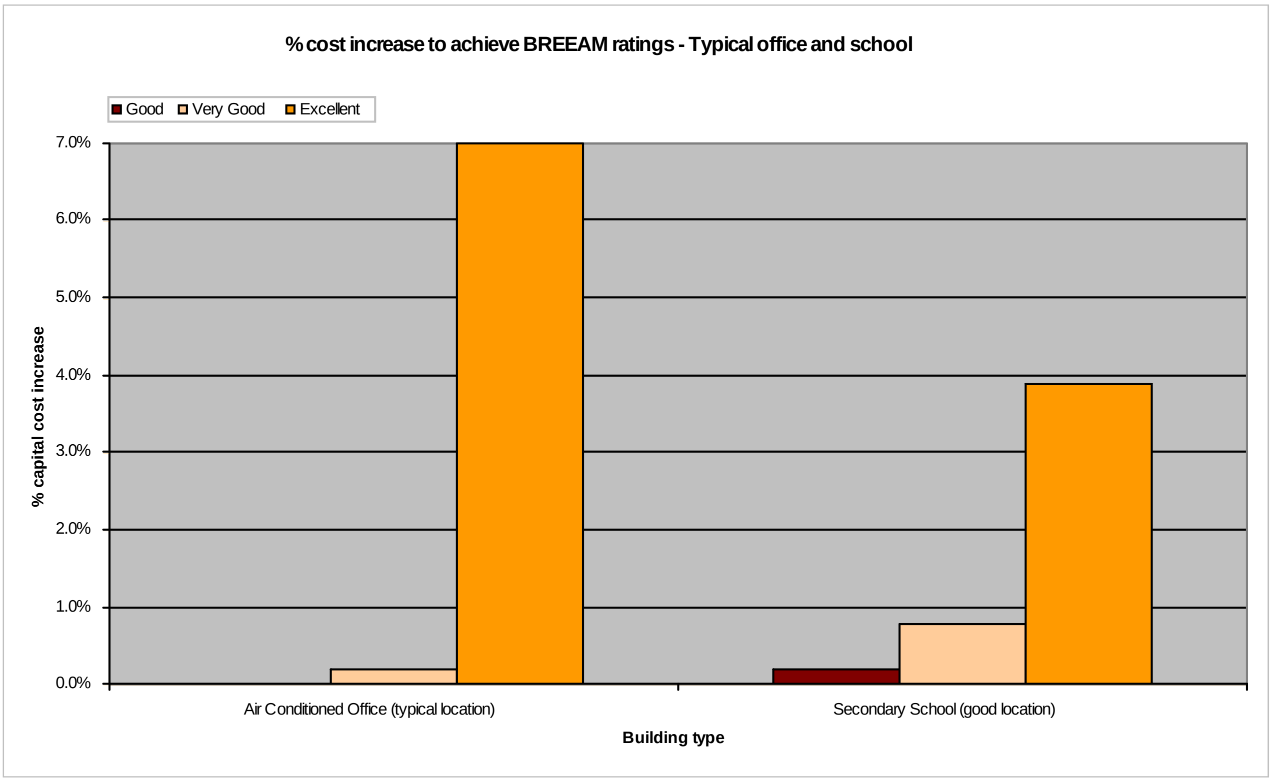

Figure 9: Costs (over base construction cost) for delivering BREEAM Offices (2004) and BREEAM schools ratings.

The cost analysis above shows that the 'Very Good' level of BREEAM is achievable with a small increase to build costs, while the costs associated with BREEAM 'excellent' are much more substantial.

2.8 KEY CONSIDERATIONS EMERGING FROM THIS CHAPTER

The sections above have considered the wider policy context, and some key findings have emerged that should be considered in the development of local policies for Blackpool:

- There are very strong and challenging policy drivers for both the reduction of CO_2 emissions and the inclusion of renewable and low carbon technologies from a national level;
- These drivers are reinforced by targets and policy at a regional level;
- The local planning documents and the emerging Core Strategy provide a useful framework for the implementation of policy relating to building related CO_2 emissions. This study is being conducted at a stage where it can directly recommend policy for inclusion in the Core Strategy.
- PPS1 Supplement requires LPAs to investigate the potential for the inclusion of renewable and low carbon technologies in their LPA area, and to identify opportunities to exceed LPA area-wide targets on strategic sites where there is good potential for additional CO_2 reductions. Therefore LPAs need to both consider policies on an area-wide scale and policies for specific sites where additional opportunities exist for additional CO_2 reductions.
- Expected changes in Building Regulations will significantly decrease CO_2 emissions from new development, therefore removing some emphasis in this role from planning authorities.

- The changes to Building Regulations are likely to create demand for 'Allowable Solutions' which involve the development of solutions outside of the site boundary that can further reduce CO_2 emissions associated with new development. LPAs are likely to need to play a role in coordinating and delivering Allowable Solutions.
- The Code for Sustainable Homes and BREEAM are national and independent assessment tools which can be utilised to appraise sustainable design and construction in new development. The energy sections of these tools can be utilised as a policy tool.
- The Code and BREEAM also require other sustainability aspects to be addressed. The costs associated with other aspects are considered reasonable in relation to the overall build cost for levels up to and including Code for Sustainable Homes Level 4 and BREEAM 'Very Good'.

3. Physical Context: Energy Demand from the Built Environment

3.1 INTRODUCTION TO THIS CHAPTER

This chapter considers the existing and future performance of buildings in Blackpool in terms of demand for energy (both electricity and heat). Firstly, it considers the current performance of buildings in Blackpool, and then considers how this energy demand from existing buildings is likely to change over time. Secondly, it considers the level of growth expected over the Core Strategy period (until 2026). The energy modelling described in this chapter was undertaken using AECOM energy use models and building typologies developed through professional research projects.

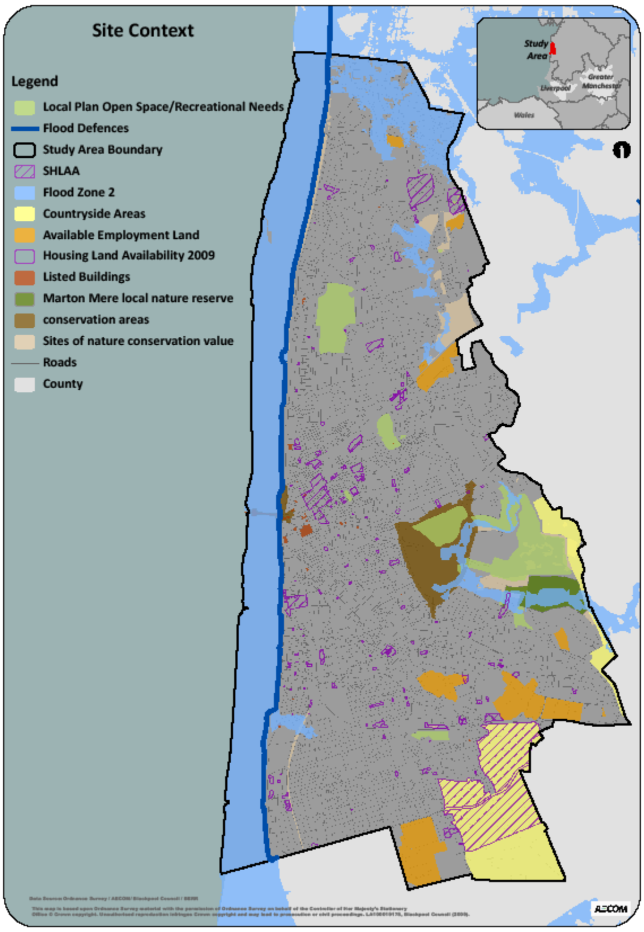

Figure 10: Development and Environmental Context in Blackpool

Figure 10 demonstrates the urban character of the Blackpool area. Within the LPA boundaries, most land area is developed, with limited areas of open space or non-urban land uses. As shown by the distribution of sites identified in the SHLAA, there is also considerable change expected across the Borough.

Due to its urban nature, the built environment and the performance of buildings is key to the energy profile in Blackpool. The scale of change proposed in the town centre is also of great importance to the changing nature of energy performance in Blackpool.

3.1.1 TOTAL CO_2 EMISSIONS FOR BLACKPOOL

CO_2 emissions per capita in Blackpool were 35% lower than the average for the UK in 2007. The breakdown of emissions by sector can be seen in Table 4. Between 2005 and 2008, the borough reported a 4% reduction in per capita CO_2 emissions[1].

Tonnes CO_2 per annum in 2006	Blackpool	Proportion	UK	Proportion
Industry & Commercial	288,760	37.2	236,400,890	45.8
Domestic	348,850	44.9	145,725,040	28.2
Road Transport	136,080	17.5	136,360,710	26.4
Land Use, Land Use Change and Forestry	2,690	0.3	-1,815,019	0.4
Total Emissions	776,380		516,671,621	
Emissions Per Capita	5.45		8.5	

Table 4: Baseline CO_2 emissions in the UK and Blackpool for 2007 (Source: Emissions of CO_2 for local authority areas, DECC)

The data also shows the following key points:

- As a proportion, Blackpool has higher emissions from domestic buildings compared with the average for the UK.
- As a proportion, emissions from road transport are significantly lower than the average in the UK
- As a proportion, emissions from industrial and commercial buildings are lower than the average in the UK

This chapter considers the current and future energy demand from the built environment, which forms a considerable portion of Blackpool's CO_2 emissions.

3.2 PROFILE OF EXISTING BUILDINGS IN BLACKPOOL

The following sections consider the character and build aspects of existing homes and other buildings that are relevant to the energy performance of buildings in Blackpool

3.2.1 RESIDENTIAL BUILDING PROFILE

There are several sources of information available which help us to analyse what the state of existing stock in Blackpool. The Department for Energy and Climate Change (DECC) provides a national data set of energy use of residential buildings within each LPA area. Information is also available from Housing Condition Surveys (where available) and through reporting under the Home Energy Conservation Act 1995. This study has reviewed the following reports:

- Private Sector House Condition Survey for Blackpool (2007)
- Blackpool Housing condition reports – Feb 2009 (online www.blackpool.gov.uk)

[1] Local and Regional CO2 emissions Estimates for 2005 – 2007, DECC

- Home Energy Conservation Act (HECA) – national summary tables for Local Authorities (2001-2007)
- 2001 Census, Office of National Statistics (ONS) (online www.statistics.gov.uk)
- DECC data on electricity and gas use for local authority areas

A private sector House Condition Survey was undertaken in Blackpool in late 2007. The following summarises the profile of existing residential buildings in Blackpool.

House types

As shown in the table below, semi-detached and terraced housing predominates in Blackpool making up over two thirds of the dwelling types (68%). This is larger than the average in England (58%). There are also an above average number of converted flats (9%). The energy demand of a home varies greatly based on building type. Buildings with a high amount of adjoining exterior walls (like flats or terraced housing) are more efficient due to reduced heat loss. Differences in energy efficiency due to house type are demonstrated in the figure below.

Housing Type	Blackpool	England
Terrace	31%	26%
Semi Detached	37%	32%
Detached	8%	23%
Flat	24%	20%
Total	**100%**	**100%**

Table 5: Mix of House types in Blackpool (Blackpool House Condition Survey, 2007)

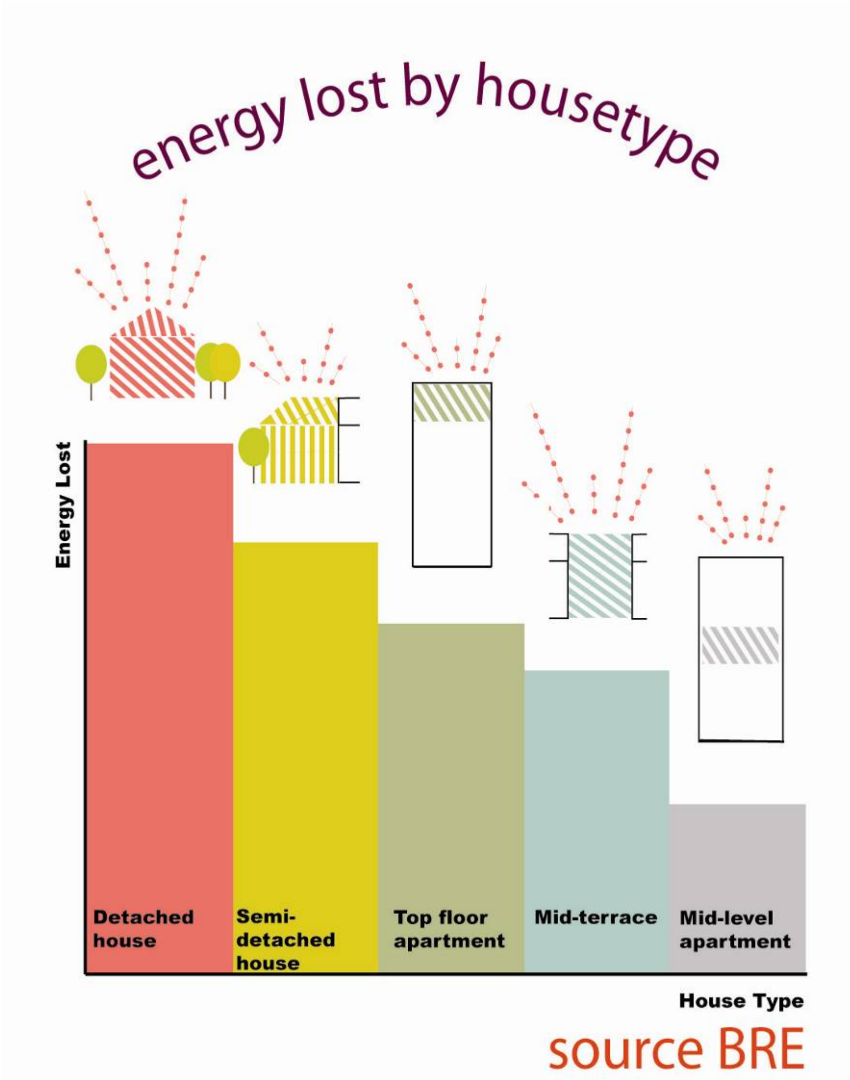

Figure 11: Energy efficiency of different housing types

Age of Homes

Blackpool has an aging housing stock compared to the UK average with a high proportion of dwellings built pre-1944 (62% against UK average of 44%). Heat loss from older buildings will invariably be higher due to lack of double glazing and wall/roof insulation.

Housing Age	Blackpool	England
Pre 1919	22%	25%
1919 – 1944	40%	19%
1945 – 1964	14%	17%
Post 1964	24%	40%
Total	**100%**	**100%**

Table 6: Age of Existing Homes (Blackpool House Condition Survey, 2007)

Tenure Mix

As shown by the table below, Blackpool has a below the English average percentage of households living in social housing (10% compared to 19% for England). The type of tenure and the utility billing arrangements have an effect on the energy use of a property. The English House Condition Survey (DCLG, 2007) revealed that social sector homes on average have been the most energy efficient and have also shown the highest rate of energy efficiency improvement since 1996. Between 1996 and 2007, Registered Social Landlord (RSL) dwellings have consistently had a higher average SAP rating compared to other tenures. This is demonstrated by the figure below.

Housing Tenure	**Blackpool**	**England**
Owned	71%	69%
Social rented	10%	19%
Private rented/other	19%	12%
Total	**100%**	**100%**

Table 7: Tenure Mix in Blackpool (Blackpool House Condition Survey, 2007)

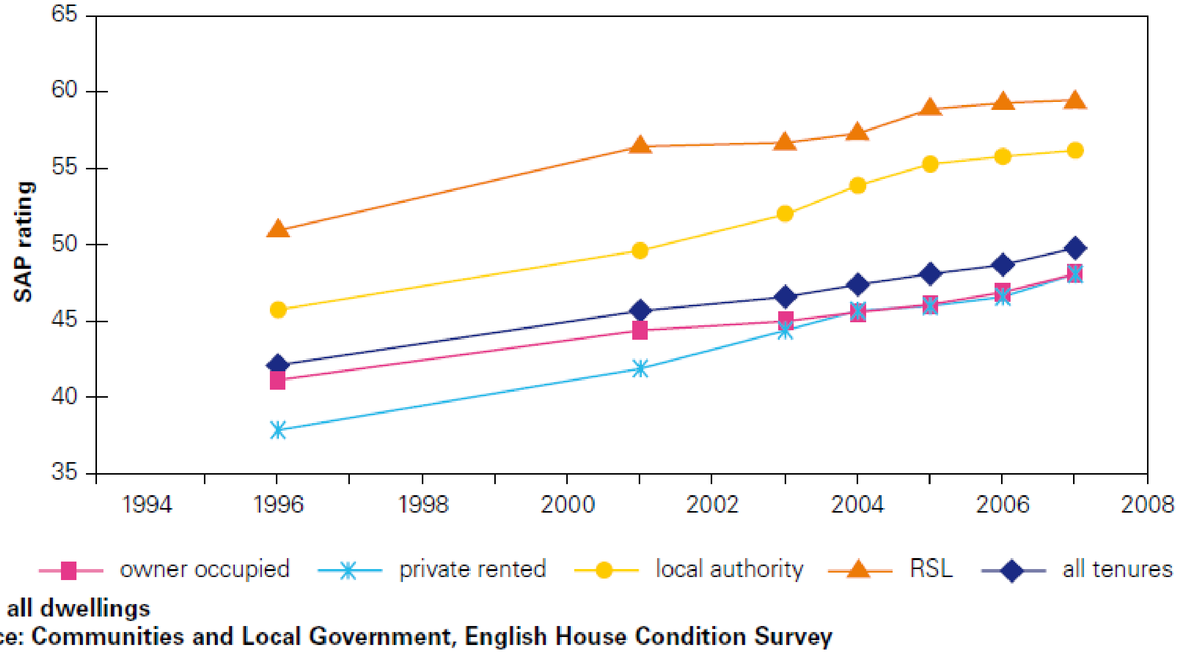

Figure 12: Energy Efficiency, Average SAP rating by Tenure (England), 1996 – 2007

The Blackpool Private Sector stock condition survey estimates that 7.7% of private sectors dwellings are in fuel poverty compared to an average of 6.1% in England (House condition reports, Feb 2009)

Household Size

Household size in Blackpool has reduced from an average of 2.53 on 1971 to 2.15 in 2001 (2001 Census, ONS). This is in line with national trends of household size, with an additional increase in single person households.

Lower household sizes generally lead to an increase in energy consumption per capita given the reduction in shared heating energy and energy associated with cooking and cleaning.

3.2.1 NON RESIDENTIAL BUILDING PROFILE

The split of commercial and industrial building types (by floor area) indicates that Blackpool is dominated by retail (30% of non domestic buildings in Blackpool compared to 15% across England). Whilst office space is broadly consistent with the average for England and the Northwest, there are fewer factories and warehouses in Blackpool as a proportion of the total of non industrial buildings.

Table 8: Commercial and industrial building split by floor area (Source: Office of National Statistics, April 2008)

Commercial and industrial buildings by floor area	Blackpool	Northwest	England
Retail	30%	15%	15%
Offices	13%	12%	15%
Commercial offices	9%	10%	12%
‘Other’ offices	4%	2%	2%
Factories	19%	22%	29%
Warehouses	21%	25%	23%
Other (Garden centres, halls, social clubs etc)	3%	3%	3%
Total	**100%**	**100%**	**100%**

Figure 13: Character of town centre buildings in Blackpool

3.3 BASELINE CO_2 EMISSIONS AND ENERGY CONSUMPTION

The following sections consider the energy demand of existing buildings, building a baseline energy use for 2006 (the beginning of the core strategy period considered in this study).

3.3.1 RESIDENTIAL ENERGY CONSUMPTION AND CO2 EMISSIONS

The Department of Energy and Climate Change (DECC) provide data that helps us to understand the actual use of energy by buildings in the LPA areas. DECC energy use data in 2006 has been used as a baseline in this study due to data availability. DECC provides spatial data (based on ‘Middle Super Output Areas’) for both electricity and gas use, and also provides oil and petroleum based product consumption on an LPA area level.

The tables below compare the performance of residential buildings in the Blackpool LPA area against the Northwest region and the British average. The figures demonstrate that Blackpool has similar domestic energy consumption per consumer (gas and electric) compared to the regional and national averages. The 2001 Census indicates that nearly one fifth of households in Blackpool resided in accommodation without central heating (2001 Census, ONS).

	Blackpool	Northwest	Great Britain
	Residential kWh	Residential kWh	Residential kWh
Electricity	4,485	4,279	4,457
Gas	18,373	18,657	18,241

Table 9: Gas and electricity consumption per residential consumer (DECC, 2006)

Electricity	Consumption (GWh)	296
	CO2 emissions (ktonnes)	161
Gas	Consumption (GWh)	1123
	CO2 emissions (ktonnes)	229

Table 10: Total gas and electricity consumption and CO2 emissions from residential buildings in Blackpool (DECC, 2006)

Spatial Distribution of Energy Demand

The spatial variation of electricity and gas use gives us an insight into the areas of existing stock which are least efficient and should be a priority for improvement. The figures below show relative performance spatially. Generally, energy use is greater in the areas near the coast. It is expected that this is due to the predominance of older buildings in these areas, with newer build homes located further inland. It is also likely that the higher energy use of buildings near the coast is due to the fact that many buildings are existing and former guesthouses, or holiday accommodation, which are likely to have higher occupancy and energy consumption levels than residential buildings. These buildings are also generally 'larger' buildings which are less efficient, also illustrated by Marton Moss where there is also relatively higher energy consumption.

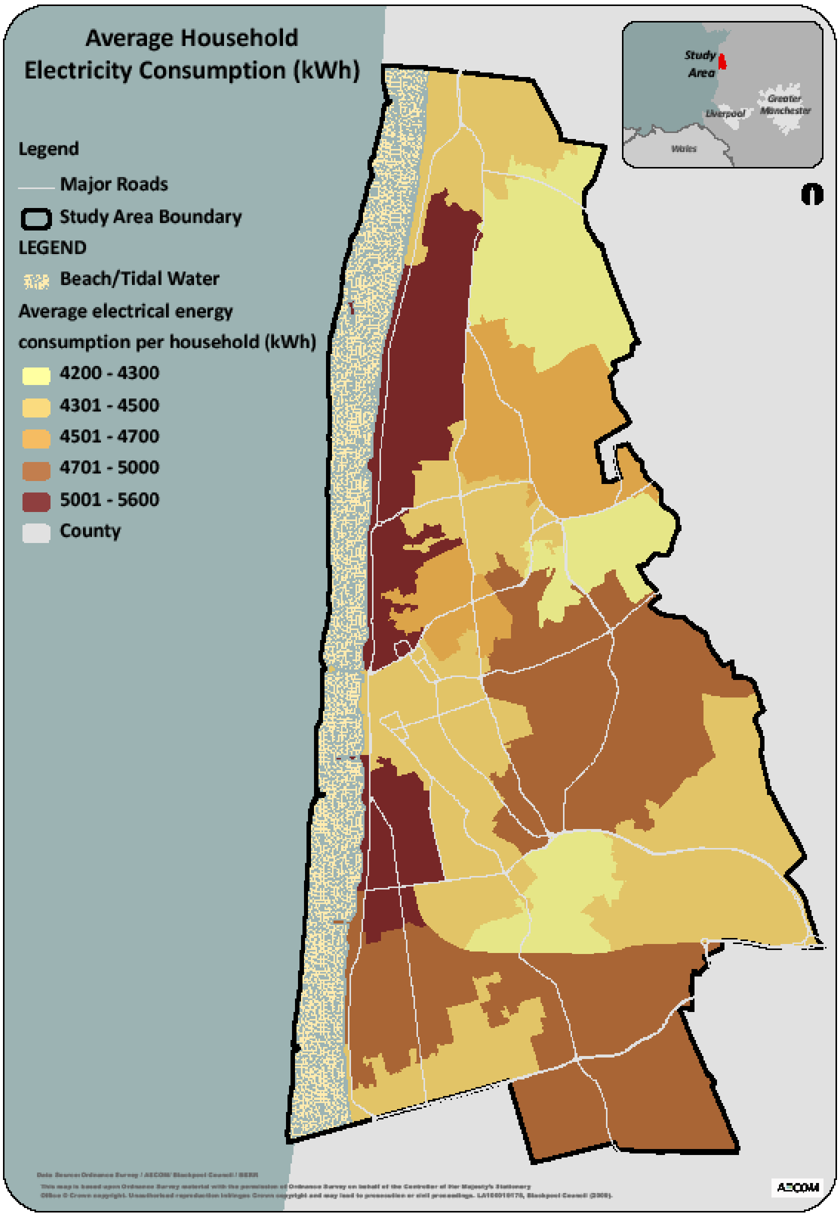

Figure 14: Electricity Consumption per Household in Blackpool

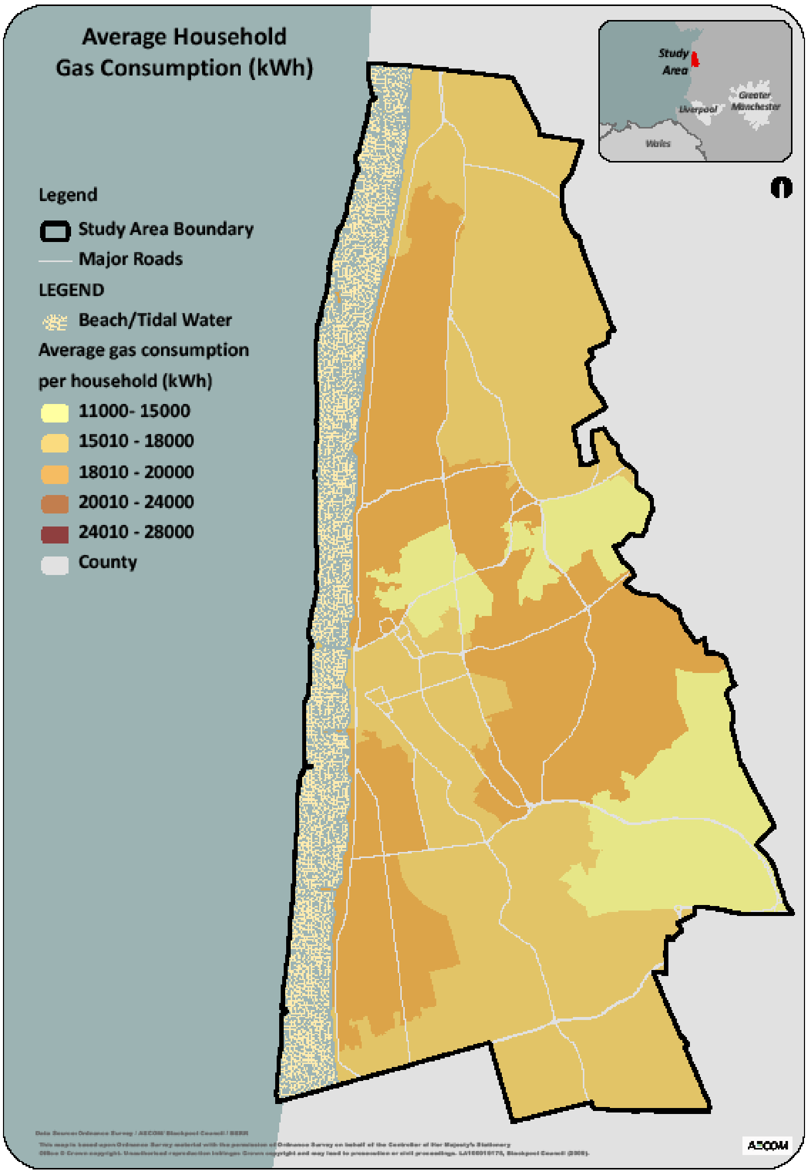

Figure 15: Gas consumption per household in Blackpool

Use of other fuels

While gas is the primary source of heating fuel across Blackpool, buildings also use oil and coal for heating purposes. The use of oil and coal is very low in Blackpool, mainly due to the urban nature of the area and associated smoke control areas. Whilst petroleum products account for 4GWh of consumption, this is likely to be related to petrol consumption in garden machinery or use of LPG gas in areas not on the gas network, rather than from fuel oil consumption. For the purposes of this study, use of oil and coal has been excluded from energy demand modelling.

Petroleum products (including fuel oil, LPG and petrol)	Consumption (GWh)	4
Coal (domestic)	Consumption (GWh)	0.1

Table 11: Petroleum and coal energy consumption from residential buildings (DECC, 2006)

Commentary on Carbon Performance of Existing Homes

The average SAP rating for private sector dwellings in Blackpool is 49 (2005 data). This compares with an average for England of 46 (based on 2005 English House Condition Survey). A higher SAP rating denotes higher efficiency. Whilst dwelling stock in Blackpool is older on average than the UK average, the SAP rating similar to the UK average. This is due to:

- The predominance of high density, terraced and semi-detached housing (which has lower heat loss due to adjoining walls between dwellings). This will compensate for the older nature of the buildings and associated low levels of insulation in these properties.
- A majority of dwellings in Blackpool are connected to mains gas which is a low carbon fuel compared to fuel oil, LPG or coal.
- There are however a large number of households who do not have central heating (19.5%, 2001 Census, ONS). These households are more likely to use electric heating which is a high carbon fuel.
- Due to the urban nature of Blackpool, consumption of fuel oil and petroleum products which are high carbon fuels is very low.

Possibilities to improve the carbon performance of Existing Homes include:

- Improved insulation (walls, roof and windows) and reducing draughts (draft excluders).
- Upgrading of boilers to more efficient condensing types.
- Fitting more efficient lighting.
- Installation of micro generation (photovoltaic, solar hot water).
- Connection to low carbon heat networks.

Previous Improvements to Existing Homes

All local authorities have been given the status of Energy Conservation Authority (ECA) by the Home Energy Conservation Act and are mandated to carry out voluntary cost effective and practical measures that will reduce home energy consumption by 30% over 10 to 15 years, that is, by 2006 or 2011[2]. The measures as defined by HECA include a combination of any or all of the following:

a. Improve levels of insulation, that is:
   - Add or increase loft insulation to a thickness of 200mm
   - Add cavity wall insulation, where applicable
   - Add or increase insulation of hot water cylinders, tanks and pipes
b. Install or upgrade heating systems to gas powered programmable central heating
c. Upgrade all windows to double glazing
d. Install low energy lighting and energy efficient electrical appliances
e. Provide good quality advice to householders.

ECAs are also obliged to report annually on the uptake of energy conservation measures. The report must include costs, CO_2 savings and annual improvements achieved in the energy efficiency of the housing stock.

In response to the requirements of HECA, local authorities have devised several innovative schemes and kick-started initiatives which include; the establishment of community businesses, provision of loans and use of negotiated bulk discounts, as well as innovative approaches to giving advice and raising awareness. These schemes vary from one authority to another.

[2] Consultation on the Review of the Home Energy Conservation Act 1995 (HECA), DEFRA (October 2007)

These schemes have been developed to encourage the uptake and implementation of energy efficiency measures for the private housing sector with the goal of achieving a 30% improvement in energy efficiency of the stock. That is, increasing the average SAP[3] (Standard Assessment Procedure) ratings of the housing stock from its current level by 30%; for instance, an increase from 50 to 65.

The graph below gives a summary of the improvement in energy efficiency for Blackpool as reported by the LPA between 2001 and 2007 (data taken from the annual HECA performance report for all Local Authorities in England). It is not clear what methodology Blackpool uses for calculating the annual improvement. The HECAMON software (Version 3, issued by DEFRA in April 1999 and updated in April 2001) was specifically developed for collecting and collating energy efficiency data by the ECAs and is a recommended approach for calculating annual improvement.

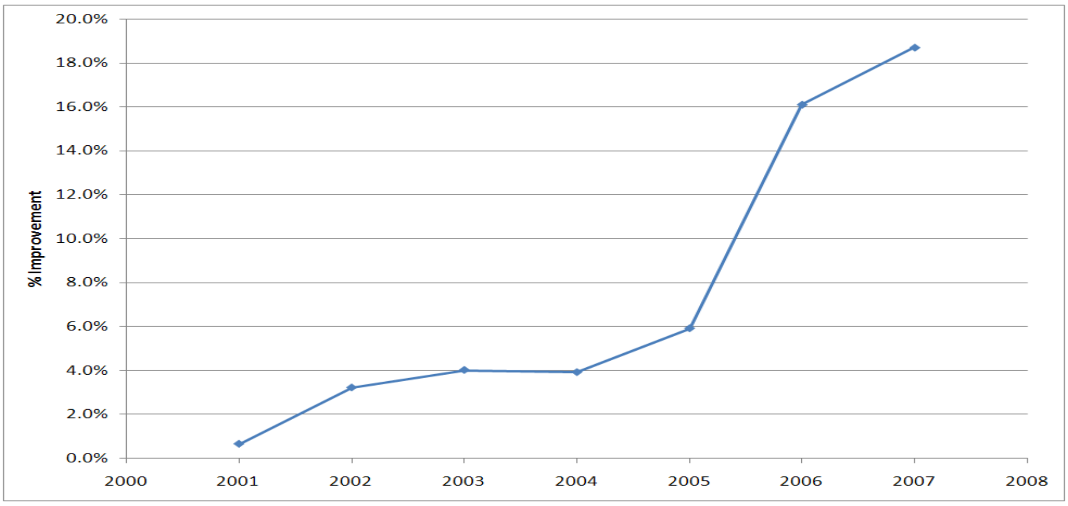

Figure 16: Blackpool improvement in energy efficiency (2001 - 2007) as reported in the annual HECA progress report updates

3.3.2 NON RESIDENTIAL ENERGY CONSUMPTION AND CO2 EMISSIONS

DECC publish commercial and industrial energy consumption collectively. DECC do not provide a geographical breakdown that includes the location of high energy users as it is potentially possible to identify individual businesses, contravening privacy policies. The table below shows a low overall average gas and electricity consumption per consumer for Blackpool compared to the averages for the Northwest and Great Britain as a whole. This potentially indicates a lower level of high energy demand process based industry, with Blackpool's commercial building's being dominated by retail and leisure.

	Blackpool	Northwest	Great Britain
	Industrial/commercial kWh	Industrial/commercial kWh	Industrial/commercial kWh
Electricity	52,179	96,282	81,952
Gas	334,645	658,252	605,793

Table 12: Gas and electricity consumption per industrial/commercial consumer (DECC, 2006)

[3] The energy efficiency level of a dwelling is often measured by its SAP Rating, also known as Energy Ratings. Houses are rated from 0 – 100; 0 (Least efficient) and 100 (Most efficient). SAP ratings are the Government's standard methodology for home energy rating and uses SEDBUK figures to calculate the energy needed for space heating and hot water supply systems. The Building Regulations require a SAP assessment to be carried out on all new dwellings (Source: DEFRA, April 2006).

The table below also emphasizes the carbon context of electricity in comparison to gas. Electricity from the grid is more carbon intensive than gas supply, meaning that while electricity and gas demands from Industrial/commercial buildings are roughly equivalent in terms of giga-watt-hours energy use, the CO_2 emissions associated with electricity are over twice the emissions associated with gas consumption.

Electricity	Consumption (GWh)	374
	CO2 emissions (ktonnes)	203
Gas	Consumption (GWh)	428
	CO2 emissions (ktonnes)	87

Table 13: Total gas and electricity consumption and CO_2 emissions from industrial/commercial buildings (DECC, 2006

3.3.3 SUMMARY OF ENERGY DEMAND FROM EXISTING BUILDINGS

The figure below demonstrates the energy use of non-residential buildings compared with residential buildings in Blackpool. Comparatively, electricity use in residential buildings overall is lower than industrial consumption. Gas usage in residential buildings is however approximately two and a half times that of industrial/commercial use, largely due to space heating and domestic hot water demands.

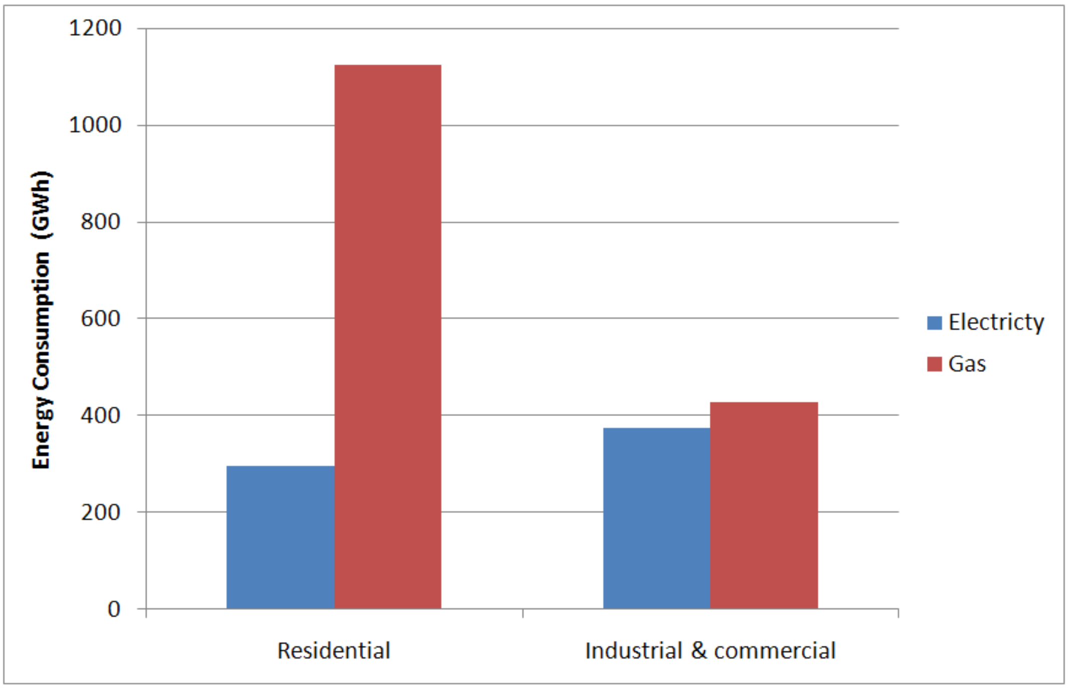

Figure 17: Total gas and electricity consumption for residential and industrial/commercial buildings in Blackpool (DECC, 2006)

The energy consumption data has been converted to a CO_2 emissions equivalent for residential and industrial/commercial buildings – as shown in the figure below. Whilst the gas usage in residential buildings is high in comparison to non-residential buildings, the low carbon nature of natural gas compared to electricity results in residential emissions being only approximately 25% greater than industrial/commercial emissions. This emphasizes that improvement programs should be focussed on both gas emissions reduction and electricity emissions reduction for both residential and non residential buildings.

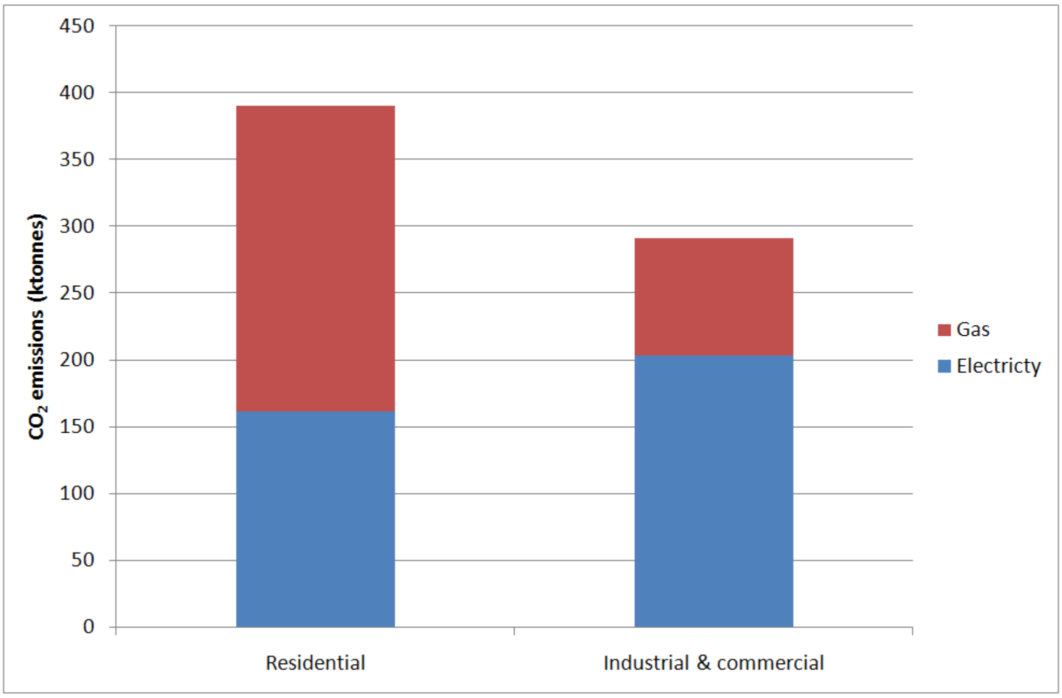

Figure 18: Total gas and electricity CO_2 emissions for residential and industrial/commercial buildings in Blackpool (DECC, 2006)

3.4 FUTURE PERFORMANCE OF EXISTING BUILDINGS

The carbon profile of existing buildings will not remain static over time. Instead we can expect changes in energy demand due to energy efficiency measures, through uptake of micro-generation technologies to supply homes with renewable energy and changes in behaviour. This section considers the likely change in the energy demand profile of existing buildings until 2026.

3.4.1 RESIDENTIAL BUILDINGS

The uptake of energy efficiency measures in the housing stock is relatively low, with most measures taking a number of decades to reach saturation. Schemes such as the Energy Efficiency Commitment (EEC) and its successor the Carbon Emissions Reduction Target (CERT) aim to promote the uptake of measures by requiring utility companies to promote and facilitate energy efficiency improvements. CERT (2008 – 2011) is significantly more ambitious than previous phases of the obligation, doubling the level of activity seen under EEC 2005 - 2008. It also sees a shift in emphasis, with the target set in terms of carbon savings rather than terawatt hours. Under CERT, energy suppliers nationwide must, by 2011, deliver measures that will provide overall lifetime CO_2 savings of 154 MtCO2 – equivalent to the emissions from 700,000 homes each year. It is expected to lead to energy supplier investment of some £2.8bn.

Suppliers must focus 40% of their activity on a 'Priority Group' of vulnerable and low-income households, including those in receipt of certain income/disability benefits and pensioners over 70 years old. By increasing the energy efficiency of UK households, CERT will not only help households from falling into fuel poverty but is also expected to help alleviate fuel poverty.

From discussions with Blackpool Council it is understood that currently there are difficulties attracting improvement of existing homes in Blackpool under the CERT scheme due to the low proportion of publically owned social housing in the area. Due to the relative difficulty of improving privately owned homes with multiple landlords, energy suppliers tend to favour achieving carbon reductions elsewhere. Delivery of improvements through CERT or other means will have to be achieved to significantly affect the CO_2 profile of Blackpool.

Estimates for energy efficiency in Blackpool have been made based on a study of the likely penetration of measures by 2020 based on historic, current, and new uptake schemes[4]. These predictions have been done on a nation-wide scale and utilise expected uptake of a range of energy efficiency measures. Extrapolating these expected rates of energy efficiency increase from the 2006 energy demand baseline, as shown in the figures below, it can be seen that electricity demand is likely to increase slightly, as demand for more energy intensive appliances outweighs energy efficiency measures. Gas demand on the other hand is likely to decrease as energy efficiency measures are applied. The figures below demonstrate the expected reduction in electricity and gas consumption over time in line with 'business as usual' rates of improvement of existing buildings, as predicted by BRE.

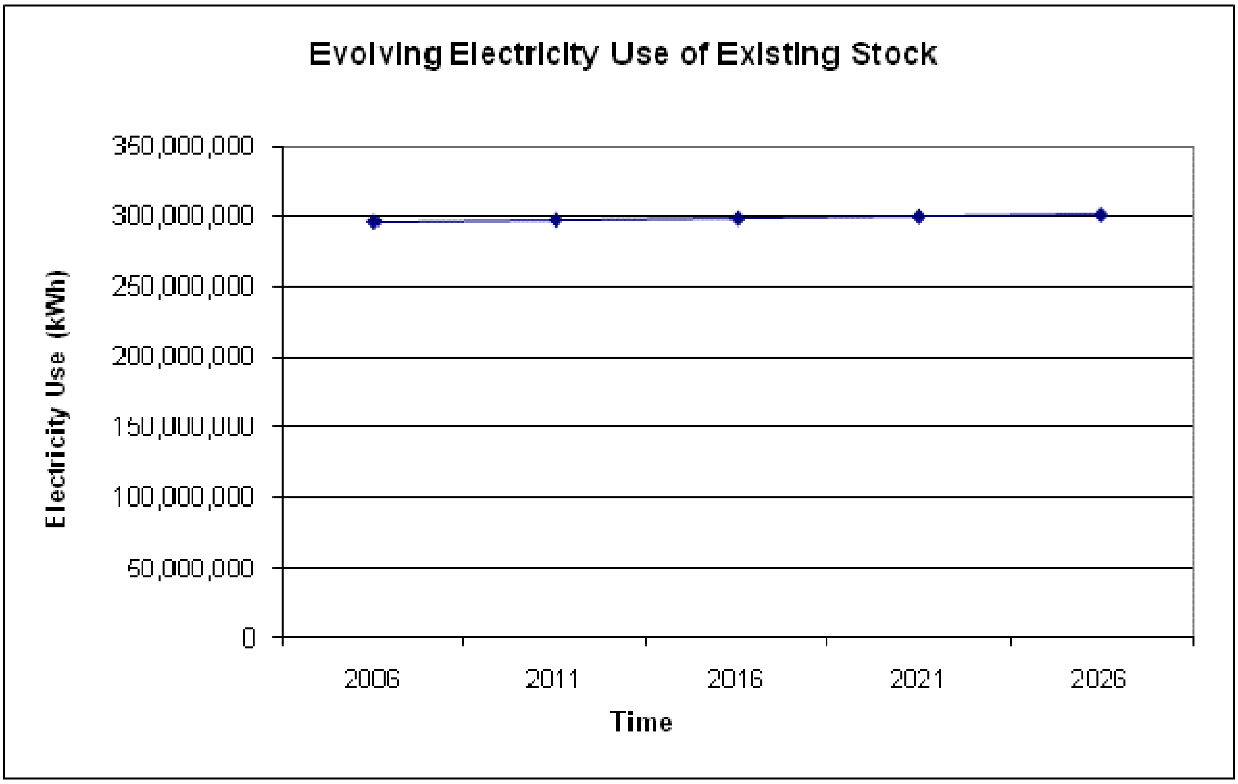

Figure 19: Expected changes in electricity demand from existing residential buildings over the core strategy period

[4] Delivering Cost Effective Carbon Saving Measures to Existing Homes. BRE for DEFRA. 2007.

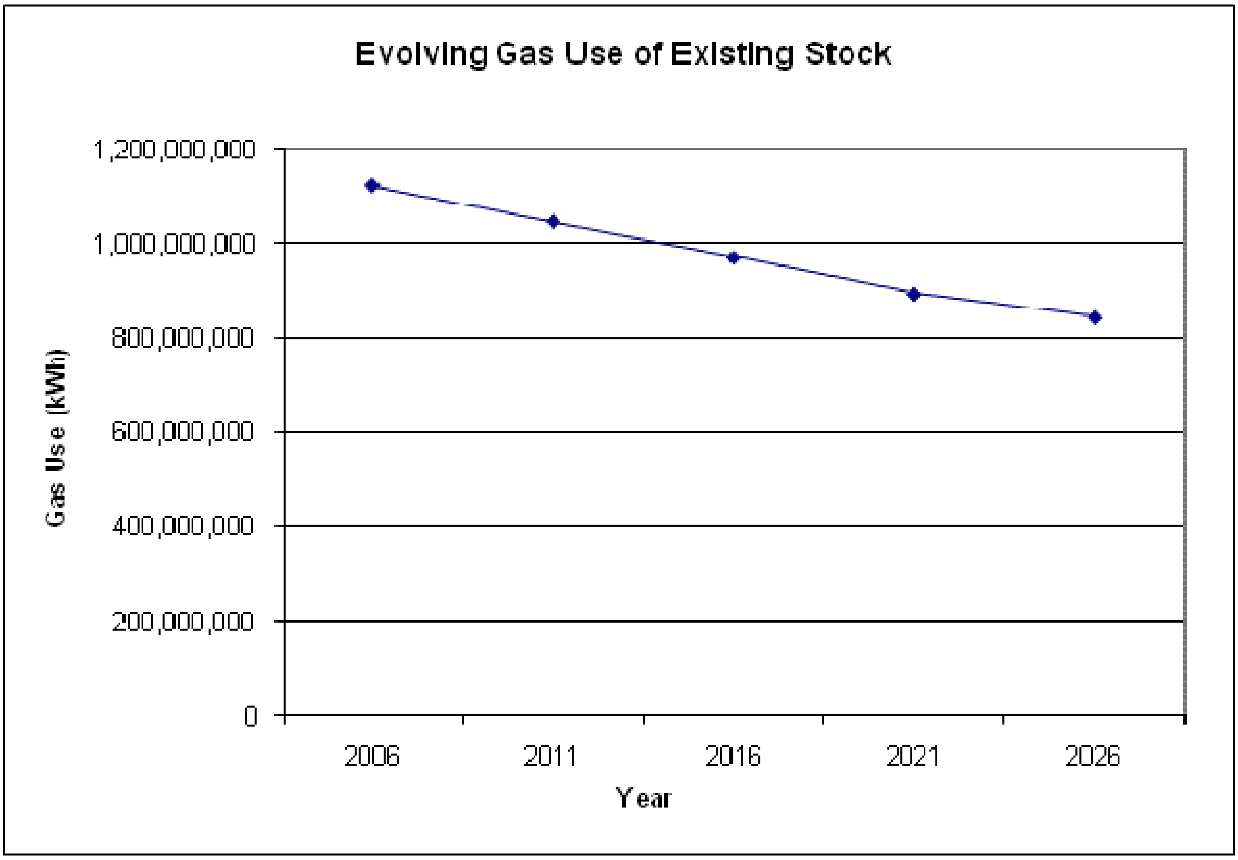

Figure 20: Expected changes in gas demand from existing residential buildings over the core strategy period

3.3.2 NON-RESIDENTIAL BUILDINGS

The assessment of energy efficiency in the non-residential sector is difficult due to the range of building forms, construction, and usage types. A large amount of advice is available from bodies such as the Carbon Trust on reducing building and process energy, but it is not simple to quantify the UK potential, or uptake rates due to lack of data at a national scale. Based on Carbon Trust targets for non-residential buildings, this study has developed estimates for energy efficiency improvement expected through behavioural change, and through capital cost measures. The trend for commercial and industrial development is one of increased efficiency in both electricity and gas use as set out in the graphs below.

While the Carbon Trust has developed targets for energy reduction in non-residential buildings, the initiatives are less visible and less coordinated than those for residential buildings. The Council plays a key role in encouraging energy efficiency in existing non-residential buildings to help to meet these targets.

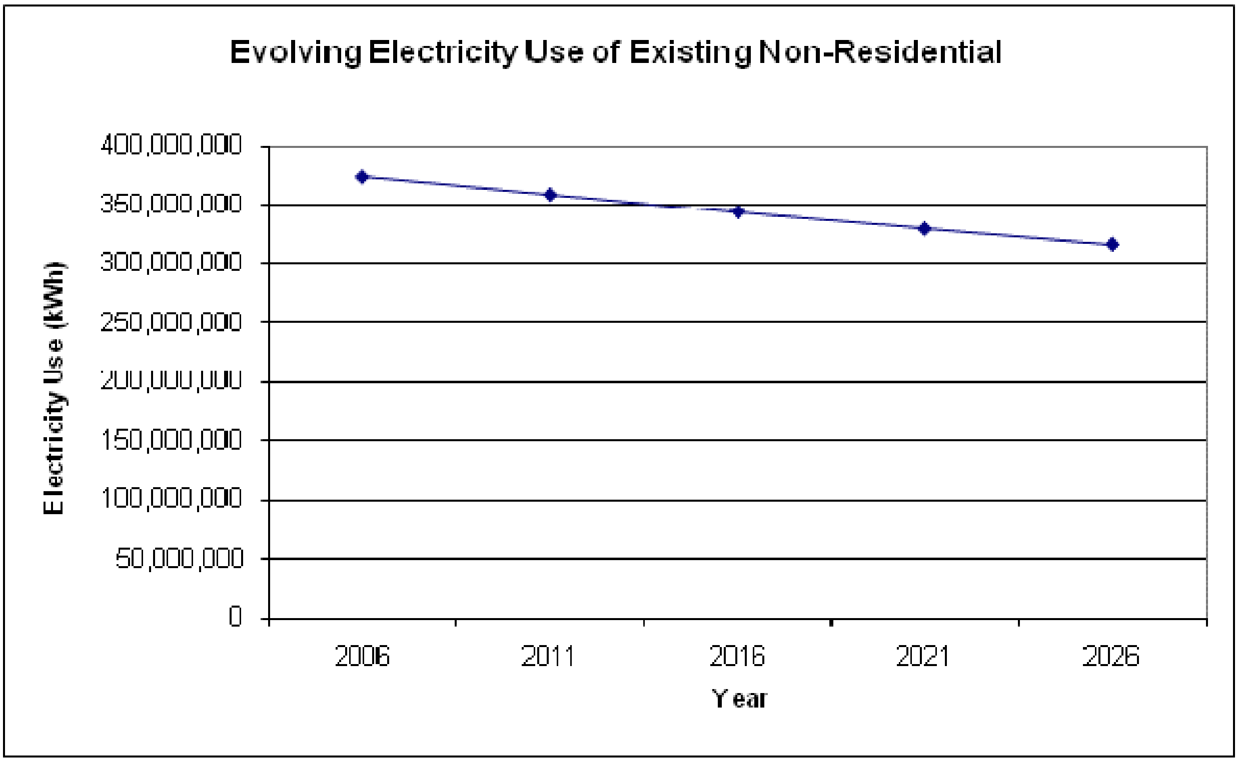

Figure 21: Predicted Change in Electricity Demand of Non-Residential Buildings

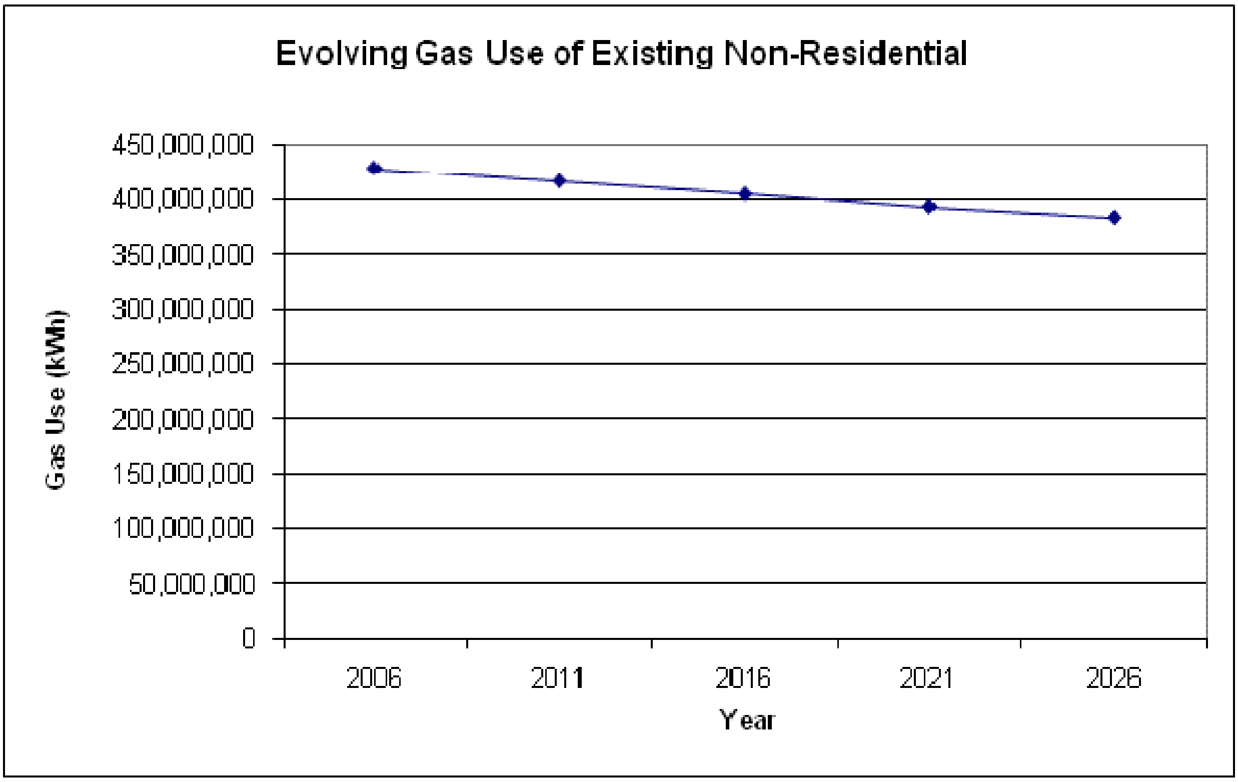

Figure 22: Predicted Change in Gas Demand of Non-Residential Buildings

3.3.3 ALL BUILDINGS SUMMARY

The graph below demonstrates the expected change in energy demand of existing buildings over the study period (2006-2026), due to nationally driven energy efficiency measures in both residential and non-residential buildings.

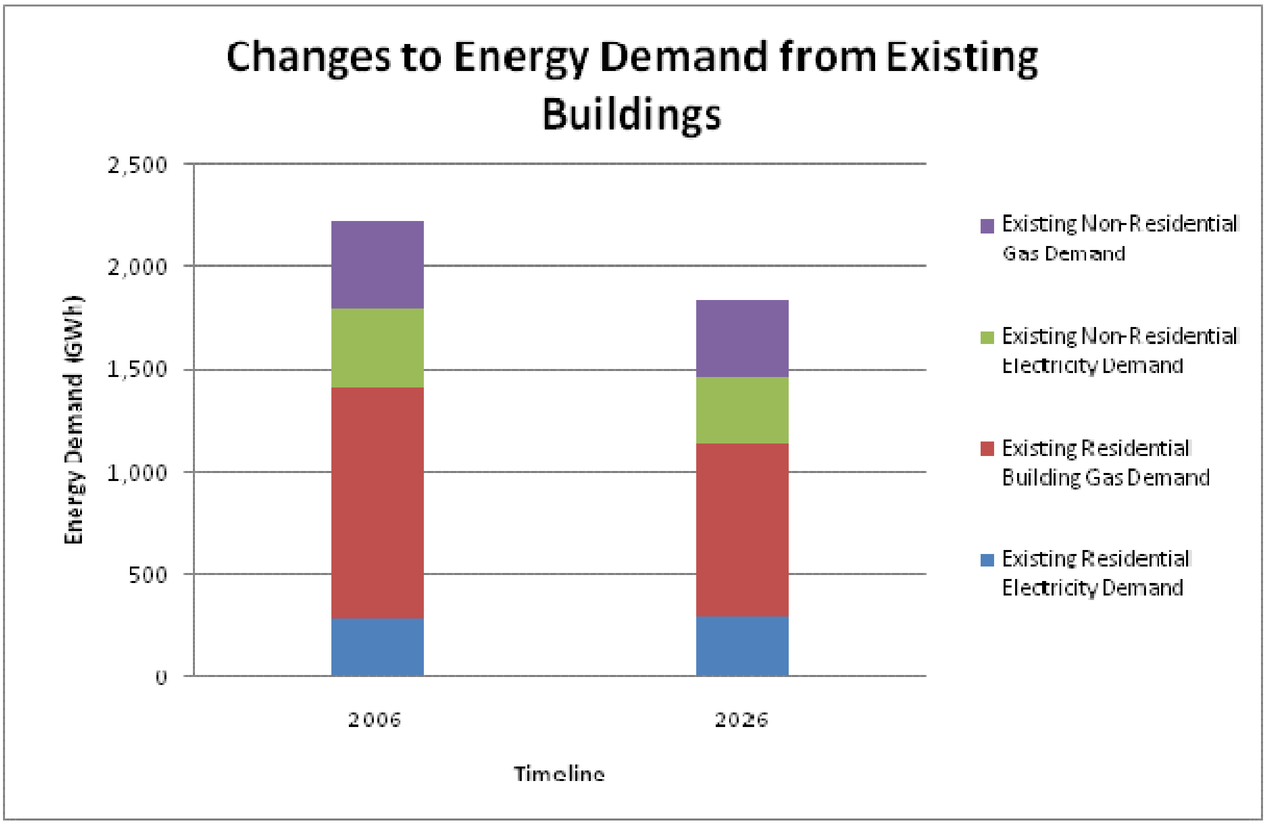

Figure 23: Expected change in electricity and gas demand over core strategy period under 'business as usual' energy efficiency measures

3.3.4 INCREASING IMPROVEMENT OF EXISTING BUILDINGS

The estimations in the change in performance of existing buildings above show a 'business as usual' estimation, where energy efficiency measures continue to be encouraged on a national scale with existing measures and initiatives undertaken by the Council and partners. This estimation reflects an expected uptake in energy efficiency measures based on which measures are most cost-effective and most easily retrofitted. A higher up-take of energy efficiency measures may be possible with targeted funding and initiatives. The table below compares the expected CO_2 saving of a 'high rate' of energy efficiency improvement (as predicted in the study by BRE[5]), compared to the baseline situation outlined above. It also assumes a doubling of improvement rates to non-residential buildings. The CO_2 savings that can be achieved through improvement of existing buildings are very substantial and this should be a priority for change in Blackpool. However, the delivery mechanisms will have to be put in place to drive substantial change to existing buildings in Blackpool.

[5] Delivering Cost Effective Carbon Saving Measures to Existing Homes. BRE for DEFRA. 2007.

Table 14: Comparison of carbon dioxide reduction due to higher energy efficiency levels being applied in existing stock in Blackpool

Demand (GWh)	2006	2011	2016	2021	2026
Baseline Scenario					
Residential Electricity Demand	296	297	298	299	300
Residential Gas Demand	1,123	1,046	970	894	844
Non-Residential Electricity Demand	374	359	344	329	316
Non-Residential Gas Demand	428	416	404	393	383
High Reduction Scenario					
Residential Electricity Demand	296	293	291	289	287
Residential Gas Demand	1,123	1,023	924	825	760
Non-Residential Electricity Demand	374	340	307	275	253
Non-Residential Gas Demand	428	404	381	358	339
Potential CO_2 Saving through increased energy efficiency (tonnes)	0	16,490	32,981	48,594	58,950

3.5 FUTURE GROWTH IN BLACKPOOL

This section outlines expected growth in the Blackpool area. Understanding the scale of expected development is crucial to understanding the probable changes in the energy profile of Blackpool.

3.5.1 RESIDENTIAL GROWTH

The **North West of England Plan Regional Spatial Strategy (RSS)** sets out housing targets for the Blackpool Urban Area. In developing its Core Strategy, Blackpool Council has set out options for where that growth could take place and how much growth each area could accommodate. This growth distribution is set out in Table 15 below.

Blackpool LPA published their **Core Strategy Issues and Options** for public consultation in June 2008. The Issues and Options set out six broad spatial options for development within Blackpool to accommodate proposed growth. Building on this foundation, and responding to the consultation, Blackpool Council have developed a draft **Preferred Option Core Strategy, October 2009**. The Core Strategy provides draft objectives which will shape development of the borough's communities up to 2025. The strategy 'prioritises inner area and resort regeneration whilst providing supporting development through new edge of Blackpool growth at Marton Moss, in conjunction with the M55 Hub'.

The draft **Core Strategy Preferred Option** responds to the growth requirements set out in the adopted North West Regional Spatial Strategy, including a requirement for 10,800 dwellings (the NWRSS 2003-2021 target rolled forward to 2026). As of April 2009, 3,000 of these dwellings have been built (1,738) or have planning permission / are under construction (1,249), leaving a housing requirement of 7,200 dwellings. The Preferred Option for meeting this requirement is set out in **Policy S3** of the Preferred Option broken down as in the table below.

Table 15: Growth distribution as set out in Blackpool Core Strategy

Growth Area	Number of Homes
Central Blackpool inner area strategic development site (through regeneration, housing intervention and market uplift	2000
Lands on Marton Moss	2700
Other strategic development sites • Talbot Gateway • Blackpool Fylde College (Bispham site) • Former Devonshire Road Hospital • Leys Nursery • Ryscar Way	1000
SHLAA sites (new build) on other small sites	700
Windfall allowance for conversions	800
Total	7200

The **Preferred Option** indicates that there will be a constant supply of housing coming forward, with around 2,700 dwellings, including existing permissions, coming forward in each 5 year phase of the plan.

The NWRSS requires authorities to base employment land requirements on the wider local employment market. It is recognised that employment land requirements within Blackpool are intrinsically linked with the surrounding Fylde Sub-Region, including Fylde and Wyre. Each authority has undertaken an assessment of their employment land requirements, establishing a combined need of around 70ha between Blackpool and Fylde by 2026. The 13 main business/industry sites allocated in the Local Plan (2006) will continue to safeguard employment areas in the short term, however there is no significant land available in the medium term, to support Blackpool's longer term employment needs.

Policy R5 sets out the proposal for Talbot Gateway, a mixed used development that will include a major food store, restaurants and shops and office development in addition to housing. It will form an important component in the town centre regeneration, helping to diversify the employment offer.

In addition, Blackpool Airport will be another key area for employment development, with the Blackpool Business Park able to capitalise on its assets and surrounding older estates able to accommodate some development.

Blackpool was approved as a Growth Point by the Government in 2008 and the M55 Hub, which straddles the authority areas of Blackpool and Fylde is seen as an optimal way of meeting growth needs. It is planned to deliver around 7000 homes and will require around 50ha of employment land. Not all of this falls directly within Blackpool Council's authority, around 2700 dwellings at Marton Moss form part of the Hub, but the scale of development presents opportunities for developing cross-boundary energy facilities, as well as other infrastructure including a primary and secondary school. A Joint Supplementary Planning Document is currently being developed by Blackpool and Fylde which will provide more details on the proposed masterplan.

Blackpool Council are also working on three Area Action Plans to help shape the transformation and regeneration of key resort areas. These are:

- Foxhall – The Council have recently published the Preferred Option for regenerating one of Blackpool's oldest areas, including new and rejuvenated housing, good quality guesthouses and mixed use development.

- South Beach – AAP proposals are currently at the Issues and Options stage and consultation has recently been undertaken. A submission plan is expected in 2011 that aims to set the framework for regeneration.

- North Beach – Currently at an early stage of production, it has been recognised that given the time it will take to develop an AAP for this area that an Interim Planning Statement is needed to prevent premature ad hoc and piecemeal development compromising the realisation of a wider regeneration of the area.

A key document in this process is the **Strategic Housing Land Availability Assessment (SHLAA)** which identifies possible development sites which are currently foreseeable. It should be noted that identified SHLAA sites do not guarantee development, but simply scope options. The SHLAA is in accordance with PPS3 Housing, which seeks a flexible and responsive supply of land for housing, identifies and records potential housing sites across Blackpool to accommodate growth over the next 15 years. PPS3 requires local authorities to avoid the inefficient use of land, encouraging local authorities to develop housing density policies having regard to the spatial vision and strategy for housing development in the area, the desirability of using land efficiently and reducing and adapting to the impacts of climate change, and the characteristics of the area including the current and proposed mix of uses. The SHLAA study provides a mechanism to support the phased delivery of housing sites, supporting the 'plan, monitor and manage' approach towards plan making.

The **SHLAA Review (2009)** identifies a potential net capacity of 6311 dwellings within Blackpool that could be delivered over a 15 year period commencing April 2009. The identified capacity of the 6311 SHLAA lands does not take account of existing planning permissions from conversions or additional windfall potential sites which can be expected to come forward in Blackpool over the longer term period to 2026 to meet this shortfall. Existing dwellings with planning permission equates to 327 dwellings as outlined in the 2009 Annual Housing Monitoring Report (April 2009). A windfall allowance for 800 net dwellings created through the conversion of existing buildings is included in the SHLAA for the period 2014-2026.

Together with the identified SHLAA sites (6311 dwellings) this increases Blackpool's identified potential housing supply by + 327 and + 800 dwellings to 7438 dwellings. This substantially falls short of Blackpool's pro-rata NWRSS requirement (8482) to 2026 by 1,044 dwellings (shown in the table below).

Table 16: Net Housing Potential Requirement (Blackpool Urban Area) 2009-2026

Total NWRSS Housing Requirement 2003-2021	8000
Total NWRSS Pro-Rata 15 Year (Core Strategy) Requirement 2003-2026	10220
Total Net Completions 2003-2009	1738
Total Net NWRSS Requirement 2009-2026	8482
SHLAA Identified Potential Capacity 2009-2024	**6311**

The shortfall will need to be met by additional new build windfall developments from further sites within the existing urban area. There are evolving proposals for pro-active inner area intervention and potential redevelopment and regeneration of declining former holiday accommodation, supported by major public funding, but the scale of this programme and its impact remains to be finalised.[6] The amount of housing identified within SHLAA sites is also shown below.

Table 17: RSS housing targets

RSS Growth Targets	2006-2011	2011-2016	2016-2021	2021-2026	Total
Blackpool Urban Area (pro-rata AECOM estimate)	2063	2063	2063	2063	8253

The table above provides a pro-rata figure for growth, taking the 10,220 total requirement for growth to 2026 from the SHLAA (as outlined in the NWRSS) but removing the conversion properties from the total 1,100 (9120 dwellings). Conversions are not included, as the building energy use is already included in estimations of existing stock. The remaining 9,120 dwellings, less completions of 867 dwellings over three years (2003-2006) leaves a growth total of 8,253 dwellings from 2006-2026. The trajectory above needs to be projected in four year tranches from 2006 as the existing energy data is only available from 2006, hence the reasoning behind this baseline, rather than the 2003-2026 growth period for 10220 dwellings outlined in the NWRSS.

Table 18: SHLAA housing site availability

SHLAA Possible Housing Numbers	2009-2011	2011-2016	2016-2021	2021-2026	Total
Blackpool Urban Area (6311 SHLAA sites+327 permissions + 800 windfall up to 2026)	1860	1860	1860	1860	7438

For the purpose of this study, it is assumed that the RSS targets are met, and hence the RSS housing delivery projections have been used to model housing growth in Blackpool. Indicative development sites, identified in the SHLAAs have been used to spatially model possible development locations in the maps in this study.

Expected Housing Type Mix of Future Development

The density of housing and the mix of house types expected in new development, has a considerable effect on energy demand. Higher density development (over 50 dwellings/hectare) lends itself to a different mix of low carbon energy options, including district heating.

The Strategic Housing market Assessment (SHMA) 2008 indicates that Between March 2008 and April 2009 most dwellings were built at densities above 50 dwellings per hectare. Only 17 new dwellings were built in schemes with a density lower than 30 dwellings per hectare. Currently, development in Blackpool is fairly high density, with a mix of house types that shows a high proportion of flats and terraced housing, as shown in the table below. Future development in Blackpool looks to redress this mix of house types to provide more family housing. The modelled mix

[6] Strategic Housing Land Availability Assessment Review (SHLAA) May 2009, Blackpool council

of house types is based on discussions with Blackpool Council concerning the likely mix for new development. This house type mix will still result in relatively high densities in most developments.

Table 19: Existing House type Mix

House type	Detached	Semi-Detached	Terraced	Flats/Maisonettes
Blackpool Mix	8%	37%	31%	24%

Table 20: Modelled house type mix for new development

House type	Detached	Semi-Detached	Terraced	Apartment
Blackpool Mix	20%	15%	30%	35%

3.5.2 NON-RESIDENTIAL GROWTH

The amount of non-residential growth that will accompany housing growth is less certain, so broad assumptions have been made in this study. Projections for commercial and industrial growth have been taken from the 'Blackpool Employment Land Review' (2008), which sets out the amount of land available in the table below. Commercial and industrial growth is assumed to fulfil these availability projects over the study period.

Table 21: Non-Residential land projections

Non-Residential Land Projections	Net Outstanding Requirement Area / Sq.m.
Blackpool and its cross-boundary urban edge – Industrial land	70 hectares to meet needs up to 2021
Strategic industrial sites • Blackpool Business Park • Whitehills Park • Blackpool Fylde Estate	29.5 hectares
Blackpool and its cross-boundary urban edge – Industrial land	Net outstanding requirement is therefore 40 hectares
Blackpool and its cross-boundary urban edge – Retail	54,315 sqm (gross) of floorspace

Given the projected growth in Blackpool, there is likely to be a requirement for supporting infrastructure, such as schools, community and health care facilities which are relatively large energy users. The expected level of growth in these areas is set out below. The information below has been supplied by Blackpool Borough Council.

Table 22: Yield assumptions

Facility type	Area assumption
Primary School	3 primary schools (Primary school - 2230m^2)
Secondary School	2 secondary schools (Secondary school - 10,000m^2)
Health Care	2 health centres (includes 1 mental health centre)
Community/Leisure Centres	Current assumption is no new provision

Table 23: Non-Residential land projections over plan period (hectares)

	Commercial/ Industrial	Schools	Healthcare	Community
Blackpool	75	2.7	1.0	none

3.6 EXPECTED ENERGY DEMAND FROM NEW DEVELOPMENT

New development will increase energy demands in Blackpool. Part L of the Building Regulations is expected to require that buildings meet increasing minimum energy efficiency standards. These standards have been applied to the quantum and assumed growth levels and mixes outlined in the sections above and modelled using AECOM residential profiles prepared for DCLG, and CIBSE industry benchmarks for non-residential development. In addition, increased energy performance in line with the proposed changes to Building Regulations Part L requirements (which will take effect in 2010, 2013 and 2016) have been taken into consideration, along with the expected changes to regulations affecting non-residential buildings leading up to zero carbon in 2019. The expected additional energy demand is set out in the tables below.

3.6.1 RESIDENTIAL DEVELOPMENT

Using the growth numbers and housing type mix outlined above, the following energy demands are expected from new development (when built to expected building regulations).

Table 24: Cumulative energy demand from new residential development (GWh)

	2011	2016	2021	2026
Electricity Demand	3	8	12	14
Gas Demand	6	13	16	19

3.6.2 NON-RESIDENTIAL DEVELOPMENT

CIBSE TM46 benchmarks were used to model energy demand of future non-residential buildings, increased energy efficiency measures mirroring expected changes to building regulations for non-residential buildings. This is illustrated in the tables below.

Table 25: Cumulative energy demand from new non-residential development (GWh)

	2011	2016	2021	2026
Electricity Demand	0	49	59	69
Gas Demand	0	223	262	273

The scale of energy demand, particularly gas (or heat) demand, predicted for future non-residential development in Blackpool is substantially higher for than that for residential growth. Non-residential buildings can have a very high energy demand, though this will vary greatly depending on the type of building. Consequently, non-residential development is often ideal for use as an ‘anchor load’ or fixed energy user to regulate supply through a district heating scheme.

3.7 TOTAL ENERGY DEMAND PROFILE

The following table summarises the energy demand profile of the Blackpool LPA. This summary assumes new development follows the expected house type mix.

Table 26: Expected Cumulative Energy Demand in Blackpool over time (GWh)

	2006	2011	2016	2021	2026
Existing Residential Electricity Demand	296	297	298	299	300
Existing Residential Building Gas Demand	1,123	1,046	970	894	844
New Residential Electricity Demand	374	359	344	329	316
New Residential Building Gas Demand	428	416	404	393	383
Existing Non-Residential Electricity Demand	0	3	8	12	14
Existing Non-Residential Gas Demand	0	6	13	16	19
New Non-Residential Electricity Demand	0	49	59	69	78
New Non-Residential Gas Demand	0	223	262	273	284
Total Electricity Demand	670	708	709	709	709
Total Heat Demand	1,551	1,691	1,649	1,576	1,531

The following graph demonstrates the effect of new development on the expected energy profile. It demonstrates that while new development will make up a significant proportion of the energy demand profile, it is still far outweighed by energy demand from existing development in Blackpool.

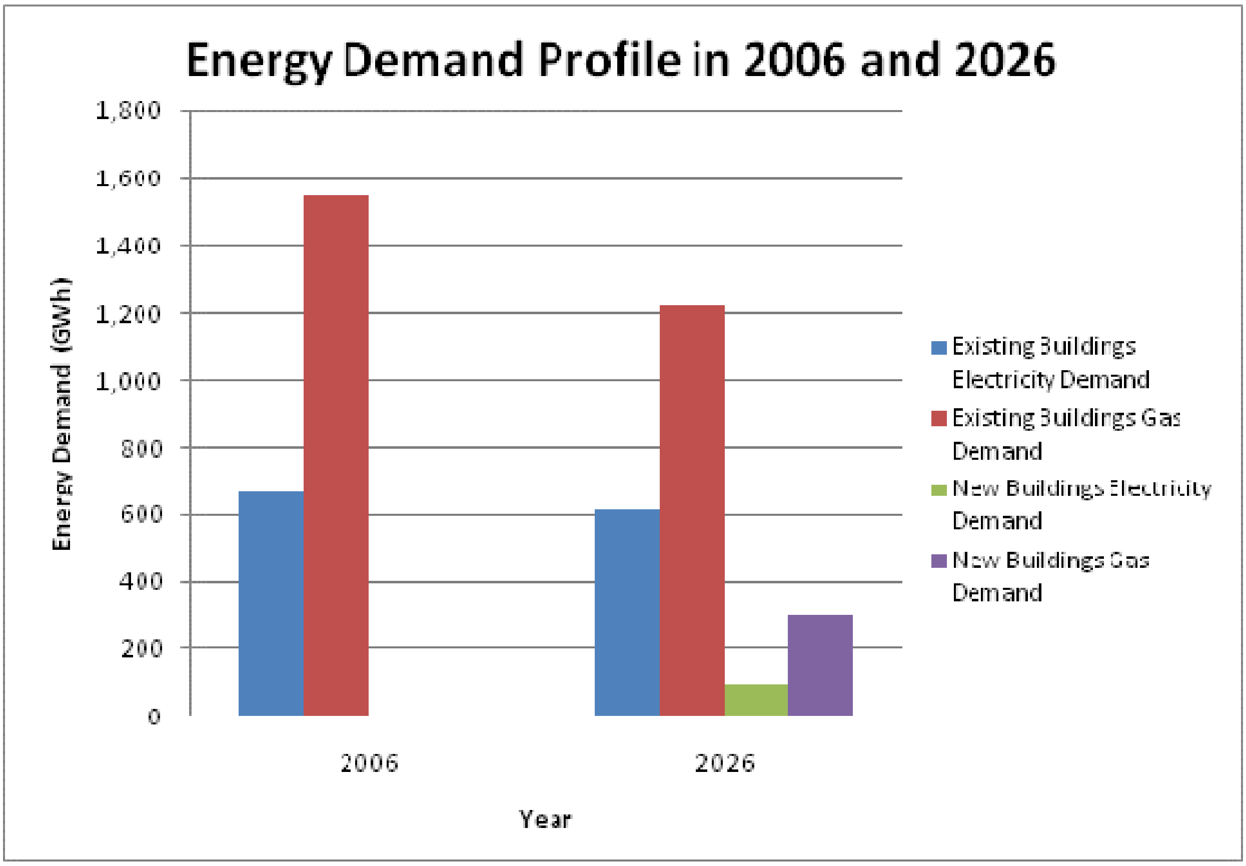

Figure 24: Comparison of energy demand from existing and new buildings (kWh)

3.8 EXISTING ENERGY DISTRIBUTION INFRASTRUCTURE

The capacity of existing electricity and gas distribution infrastructure in Blackpool has been reviewed as part of this study. The results of the review are included in Appendix A. The review shows that generally the capacity of the electricity grid in Blackpool is good, though some substations may require upgrades if significant additional loads come on-line. Existing constraints and the need for additional distribution and supply infrastructure are important considerations in the planning and design of new low carbon and renewable energy infrastructure. In the case of small scale generation, such as micro-renewables, feasibility is unlikely to be affected by the condition and capacity of existing electricity infrastructure. However, larger loads such as Combined Heat and Power and medium to large scale wind turbines may require upgrades or additional electricity distribution infrastructure in some cases.

Gas networks are extensive in Blackpool. The existence of an existing gas network will make it easier to both retrofit in district heating networks from a local heat generation source and also to supply gas as a possible fuel source for combined heat and power.

3.9 KEY CONSIDERATIONS EMERGING FROM THIS CHAPTER

The sections above have considered the energy profile of the Blackpool LPA area, both now and in the future. Key considerations emerging from this chapter are:

- It is important to realise the scale of energy demand in order to both set planning targets and measure planning targets for renewable energy delivery based on a percentage of demand. Current and future energy demands have been calculated in this chapter for use in policy and delivery.
- The Council plays a key role in increasing energy efficiency of existing buildings. Existing buildings make up the bulk of the future energy demand, and hence efforts must be made to reduce energy demand of existing stock.

- Existing non-residential buildings often receive less focus than existing homes. The Council should support initiatives to increase energy efficiency in non-residential buildings in their area, particularly large energy users.
- The capacity of electricity distribution networks should be considered in the planning of large-scale low carbon and renewable electricity proposals.

4. Physical Context: Renewable and Low Carbon Potential

4.1 INTRODUCTION TO THIS CHAPTER

This chapter considers the scale of potential for introduction of renewable and low carbon technologies in Blackpool. Opportunities and constraints vary on a local level according to the features of the natural environment and the built environment, and it is crucial that LPAs understand their local context to set appropriate targets and policy and to support delivery of key opportunities.

4.2 EXISTING SITUATION

Blackpool's approach to carbon reduction

Blackpool have recently developed their Strategy Implementation Plan for carbon management (July 2008). The Strategy and Implementation Plan (SIP) discusses key activities to deliver the strategic objectives and targets identified and committed to under the Local Authority Carbon Management Programme. The SIP is a formal deliverable as part of LACM programme and has been developed by Blackpool Council under the guidance of the Carbon Trust. The plan makes reference to the renewable energy targets set out in the North West Plan and sets this against the latest thinking, providing an up to date implementation plan for carbon management for the local Blackpool area.

Blackpool is a deprived Urban Authority, with an average index of deprivation score of 37.66, which was the worst result for the 14 Lancashire Authorities. This results in Blackpool having relatively low per capita CO_2 emissions at around 4.9 tonnes (2004 figures).[7] Blackpool Council has set the target of reducing carbon dioxide emissions by 25% by 2013. This reduction will require an investment of £2.3 million to save 6,307 tonnes of carbon dioxide and realise savings of £758k per annum.

In order to achieve these goals and participate in the Carbon Trust's programme of delivering real reduction in carbon emissions and a reduction in the Council's energy expenditure, the Local Authority Carbon Management programme (a robust delivery vehicle) is under the direct control of the Local Authority. The LDV is designed to deliver improved energy management to reduce emissions.

Local internal initiatives include actions to reduce carbon emissions in households through installation of insulation and other energy efficiency measures and low energy lighting as referred to as part of the Sustainable Community Strategy (SCS) for Blackpool. The Corporate Plan also includes commitments to reduce the operational impact of the Council on climate change through the work of the Energy Management Section and the Council's Climate Change Group.

The strategic aims of the Carbon Management Plan include taking action to mitigate and adapt to climate change, assist the region in achieving by 2050 a reduction in CO_2 by 60%. The Plan will also acknowledge, demonstrate and raise awareness that action needs to take place at all levels, global, international, European, nationally, regionally and locally.[8]

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[7] Strategy Implementation Plan, Blackpool Council (July 2008)
[8] Strategy Implementation Plan, Blackpool Council (July 2008)

Existing Low Carbon and Renewable Energy in Blackpool

Details of the current known renewable and low carbon installations in Blackpool are shown in the table below. The Council has proactively encouraged installation of renewable energy showcases, including photovoltaic array and small wind turbines at the Solaris Centre, which also gives educational material on energy efficiency and low carbon living. The Council have also installed small scale wind turbines on a section of the promenade. These initiatives should be commended for their educational and leadership benefits to show Blackpool is proactive in reducing its emissions. In terms of overall carbon reduction however, the current installations are modest and make a limited impact on the overall reduction of Blackpool's carbon emissions.

Table 27: Known existing renewable and low carbon technology installations in Blackpool

Source	Contractor	Location	Installed Capacity (MW)	Status
Wind Power	Blackpool Council	Blackpool Promenade	0.045	Operational
Wind Power	Solaris	Solaris Centre	0.012	Operational
Wind power	Holy Family	Private	Unknown - Small scale	Planned
Photovoltaic Array	Solaris	Solaris Centre	0.018	Operational
Combined Heat and Power	Solaris	Solaris Centre	0.055	Operational
Combined Heat and Power	Blackpool Council	Sandcastle Complex	Unknown - Medium Scale	Planned
Combined Heat and Power	Blackpool Council	Homes for Elderly	Unknown - Small Scale	Planned

Figure 25: One of the existing wind turbines installed outside the Solaris Centre

4.3 THE RENEWABLE ENERGY CHALLENGE

The EU Renewable Energy Target requires a 20% reduction on 1990 levels by 2020 of CO_2 from electricity, heating and transport. The UK is expected to meet 15% of this target, which equates approximately to around 30% reduction in carbon dioxide from electricity production and approximately 12% from heating requirements as set out in the UK's Renewable Energy Strategy 2009. The contribution of different areas to this target should depend on the scale of potential and delivery opportunities. However, the scale of the challenge is vast, and Blackpool should seek to maximise opportunities. Simultaneously, renewable energy targets have been set for Blackpool as a whole through the North West RSS, as described in Chapter 2. In relation to Renewable Energy, the proportion of electricity supplied from renewable energy sources in the region should be 10% by 2010 and 20% by 2020 and local planning authorities should ensure all residential developments comprising 10 or more units should secure at least 10% of their predicted energy requirements from decentralised and renewable or low-carbon sources. These targets are considered a minimum in this study. To some extent, these targets have been superseded by current National aspirations, but they are still based on an assessment of potential of the North West. The Blackpool LPA should seek to at least meet their share of the North West targets, and exceed these where possible to assist with meeting the National targets.

This chapter seeks to review the opportunities in Blackpool to deliver low carbon and renewable energy. Chapter 4 has established an energy profile for Blackpool, which allows us set energy generation targets for renewable energy based on a percentage of energy use in Blackpool. The table below sets out the amount of renewable energy which would need to be produced to meet the North West RSS requirements and to meet an equal share of the National Renewable Energy targets.

Table 28: Blackpool's renewable energy requirements (GWh)

LPA area	North West 2020 renewable electricity target (20%)	National 2020 renewable electricity target (30%)	National 2020 renewable heat target (12%)
Blackpool	142	213	189

* Note: 2020 targets have been approximated from the 2021 modelled scenario

4.4 ESTIMATING BOROUGH WIDE LOW CARBON AND RENEWABLE ENERGY POTENTIAL

Before estimating the potential for the delivery of low carbon and renewable energy, it is important to understand the opportunities and constraints around the use of different generation technologies across the Local Authority Area, and how this compares with the wider Region. Blackpool has its own unique opportunities and constraints, and while some resources are not as abundant as other areas in the North West, urban nature of Blackpool lends itself to some opportunities that are very deliverable. It is important to first identify opportunities to maximise potential within the Authority.

The current North West RSS regional and sub-regional targets for renewable energy are based on the findings of the 2001 study and subsequent report entitled "*From Power to Prosperity*". The report determined the region's potential for renewable energy generation via different technologies including both on and offshore wind, biomass, solar, small-scale hydro, landfill gas and energy from waste. The targets proposed in the study were envisaged as increasing the North West renewable energy capacity from 1.3% to 8.5% of total electricity generation capacity by 2010.

To inform a partial revision of the RSS targets, Arup prepared a study on behalf of 4NW in 2008 to investigate the existing capacity, opportunities and constraints for renewable energy across the North West. The study concluded that the region faces considerable challenges in delivering upon the targets set out in the RSS but nevertheless states that the North West has potential to generate 'considerably more' renewable energy than present levels.

In assessing regional renewable capacity, the study sets out both a 'theoretical maximum' scenario and 'pragmatic' scenario for a series of energy technologies. The latter scenario reflects what is considered to be a realistic estimate of renewable energy generation that could be delivered by 2020. The theoretical maximum renewable output across the North West is estimated to be 3,090 MW, with an electrical output of 9,155GWh while the pragmatic scenario suggests a more realistic potential capacity of 1,990MW, equivalent to 5,755GWh output.

From the priorities identified in studies of the North West along with assessment of the character of Blackpool, this study focuses on the potential for renewables and low carbon technologies associated with wind, biomass, geothermal, combined heat and power and micro-generation. It also scopes the potential for renewable energy installations off-shore on the coast bordering Blackpool. However, it should be noted that offshore technologies will not contribute to Blackpool LPA contributions as the boundary of the LPA stops at the low tide mark.

The following renewable technologies are excluded from the borough-wide analysis for reasoning as follows:

- **Energy from sewage**: Energy from sewage needs to be taken forward at a wider-scale and is very dependent on existing infrastructure. Currently, sewage from Blackpool is conveyed to a treatment plant in Fleetwood, outside the LPA area. Opportunities for this could be explored in partnership with the neighbouring authorities.
- **Energy from waste**: Potential for energy from waste should be considered at a regional or county level, but is considered outside the influence of Blackpool council alone. Currently, Blackpool waste is managed at Fleetwood, outside the LPA area.
- **Hydropower**: Hydropower has been excluded from this study as there are no significant sources of hydropower known in Blackpool.

4.5 WIND ENERGY POTENTIAL

The adopted Regional Spatial Strategy for the North West sets out 5-year targets for on-shore wind generation across the region. The RSS sets an indicative regional target of 44-62 on-shore wind farms / wind clusters by 2020, with a combined capacity of 720MW. In addition, the RSS targets an additional 50 single large wind turbines with a capacity of 75MW by 2020.

Arup's 2008 study for 4NW estimates a 'theoretical maximum' installed capacity of 838 MW with an electricity output of 1,982GWh across the North West. This figure includes 100MW of capacity (236.5 GWh electrical output) on 'constrained' sites, which includes national parks, AONBs, RAMSAR sites and other constraints typically seen as incompatible with large-scale wind power. The 'pragmatic' scenario suggests a more realistic regional target is 502MW with an electricity output of 1,187GWh, which still includes 50 MW installed capacity in 'constrained' areas of the region.

This section explores the potential for Blackpool to contribute to these regional targets for on-shore wind energy generation.

Understanding Scale

This section analyses the potential for small (<10m tall), medium (10-50m tall) and large scale wind turbines (>50m tall) in Blackpool. It is important to realise both the scale of renewable energy generation and the design constraints that are associated with the various scales.

The diagram below indicates the various types of wind turbine options. The rate of energy generated multiplies at a logarithmic scale, which in short means that a large wind turbine generates much more energy than a smaller wind turbine, due to this logarithmic rate and access to much higher wind speeds, as larger wind turbines are much higher than smaller ones.

Small scale wind turbines like those installed outside the Solaris Centre and on the Promenade produce a relatively small amount of energy (enough to supply 1-2 buildings), whereas a large wind turbine used in a wind farm could power thousands of homes.

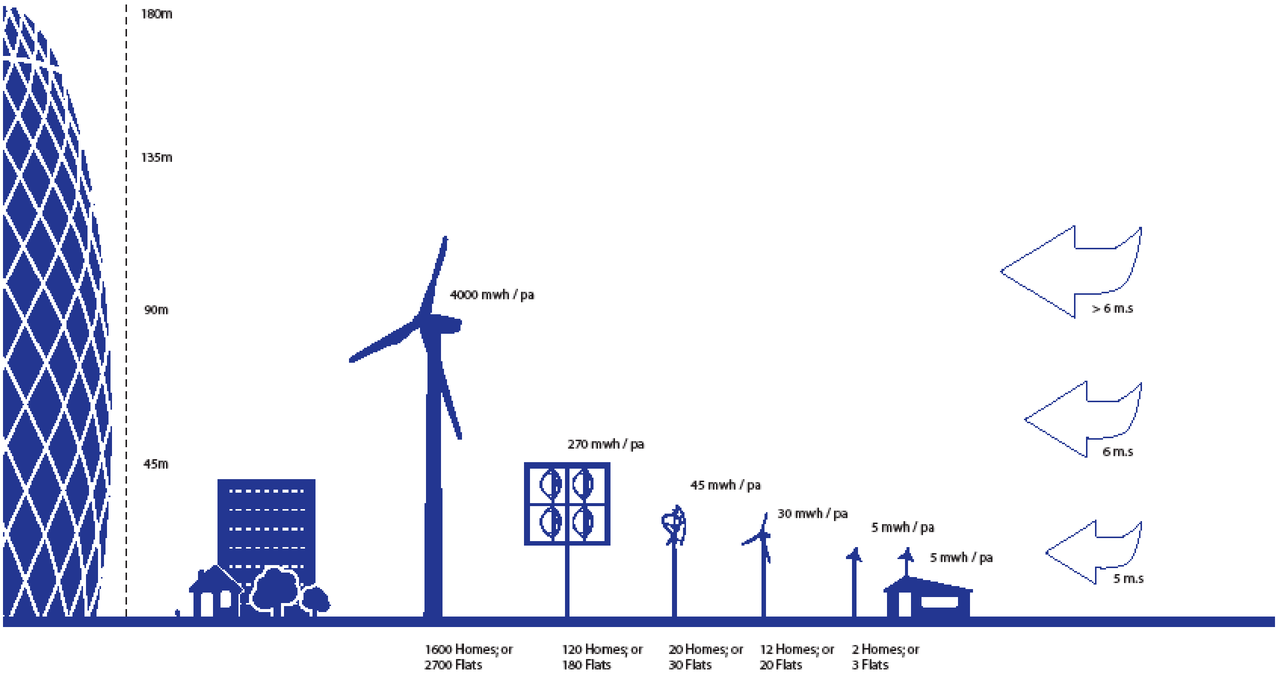


Figure 26: Difference in output relating to scale of wind turbine

Potential and constraints to onshore wind development in Blackpool

Generally wind speeds over 5.5m/s at 45m elevation are considered to be favourable to make wind power technically and commercially viable. The figure below shows wind speed at 45m above ground level, demonstrating wind energy generation from large scale wind turbines is viable (in terms of wind speed) across the entire study area, bar a small part of the immediate shoreline. This study considers the wind energy potential of Blackpool from a desk-top study based on GIS modelling using data available. Higher wind speeds, above 7m/s at 45m, will be more desirable as available power from the wind is a cube function of wind speed velocity power output, and the potential of these sites should be investigated first. The figure below shows wind speed distribution across Blackpool.

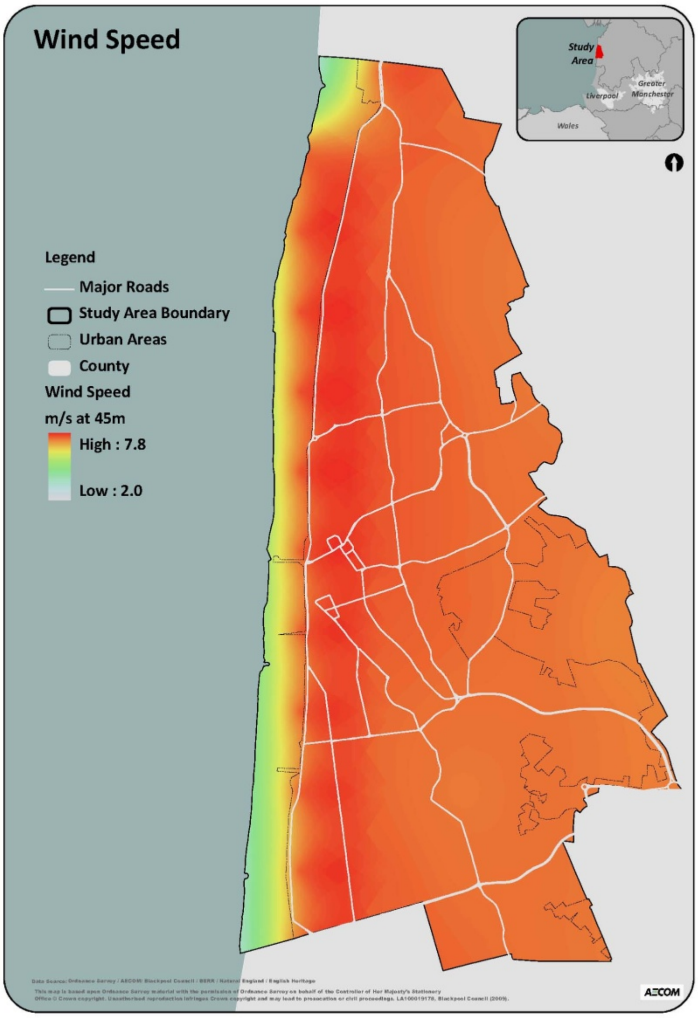


Figure 27: Wind Speed Distribution

Obviously, wind turbines are not suitable everywhere in Blackpool due to the urban and environmental context. Blackpool is a very urban borough, where the majority of land is developed, with a high proportion of residential land and public realm. This has different implications for different scales of wind turbines. The following sections consider the potential for large scale turbines and smaller scale wind turbines in Blackpool.

Potential and constraints for large-scale wind power

A process of physical constraint mapping has been used to identify which sites are likely to have the greatest potential for large wind turbine location. These areas indicate an 'area of search' rather than specific locations and still need to be subject to further local investigation. Through GIS analysis, the following constraints have been included:

- Safety Buffer of 100m from roads, rail and major overhead transmission lines (approximate for a large turbine);
- 400m noise buffer from residential buildings;
- Exclusion of designated sites of ecological or landscape significance; and
- Exclusion of un-designated woodland and forest.
- Locations of existing turbines
- Airfields (licensed for public use).
- Airport radar 'safeguard zones' (note: these are zones where consultation should occur with aviation authorities, but development is not necessarily restricted)

Constraints are mapped across Blackpool LPA in the figure below

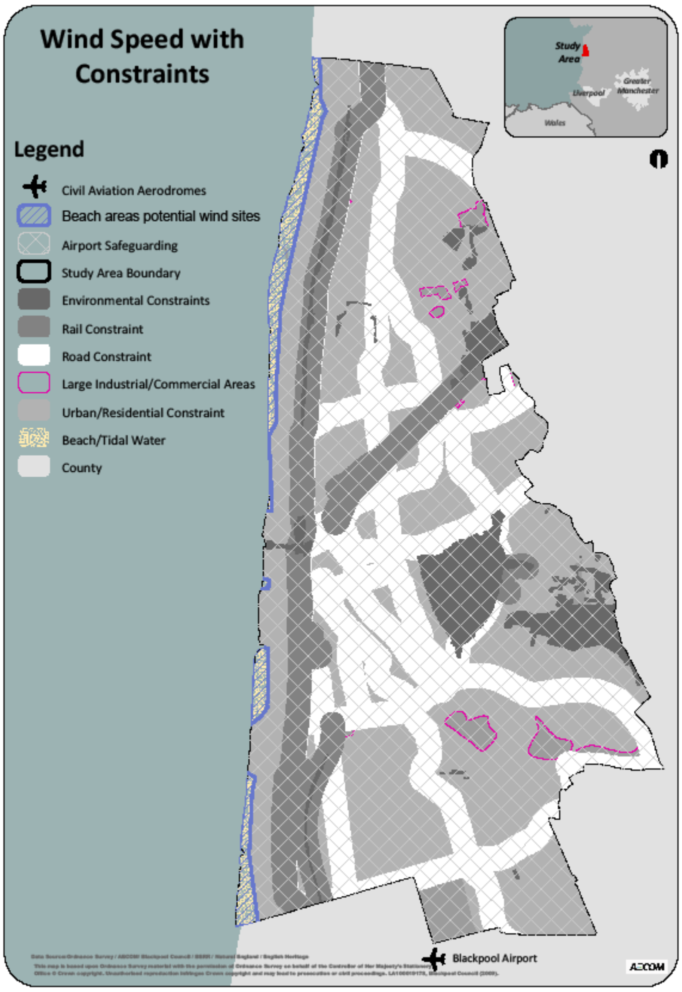


Figure 28: Large Scale Wind Energy Opportunity Areas

Due to the proximity of Blackpool Airport, all areas in Blackpool fall within a consultation zone where discussions should be had with aviation authorities to identify any radar interference issues, but do not necessarily preclude installation. Constraints are shown in shades of grey, where dark grey indicates a more finite constraint, lighter greys indicate less restrictive constraints where site specific investigation is needed to determine feasibility.

The areas which have potential for further investigation are coloured in the figure above, showing priority relating to wind speed. Applying these generic constraints, the biggest opportunity for wind power is to the North of the promenade/beach front and in a small area of open space to the east of the Borough.

A large wind turbine could potentially be located on the beach front. The location of a large wind turbine here could be a unique selling point for Blackpool and could be painted or lit up in a similar style to the other Blackpool attractions, to make the wind turbine a feature of interest. This could assist with the marketing and help to further raise the profile of Blackpool.

A precedent example exists for locating a large 45 meter tall wind turbine in an urban area along a water front edge. The example is the electric storm wind turbine which was erected along the South Bank in London as part of a temporary installation. The installation comprised of lighting reminiscent of "the Northern Lights", with the addition of mist and sound effects. The effects were driven by various environmental readings continuously made at the site. The foundation design for the wind turbine involved piles of 27 metres depth in an area with complicated ground conditions in the centre of London, a busy major city.

Source: http://www.windmillworld.com/energy/electricstorm.htm

In Blackpool a proposal is currently in place to locate a snowdome in the town. A snowdome is a large electricity user, and so if a large wind turbine were to be located on the promenade it could be delivered in conjunction with the snowdome as a direct source of green energy, thereby offsetting the snowdome energy use.

It is important to note that locating a large wind turbine on the beach front in Blackpool would be dependent on engineering capabilities and feasibility issues, due to the tidal location and ground conditions. Sand may prove a difficult material as a base for the wind turbine to hook into and to remain stable. A wind turbine in this location may also prove difficult to access, as via the sea the waters would be too shallow and by land would require a crane to hoist the wind turbine onto the beach.

A large wind turbine would be possible in this location, but is likely to have serious cost implications surrounding it. We therefore recommend an engineering feasibility study is conducted to assess the potential.

All areas classified as urban environment in the spatial dataset have been buffered on the above map, indicating areas where the built context and its sensitivity to noise need to be taken into account. This is primarily an issue for residential development, where wind turbines should be a certain distance away to avoid adverse night-time noise effects. However, large wind turbines can still be included in urban areas where the surrounding land uses are of a commercial or industrial nature and may not be adversely affected by the noise generated by turbines.

There are many precedent examples across the UK where large wind turbines have been installed in non-residential areas in an urban context. The seaside town of Lowestoft in Suffolk has a large wind turbine in the port area of its town centre which was built in 2004.
It was Suffolk's first commercial wind turbine and the largest single turbine in the UK (rated 2.75MW), generating enough energy to power 1500-1600 homes. The wind turbine was built by SLP Energy, and is located at Britain's most easterly point, Ness point in Lowestoft. The wind turbine stands 126m (413 ft) high and can be seen towering over the town. It has become an icon for the town and is widely supported by the community.

In addition two large 85m high wind turbines which have a rotor diameter of 70 m and a combined capacity of 3.6 MW have been installed in an urban area of London. The wind turbines are located on the Dagenham estate of the Ford Motor Company in East London. The turbines were completed in April 2004 and are landmarks of the skyline and the first 'wind farm' to be built in London. The turbines are located 10 miles (16 km) east of the City of London.

Figure 29: 2.75MW Wind Turbine (100m tall) in a light industrial area in the town centre of Lowestoft, North East Suffolk

Blackpool has a number of large areas which are predominantly of commercial or light industrial use. These have been identified from aerial mapping as part of this desktop study, and are shown in the diagram below. These areas all demonstrate high wind speeds. Possibilities for the integration of large scale wind turbines in these areas and any other suitable non-residential areas should be investigated in terms of the specific site context. Integration of large scale wind turbines in industrial areas is recognised as a key economic opportunity for Fylde Coast in the Fylde Coast Multi-Area Agreement.

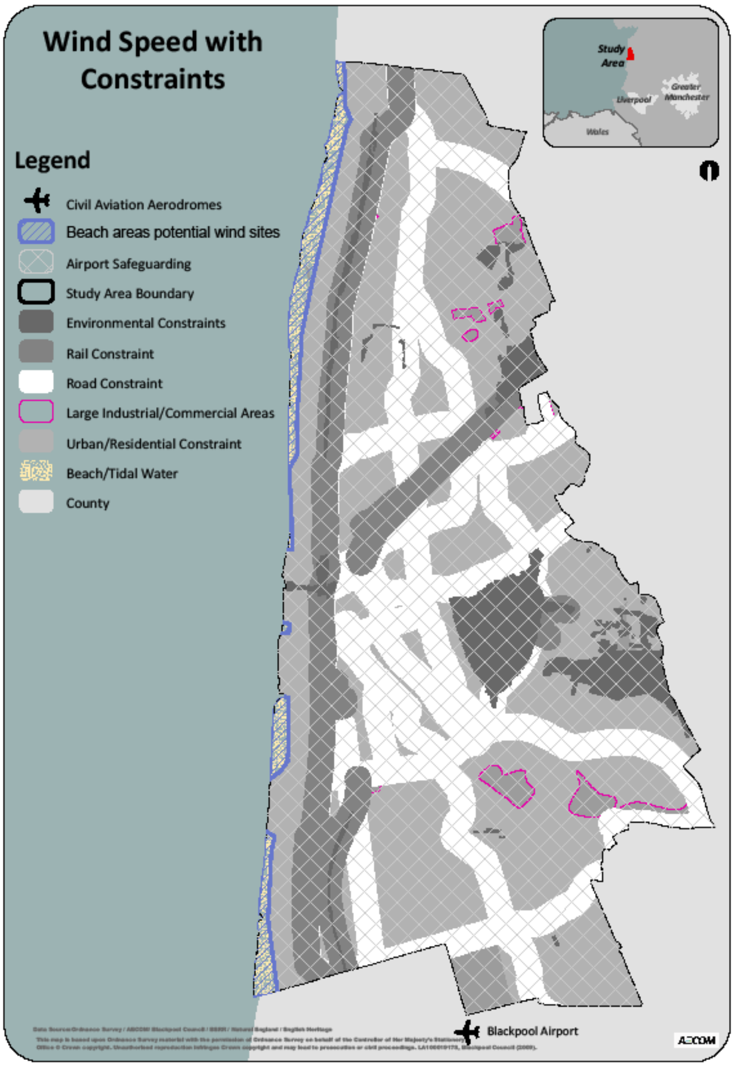


Figure 30: Commercial and industrial areas in Blackpool where large scale wind could possibly be integrated

Further detailed feasibility studies would have to consider a number of additional siting constraints in addition to these before any site could be confirmed, including:

- **Local Wind Resource Survey** - Wind speeds of 5.5m/s or above at turbine hub level are needed to operate a large scale wind turbine efficiently. The national dataset for wind speeds at a height of 45m above ground level was used to examine wind speeds across the Authority, however, this study is not a sufficient evidence base for the actual siting and delivery of wind turbines, but it gives a high level assessment of promising areas to look into further.
- **Noise implications** - Concerns over noise are usually related to perception rather than actual experience. The noise impact of large scale wind turbines will depend on local sources of noise such as from major roads, rail lines, industrial areas etc. There are no required distances between wind turbines and residences, but 400m is a rough guideline that is often used and has been adopted within this assessment. Distances between turbines and industrial buildings are not subject to the same restriction. More detailed studies will be required to map noise and identify areas of least impact for turbine development.
- **Aeronautical and Defence Impacts** – Wind turbines may interfere directly with the operation of aeronautical and defence equipment, for example, when located near aerodrome protected surfaces, runway takeoff points or within military low-flying zones. Radar systems associated with airports and military sites are also a significant issue; for example, radar technology that is unable to differentiate between rotating turbine blades and an approaching aircraft have contributed to the rejection of a number of wind applications in the UK.

Consultation will have to be undertaken with MOD and nearby airport authorities to determine particular constraints in the area and possible mitigation strategies, such as software upgrades to the radar technology. It is emphasised that the presence of local airports or military sites is not necessarily a critical constraint when considering the exploitable wind resource, but consultation is advised on a case by case basis.

- **Grid connection and Sub Station Requirements** –It will be necessary to carry out a detailed assessment of the opportunities and constraints presented by existing infrastructure in relation to each turbine site. And this information should feed into any development programme for turbines. Planning applications for sites close to a suitable grid connection should be prioritised
- **Flood risk -** Development of wind turbines on areas of high flood risk is currently restricted by PPS 25. This could potentially impact upon the construction of Turbines in the flood risk areas. Proposed revisions to PPS 25 suggest wind turbines be reclassified as essential infrastructure[9.] This would largely permit turbine development in flood zones and as such flood zones have not been considered a constraint in the above analysis.
- **Shadow Flicker Modelling** - This can be an issue at certain times of day when the wind is blowing, but effects can usually be mitigated against and has not been specifically considered at this stage. This would need to include driver distraction issues, in partnership with the Highways Agency and local highways services.
- **Telecommunication Impacts** - Wind turbines can interfere with radio signals, television reception and telecommunications systems. This has not been specifically assessed at this stage, but with consultation measures can be put in place to mitigate these effects.
- **Landscape and Visual Impact** - A detailed visual and landscape impact assessment has not been conducted at this stage. The specific sites of the turbines would have to be carefully considered to ensure that they do not detrimentally impact key view corridors and that they are well integrated into the surrounding landscape.
- **Bird Migration** - An important element that will need consideration is the annual migration of birds, particularly due to the presence of important environmental sites in the area. A detailed migration survey must be conducted over a year period.
- **Transport Access Assessment per turbine** - Blade section is the longest/largest full section to be delivered on site. Some sites are restrictive.
- **Additional losses to turbine energy output** - A more detailed analysis would be required into the effect of local topography, clustering effects, hysteresis and local climatic conditions on the energy yield of the turbines.
- **Impact upon land use and land management** - The amount of land consumed by wind turbines is relatively small. Nevertheless, further study should be carried out to ensure that the turbines do not have a negative effect upon land use potential.
- **Ground Condition Survey** – The feasibility of the construction of a large turbine would have to be supported by geotechnical investigations
- **Gas pipelines and other sub terrain analysis** - The current assessment has not assessed the presence of utility pipelines beneath the sites which would have considerable impact on the ability to site turbines.
- **Archaeological Constraints** - Any impacts on archaeology in the area will have to be assessed in more detailed studies.
- **Listed Building and Conservation Area impact** – a detailed impact assessment has not been conducted at this stage and would be required for any further study.

[9] Planning Policy Consultation – Consultation on proposed amendments to Planning Policy Statement 25: Development and flood risk, paragraphs 3.31-3.38
- http://www.communities.gov.uk/documents/planningandbuilding/pdf/consultationfloodrisk.pdf

Potential and constraints for small-medium scale wind power

Smaller wind turbines have a significantly reduced visual impact and, whilst their output is significantly less, small-medium scale wind can contribute to Blackpool renewable energy generation capacity. Recent reports have shown that smaller-scale wind can be inefficient in urban or sub urban locations due to the effects of turbulence at low levels on power output. This highlights the need for sensible locating of smaller wind turbines.

In Blackpool, the best location for smaller scale wind turbines would be along the coast and promenade where turbulence caused by buildings is likely to be minimised. Four small wind turbines have already been located along the promenade and at the Solaris Centre. Additional wind turbines could be located here, though opportunities to increase the size of the turbines (and thus the generation capacity) should be investigated. The promenade is an area of recreational activity and attractive public realm and so the siting of wind turbines in this location would need further discussion, but the location of well designed turbines could potentially become a public realm feature. LED lighting can be integrated into turbine blades to create visual effects.

Figure 31: Blackpool Promenade Public Realm area which may be able to incorporate installation of small to medium scale wind turbines

Figure 32: Visualisation of Quiet Revolution turbines with integrated LED lighting (Source: Quiet Revolution[10])

The yearly average wind rose for Ringway, North West England, the closest annual wind rose available from the Met Office to Blackpool, indicates that as with the rest of the UK the predominant direction of wind is from the South and Southwest, see Figure 33 below. Often it isn't feasible to carry out a year-long monitoring exercise examining wind speed and direction to site a medium scale wind turbine, and therefore turbines of this scale should therefore be sited to take maximum advantage of winds originating from this direction.

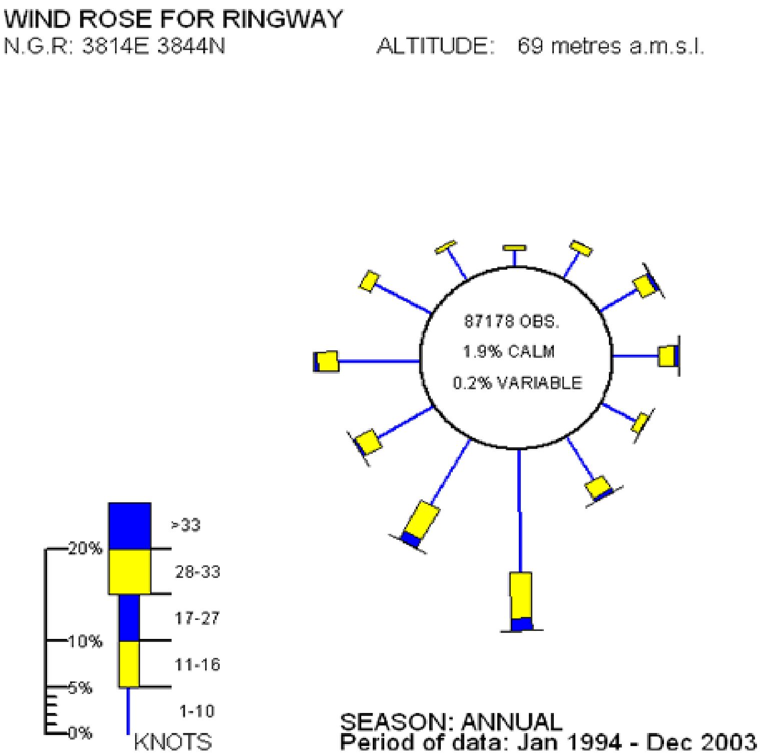


Figure 33: Met office wind rose for Ringway, North West England [11]

[10] www.reuk.co.uk/XCO2-Elegant-Wind-Turbine.htm

Scale of Potential for Wind Power in Blackpool

In conclusion, as evidenced above, harnessing wind power is most effective at the larger scale. It is therefore suggested that opportunities are explored for the largest wind turbines, where possible and within the right context, for example within commercial or industrial areas or in unconstrained open spaces. The promenade and beachfront also offer potential for smaller scale wind turbines, and the size of these should be maximised with respect to access and design constraints. Deciding upon the promenade, the industrial park or shallow water options as to which is the appropriate location and at what scale, will require further discussion.

If Blackpool were to install 200 medium-scale wind turbines (6kW, 15m tall) turbines would add 1.2MW capacity to Blackpool's contribution to the North West target and generate approximately 1.6GWh per annum. This contribution is less than a third of the electricity generated by 1 large-scale Turbine. This highlights the efficiencies of scale achieved by large scale wind, as demonstrated in the figure below.

In addition, the urban regeneration company ReBlackpool are conducting a study on wind turbines to be located in the shallow waters along the Blackpool coast. Locating wind turbines this close to shore may mean that the energy generated would count towards Blackpool LPA energy targets, as opposed to the offshore turbines which do not count.

Community involvement in the decision making process and in the financial gain from electricity generation, such as through community investment models, will be important if the resource is to be utilised for the benefit of the Borough and with community support.

Delivery Considerations for Wind Power in Blackpool

The conversion of potential to delivery requires consideration of a number of factors including:

- **Thorough engagement and investigations** – While there is a great impetus to deliver renewable energy, engagement with stakeholders and thorough investigation of all effects of wind power development needs to be undertaken to locate feasible sites.
- **Connection to the grid** – The most efficient way of providing electricity is most likely connection to the grid rather than individual developments. A clear funding scheme would have to be put in place to establish which developments can claim allowable offsets from such an investment in electricity generation and how they contribute to that investment. Grid capacity should also be taken into account.
- **Partnerships with electricity providers** – To finance the capital investment and collect revenue, wind projects would have to partner with an electricity provider.
- **Community involvement** – there are many models for community installation and investment in large-scale wind turbines, which helps return investment gains to local communities.
- **Identifying suitable sites** – the greatest opportunity for large scale wind development exists in commercial and industrial areas in Blackpool. Business and industrial parks should be scoped for potential, and where redevelopment or changes occur in these areas, installation of wind turbines should be investigated.

[11] http://www.metoffice.gov.uk/climate/uk/location/southwestengland/wind.html

4.6 BIOMASS ENERGY POTENTIAL

Introduction to Biomass Energy

Biomass is an organically based fuel which can be utilised to produce low carbon energy. As organic material can be grown, it is regarded as a rapidly renewable resource. Utilisation of biomass for energy production does produce CO_2 emissions, but during the growth and production of organic matter, CO_2 is also absorbed from the atmosphere, so over its whole lifecycle it is regarded as a low carbon fuel source.

Biomass can contribute to generation of heat through either individual biomass boilers in homes or district heating systems, and it can contribute to the generation of both heat and power through the use of a combined heat and power system (CHP). The use of CHP requires a higher tonnage of biomass fuel to produce the same amount of usable heat, though it also produces electricity. Some types of biomass can also be used to produce biogas through an anaerobic digestion process.

Some biomass products are waste products from other activities including agriculture and forestry, while biomass can also be specifically produced through growth of bio-crops. There is concern in the industry that excessive specification of biomass technologies on a site-by-site basis will lead to either long-distance import of biomass material or the sacrifice of food-producing arable land to grow dedicated biomass crops. There is a need to take a region-wide approach to biomass sourcing and supply to ensure that biomass is both available for energy use, but that its use is managed and sustainable and that waste biomass sources are utilised first.

The following sections consider various types of biomass available for direct combustion in biomass boilers or biomass CHP:

- Waste wood from industrial uses
- Forestry residues
- Fuel crops including miscanthus and short rotation coppice such as willow

Other types of biomass could be utilised in anaerobic digestion processes to generate energy, including:

- Straw
- Pig and poultry farming sectors
- Meat and Poultry Processors
- Brewing
- Water industry
- Food waste

However, as there is no significant agricultural activity in the Blackpool area, these resources are unlikely to be available in qualities viable to initiate energy schemes. Domestic waste streams are also managed in facilities outside Blackpool. Hence, these resources are not investigated further in this study. There may be potential for coordination of collection and supply of these biomass resources on a wider county scale, and this should be investigated in conjunction with surrounding areas.

4.7.1 BIOMASS SUITABLE FOR DIRECT COMBUSTION

Three sources of biomass have been explored:

1. Predicted arisings of low grade wood from improved management of forestry in Lancashire. Unmanaged forests could be brought back into productive use as a biomass fuel resource;
2. Potential contribution of dedicated biomass crops such as miscanthus or willow, grown in short rotation on agricultural land. It is unknown how much biomass is currently grown for fuel in the LPA area, though it is assumed to be negligible. The use of Grade 3 and 4 agricultural land is ideal for the cultivation of biomass crops; and
3. Waste wood recovery.

Biomass available from woodland management

Arup's 2008 renewable energy study estimated that 90,000 oven dried tonnes (odt) of wood products could be available each year across the North West through woodland management. The 'theoretical maximum' output from this resource is estimated to be 161GWh of electricity and 215GWh of heat if used in CHP plants with an installed capacity of 52MW. If used for heat-only, the regional theoretical maximum output is estimated to be 419GWh with an installed capacity of 58MW. The 'pragmatic' scenario estimates that targets are approximately 75% of the identified theoretical maximum.

Blackpool is not an agricultural area and therefore there are limited resources of woodland to provide biomass fuels within the LPA area itself. As part of this study, the wider Lancashire County has been mapped in terms of forestry resource to understand the scale of local potential which could provide biomass to Blackpool without significant transport implications. Biomass resource should ideally be managed on a County or Region scale, as management phasing will mean that different areas of forest have waste arisings at different times. Biomass supply chain coordination is a good opportunity for Blackpool to work with the wider Region to establish a local supply scheme. A coppicing study has been commissioned for the County which should make delivery mechanisms apparent.

The North West is not a particularly forested area in England, but even so there is significant fuel potential in Lancashire. There are approximately 14,715 ha of woodland in the study area, which through effective management could generate 51,500 oven dried tonnes of biomass fuel from trimmings. Assuming that all the woodland is managed and waste wood was made available for biomass energy through an appropriate supply chain, this could potentially generate a large amount of energy. If all the biomass was used in a biomass CHP unit this could generated enough electricity for over 53,000 homes and heat for around 68,000 homes. If used for a district heating system this would be enough to supply around 144,000 homes with heat each year.

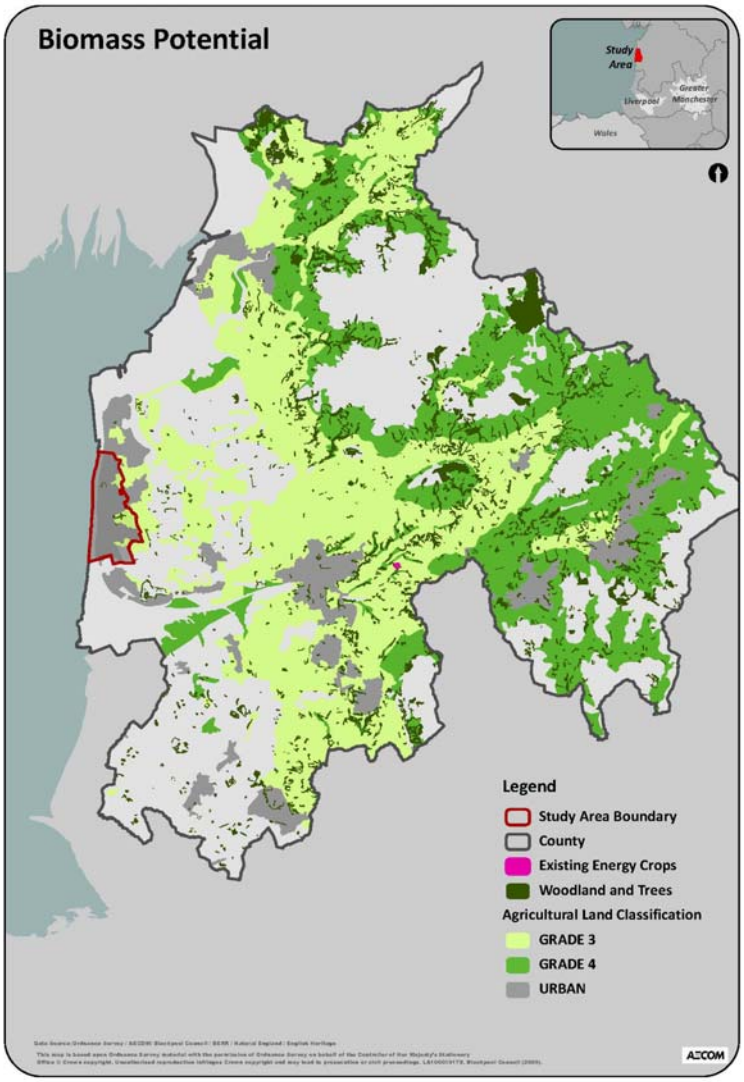
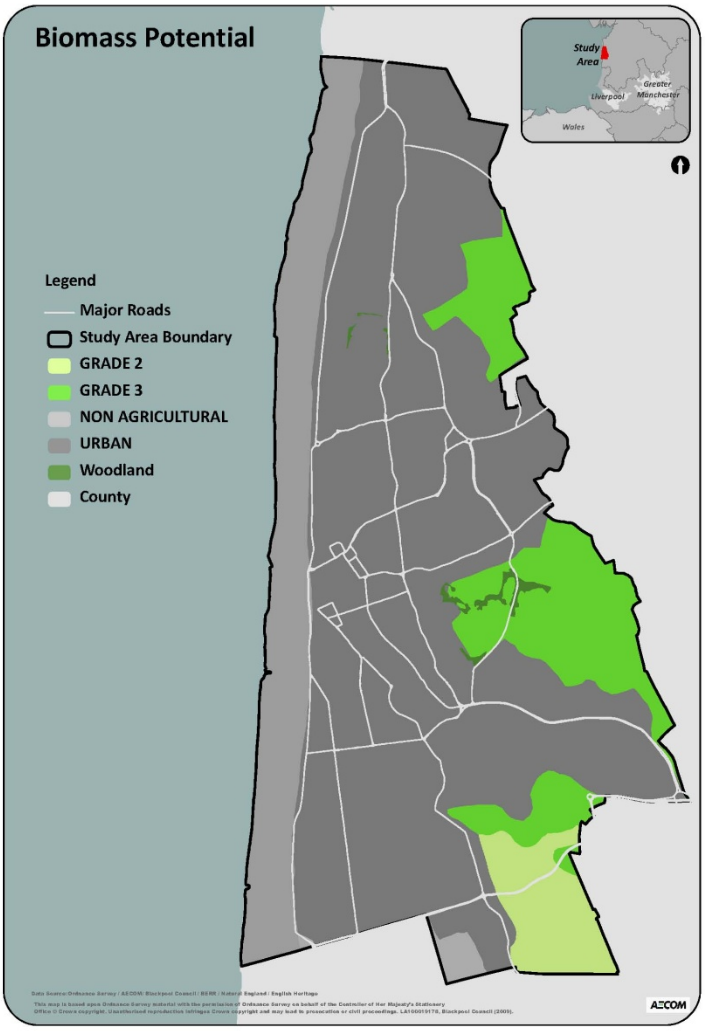


Figure 34: Wood-based Biomass potential in Lancashire

Biomass Potential from Fuel-crops – short rotation coppice and Miscanthus

The figure below shows the location of the agricultural grade land resources in Blackpool. Blackpool is an urban area and therefore there is a very limited availability of land to grow crops on agricultural land within the Borough. Most existing areas that are classified as agricultural use are currently in other uses such as parkland or golf courses where large scale biomass cultivation isn't suitable.

Figure 35: Potential Wood-based Biomass Locations in Blackpool



Looking at the grades of agricultural land across Lancashire, the grades of agricultural land that are ideal for cultivation of bio-crops (grade 3 and 4), the area immediate surrounding Blackpool is unsuitable, but further afield on the eastern side of Lancashire there are wide expanses of suitable land. Grade 3 and 4 is considered ideal for fuel crops as it preserves the most productive land, grade 1 and grade 2, for sole use for agricultural crops but are still of sufficient quality to grow well. Given that large areas are required to grow and/or collect biomass resources viably, and that Blackpool is constrained in its opportunities for biomass, an assessment would need to be considered across Lancashire and a county wide co-ordinated approach to delivery would need to be taken. It is important that the biomass resource is sourced locally, at the county level, as much as possible, rather than sourcing from the more forested and agricultural south East of England, as this is not regarded as a sustainable approach.

The yield of biomass resource from fuel crops is more efficient than forestry arisings, generating between 10 and 12 oven dried tonnes (odt) per hectare rather than around 2-4 odt per hectare. If 5% of the Grade 3 agricultural land in Lancashire was dedicated to growing fuel crops this would generate approximately 44,000odt. This would provide electricity for approximately 45,000 homes and heat for 58,000 homes if used in a biomass CHP or heat to 123,000 homes in a district heating system directly through using biomass boilers.

Diverting significant areas of good quality arable land from food cultivation to industrial growth for fuels could prove counter-productive to wider aims of sustainability and local self sufficiency.

Nonetheless, as part of a wider strategy for regional and borough energy self sufficiency, sourcing a proportion of fuel from woody bio-fuels offers the potential to reduce the CO_2 emissions in Lancashire. Key opportunities are offered by urban centres that offer sufficient demand to make a Biomass CHP system viable, and development of strong local sources of biomass will be essential.

It is expected that energy crops would be developed later than the utilisation of woodland trimmings and waste wood. This will be driven by the market price of energy crops. Currently the market price of miscanthus is not yet considered economically viable in the North West of England. It is expected that increased competition for limited fossil fuel resources and a rising cost of carbon will drive an increase in the demand for biofuels. In order to achieve a target of 12% renewable heat, Lancashire should firstly seek to harness waste wood and forestry arisings, before supplementing supply with local bio-crops. Where local supply-chains are not in place, fuel can be imported from elsewhere, but this is not desirable from a carbon perspective.

Biomass available from waste wood streams

Municipal waste streams offer potential for source separated fuels (wood fuels) that can be burnt, and this can be economically attractive as waste handlers can avoid disposal costs by using waste wood as a heat source. Based on information provided by the Council, it is clear that waste wood is separated as part of the recycling process, but it is then chipped and shipped out of Blackpool, which means that this resource is not available to harness, unless this system is changed.

Delivery Considerations for Biomass Energy for Direct Combustion

The conversion of potential to delivery requires consideration of a number of factors including:

- **Establishment of a supply chain** – While there is already biomass resource available, there is no supply chain set up to collect, process and distribute that fuel. The Council should work with neighbouring authorities and with partners to enable the set up of a local supply chain.
- **Management of local forests** – Ownership and status of local forest varies. A management plan and coordinated programme will need to be in place in partnership with the Forestry Commission and key stakeholders to ensure forests are appropriately managed and the biomass yield is captured for local use. This initially might be best undertaken on a county scale.
- **Management of environmental effects** - The South East Renewables Review reported that 'most of the wood fuel projects coming forward are of a relatively modest scale and have so far not given rise to severe difficulties through the planning system in the region. Impacts that are of concern relate to: emissions, stack size/ height, extra transport movements, access issues, smell and potential fire hazards from stored fuel'.

4.7 COMBINED HEAT AND POWER

Potential and constraints of CHP

Combined Heat and Power provides a much more efficient way of generating and distributing energy as it makes use of the heat usually wasted in energy production and because it is located close to the development the losses in transmission are reduced. Typically, a standard CHP achieves a 35% reduction in primary energy usage compared with conventional power stations and heat only boilers. However, CHP can also be run using biomass/biogas to provide a low carbon solution, with reductions in emission nearing 100%. The figure below shows the CHP arrangement compared with traditional energy generation. Policy EM 15 of the adopted RSS for the North West seeks to double the region's installed CHP capacity from 866MWe to 1.5GW by 2010.

Arup's 2008 energy potential study conducted for 4NW estimates a theoretical maximum electricity output of 1,420GWh and heat output of 1,894GWh from CHP schemes in the North West region. The theoretical maximum 'heat only' output is estimated to be 3,693 GWh. The pragmatic scenario suggests that 10% of the estimated theoretical maximum output could be attained across the North West, which translates as 142GWh electricity and 189GWh heat from CHP schemes or 369GWh heat-only output.

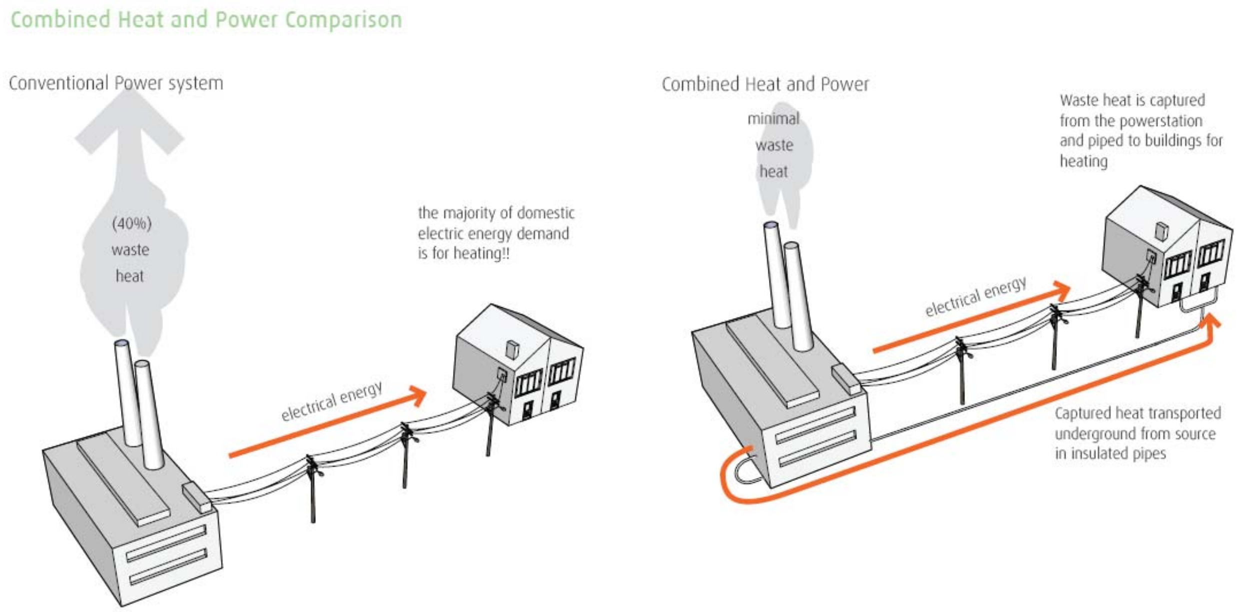


Figure 36: CHP comparison with traditional generation

Heat networks can either be connected to a district heating system or a combined heat and power system (which distribute waste heat from the electricity generation process). These systems could utilise gas or biomass as a supply fuel, and the distribution of heat in such a fashion brings great efficiencies as heat demands are balanced across an area. It should be noted that while the introduction of CHP is strongly encouraged at a European and National level, and local authorities play a key role in delivery, CHP will only count towards renewable energy targets where it is fuelled by a renewable or low carbon source such as biomass or biogas. Technology surrounding biomass powered CHP is still developing in the UK but is expected to be perfected over the coming years. Hence, depending on delivery conditions it may be more suitable to implement gas-fired CHP in the interim and convert the fuel source to biomass or biogas as the technology and supply chain develops. However, the introduction of gas CHP is still beneficial as it contributes directly to CO_2 reduction targets through efficient supply of electricity and heat.

Scale of potential

The figure below highlights areas which have a heat demand intensity of greater than 3MW/km2 (or 26kwh/m2). These areas are expected to be commercially viable for the installation of a district heating or combined heat and power system based on professional experience. The heat density is high and the distribution is linear from North to South along the promenade and the town centre. This situation lends itself to the whole Borough being fitted with a district heating system, applying a blanket distribution across the whole area. This is a very good opportunity to distribute low carbon heat which is ideal in Blackpool due to the mix of uses and the densely developed borough area.

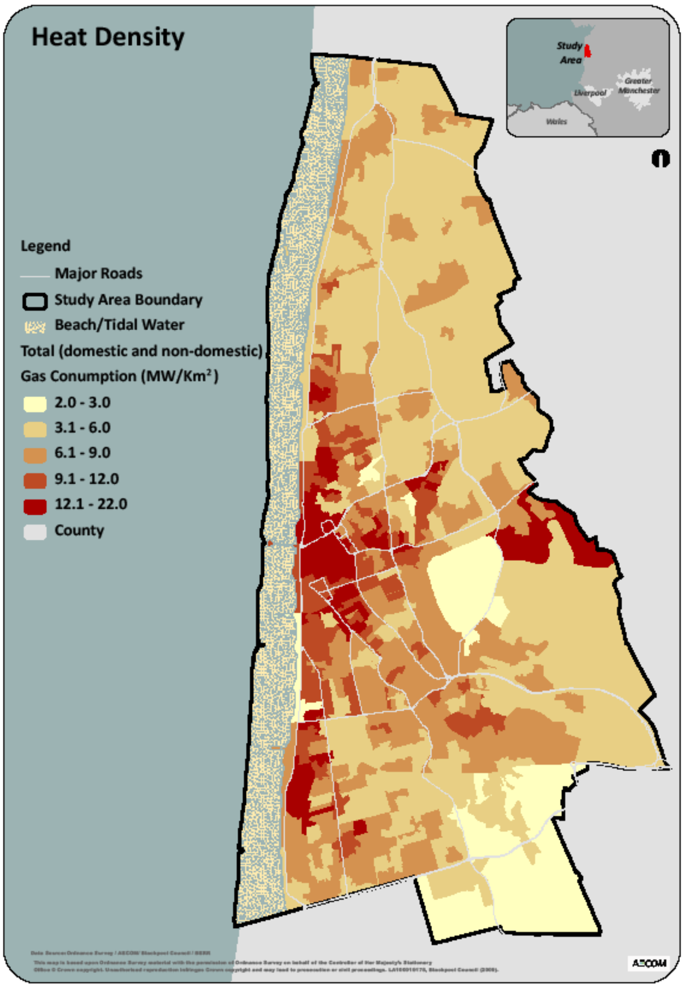


Figure 37: Current distribution of heat density

The retrofit of district heating infrastructure into existing areas is not a simple task, and it is sensible to both locate and phase interventions alongside other changes to the urban fabric. New development sites are a good opportunity to install new infrastructure and gradually extend that infrastructure out to existing neighbourhoods. The figure below shows the SHLAA sites in comparison to heat density areas.

Given the scale and nature of change planned in Blackpool town centre and its high density this is a very good prospect for provision of district heating. It is sensible for anchor loads to be driven by new development opportunities as the process can be instigated from the beginning when the first pipes go in the ground. Therefore SHLAA sites and the AAP areas are key triggers, from which the new heating system can branch out from, thus expanding out from key sites across the area. However, without major intervention monies the focus in AAP areas will be on refurbishment transitions from holiday accommodation to residential. The Foxhall redevelopment and relocated college are the major current anchor load proposals.

There may also be delivery opportunities associated with general road works and public realm improvements where there is an opportunity to install district heating networks in existing areas.

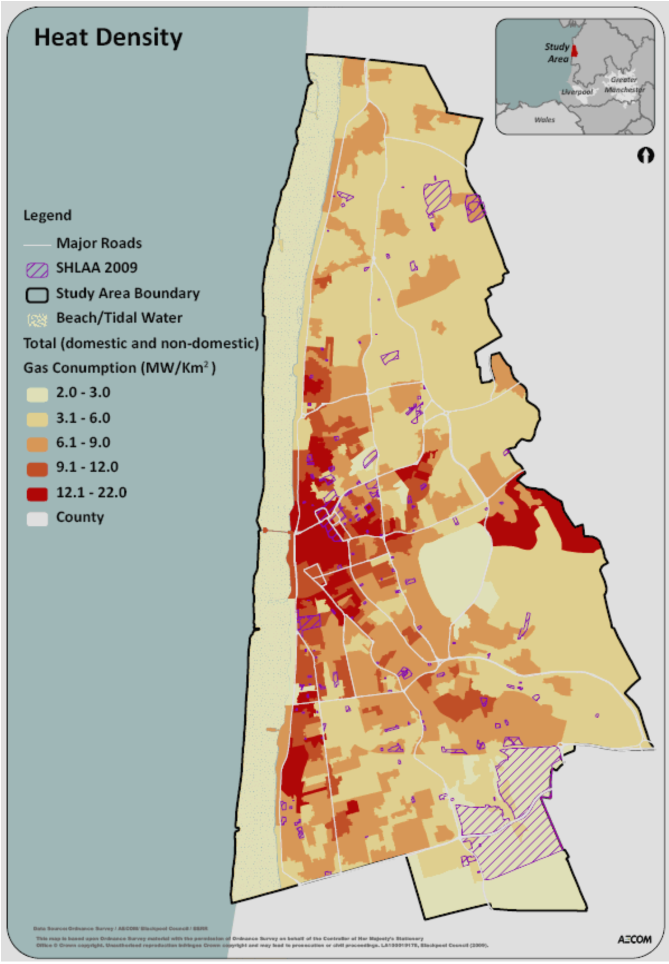


Figure 38: Current distribution of heat density with SHLAA sites

The figure below shows the location of high energy demand facilities such as hospitals, leisure centres and schools. The location of such facilities is key as district heating schemes often need an 'anchor load' or consistent energy user to operate efficiently. Therefore areas around these anchor loads are priorities for development. In Blackpool these anchor loads are Blackpool Victoria Hospital, Industrial and Commercial buildings, the Pleasure Beach, local Authority buildings and schools.

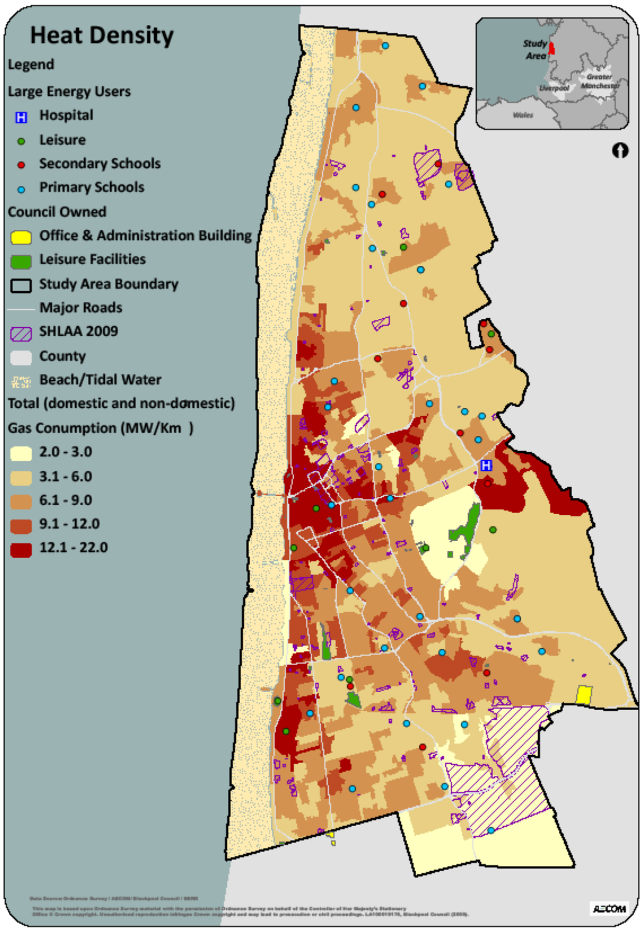


Figure 39: Current distribution of heat density with Anchor Loads

The table below shows the expected energy generation and CO_2 savings associated with installation of gas-fired CHP to 15% of the viable areas (5% uptake each phase, beginning phase 2). CO_2 reductions could be further increased through a larger take up of heat networks, or through the use of biomass fuel in the place of gas.

Table 29: Effect of introduction of gas CHP into 15% of viable existing areas

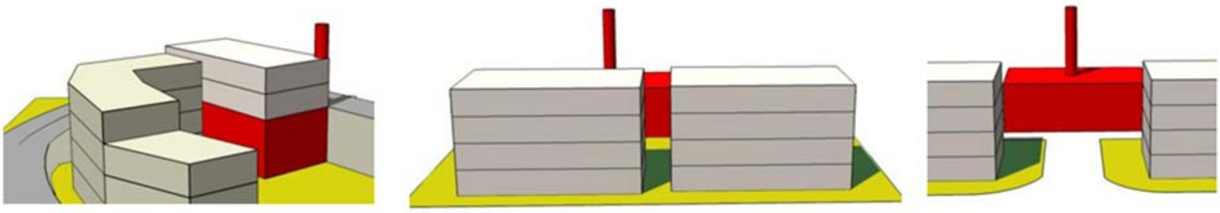
	2006-2011	2011-2016	2016-2021	2021-2026
CHP Electricity Production (GWh)	0	66	132	197
CHP Heat Production (GWh)	0	100	199	299
CO_2 Reduction due to CHP (tonnes)	0	7,105	14,211	21,316

Delivery considerations

CHP linked to a neighbourhood via a district heating arrangement could meet the home's annual heating, hot water and most, if not all, of their electrical requirements. Higher density housing, typically at least 50 dwellings per hectare, tends to be more commercially viable to reduce district heating infrastructure costs as costs are related to the length of the pipe, although CHP is technically viable at most densities. CHP also works best in mixed use developments as they operate most efficiently near maximum capacity. As different users have different energy use patterns (residential more in the morning and evening whilst offices through the middle of the day) mixed use development allows energy requirements to be balanced.

The size of the facility will be somewhat dependent on the number of homes it is to serve. For a facility to serve 1500 homes, you would probably require a facility of 500m^2. For biomass powered you would need a fuel storage area as well. The majority of the building could be 4m high, but a section rising to 7-9m would also be needed to house the heat store and there would also be a flue which will need to be a few metres higher than surrounding development.

As CHP works best in higher density areas, siting facilities can become a challenge. With sensitive and creative urban design, there is however, limited reason as to why they could not be able to be integrated into a townscape. The figure below highlights some potential options for urban design of CHP.



Bury it? Hide it? Celebrate it?

Figure 40: Design options for siting CHP

4.8 GEOTHERMAL ENERGY

This section describes the potential opportunities for utilising geothermal energy as a source of heating and / or cooling buildings in the Blackpool area. This includes the exploitation of geothermal energy from the geological strata at deep levels using boreholes or utilising groundwater in the underlying aquifers, or from surface waters. The feasibility of a geothermal system in any area depends significantly on the geological and hydrogeological conditions.

Bury it? Hide it? Celebrate it?

The section provides an assessment of the regional geological and hydrogeological conditions in the Blackpool area in order to determine the potential for geothermal energy in underlying strata. A broad overview of the potentials in the whole of Blackpool Council area has been provided. A more detailed site specific investigation will be required in order to confirm the feasibility of utilising the geothermal energy source on any given site across the area.

Geothermal power refers to energy derived from the latent heat beneath the earth's surface. In specific geologically suitable areas, heat from deep inside the earth can rise up to the surface via thermal conduction and by the intrusion of molten magma into the earth's crust. Groundwater stored within this hot rock is heated, producing geothermal energy in the form of steam or hot water. Such 'geothermal reservoirs' can be used to provide heat directly while geothermal power plants access steam or hot water to drive turbines in order to generate electricity. Geothermal energy could be harnessed in conjunction with a district heating network.

Scale of potential of geothermal energy

As figure 45 below illustrates, Blackpool lies in close proximity to the Cheshire Basin, which was identified in the 1980s as having potential for generating geothermal energy by the British Geological Survey. Temperatures within the Basin, which includes the Sherwood Sandstone and Collyhurst Sandstone aquifers, were estimated to be sufficiently high for harnessing geothermal energy. However, the viability of this resource remains unproven.

Assessment of the Geological and Hydrogeological conditions

The geology of the Blackpool area is dominated by the Permo-Triassic rocks, which form part of the Sherwood Sandstone Formation and the Mercia Mudstones. The Mercia Mudstone formations in the area are of significant thicknesses and confines the Sherwood Sandstones to depths of up to 500m below the surface. Across much of the region, the Permo-Triassic rocks are overlain by a variable thickness of superficial deposits of boulder clay, fluvio-glacial sands and gravels and alluvium. The general geological sequence is shown in Table 30.

Table 30: Regional geology

Strata		Thickness (m)	Lithology
Superficial deposits			
Alluvium		variable	Clays and silts, peat and blown sands
Sand and Gravel		Variable (up to 20 in places)	Sand with rare pebbles separating the upper and lower boulder clay.
Boulder Clay		variable	Brown to blue grey till, becoming heavily compacted and purple with depth
Permo-Triassic			
Breckells Mudstones		150	Red structureless mudstones with few grey-green bands. Gypsum nodules and isolated halite crystals and veins are common.
Kirkham Mudstones	Coat Wall Mudstones	Up to 120	Structureless, red-brown mudstones interbeded with laminated, red-brown and greenish grey mudstones and siltstones
	Preesall salt	Up to 180	Rock salt with thin partings of red-brown and greyish green thin mudstones preserved in a deep syncline
	Thornton Mudstones	Up to 110	Interlaminated mudstones and siltstones, alternating red-brown and grey-green well bedded mudstones with thin siltstone bands. Thin salt beds near the top and base
Singleton Mudstones		Up to 310	Red-brown poorly bedded red-brown mudstones with gypsum veins. Thin salt beds (Rossall and Mythop Salts) lie near the base and top of the formation respectively.
Hambleton Mudstones		Up to 35	Grey mudstones with thin siltstone bands and organic trails
Bunter sandstones		Up to 500	Predominantly fine grained red sandstones with occasional white pebbly sandstones at the top of the formation

The British Geological Survey (BGS) Memoir for 1:50,000 scale map Sheet 66, Blackpool, below, indicates that the Permo-Triassic rocks of this area are gently folded and disrupted by a number of normal faults trending approximately north-north east to south-south east. The Preesall Fault which is a major fault is in the north eastern area. There are two major synclines in the region, the Preesall Syncline in the north which trends approximately north-south with its axis close to the eastern bank of the Wyre estuary and the sub parallel Kirkham syncline just outside the borough to the south-east, which are separated by three smaller folds.

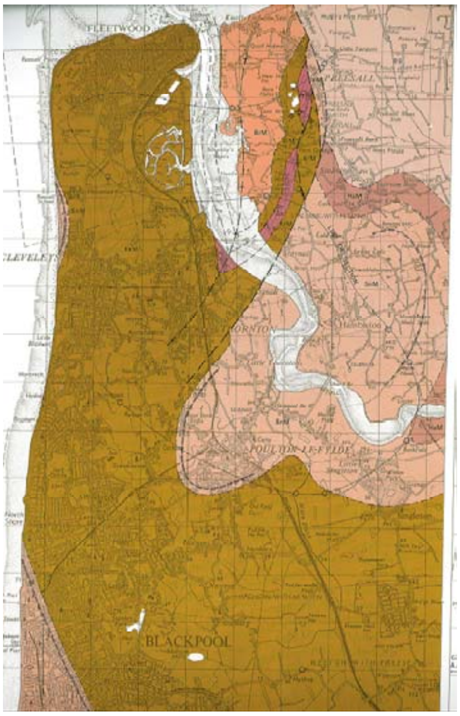


Figure 42 Extract of Geological Map showing Blackpool Area – reproduced from the BGS 1:50,000 scale plan Sheet 66. The area is generally underlain by Permo-Triassic Sandstones and Mudstones.

Hydrogeology

The Sherwood Sandstone which is confined by the Mercia Mudstone Group in this area, typically has a high intergranular permeability and often also a significant secondary permeability imparted by the presence of fractures. It is likely that any marl horizons within the aquifer have a lower permeability, which restricts vertical groundwater flow and, if the marl bands are laterally extensive, may result in the development of a series of individual aquifers.

Information on aquifer properties published in the BGS report WD/97/34 'The physical properties of major aquifers in England and Wales' suggest that the sandstone in the area has a variable hydraulic conductivity (0.1m/day to 10m/day). The wide variation in the hydraulic conductivity value may be attributed to the presence of low permeability mudstone lenses within the horizons. The faulting in the area will also have an impact on the hydrogeology and locally may influence the hydraulic properties of the Sherwood Sandstone aquifer.

The Sherwood Sandstone is designated as a primary (major) aquifer in the EA 'Policy and Practice for the Protection of Groundwater' and is of regional importance which has been exploited extensively for public and private water supplies.

No groundwater level data in the Sherwood Sandstone is currently available. The BGS Memoir for Sheet 66 indicates that some of the boreholes drilled to depths of 44m to 46m in the glacial deposits around the area yielded saline and brackish water. It is likely that the groundwater quality in the Sherwood Sandstone is also brackish as a result of impact from the tidal waters of the River Wye which dominates the northern part of the area.

From a review of the regional geological and hydrogeological conditions, it is considered Blackpool is predominantly underlain by the deep confined Sherwood Sandstone aquifer (as shown on Figure 43 below) this has the potential for geothermal energy utilising groundwater in the aquifer through an open-loop ground source heat pump (GSHP) scheme. However, in order to develop a geothermal abstraction in any specific area, a number of factors need to be investigated on a site specific basis. This includes the presence of other licensed abstractions in the vicinity of the site and an assessment of the potential derogatory impacts of a new geothermal abstraction on the groundwater quality and quantity. The depth to groundwater level, the groundwater quality and the thickness of the unsaturated zone also need to be investigated.

Typically for open–loop GSHP, which involve abstraction of water from a borehole and recharge back to the aquifer via a second borehole, it is currently acceptable to change the temperature by +/- 5°C. For an abstraction rate of 20 litres/seconds, considered achievable from the Sherwood Sandstone aquifer, this would provide energy of approximately 400KW.

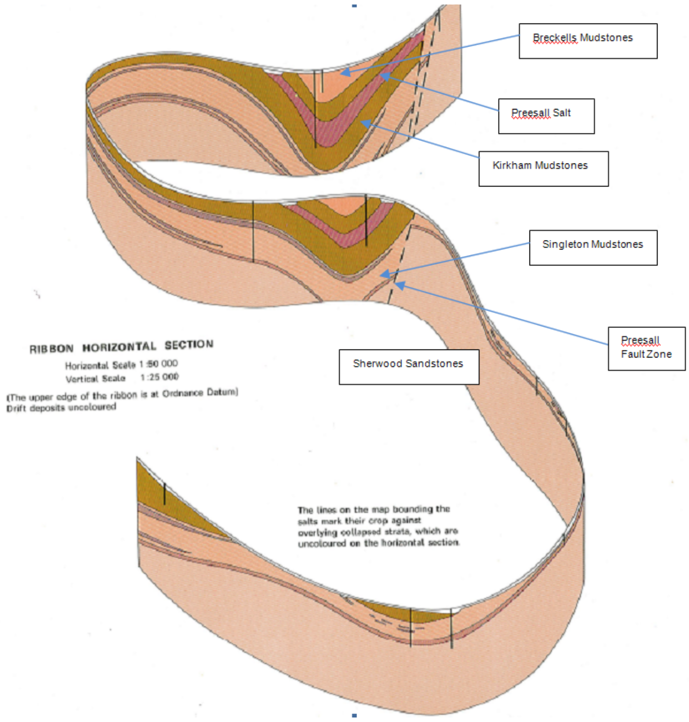


Figure 43 Geological Cross Section– reproduced from the BGS 1:50,000 scale plan Sheet 66

Mine Water

Due to the absence of Carboniferous Coal measures in the Blackpool area, there are no potentials for utilising shallow mine waters which could be exploited for geothermal energy purposes.

Geothermal Rocks

A paper by Allen et al, 1985, Evaluation of The Permo-Triassic Sandstones in the UK as Geothermal Aquifers, defines geothermal energy as the natural heat of the Earth stored in rocks and in the fluids within them. Most of the energy is derived from decay radioactive minerals within the Earth. As a result of this heat production, there is a flow of heat towards the Earth's surface and temperatures increase with depth (the geothermal gradient).

The heat flow and geothermal gradients are highest in volcanic and seismically active regions. In the United Kingdom, which is geologically stable, the gradient is generally similar to the world average of about 25°C/km. The temperature gradients vary in different locations depending on the local heat flow and on the thermal conductivities of the overlying rocks. In areas where favourable conditions exist, the gradients exceed 30°C/km.

At these temperatures, groundwater can provide low enthalpy geothermal resource if it can be extracted economically. Published information indicates that the Permo-Triassic sandstones are the most favourable of the Mesozoic rocks for low enthalpy geothermal energy.

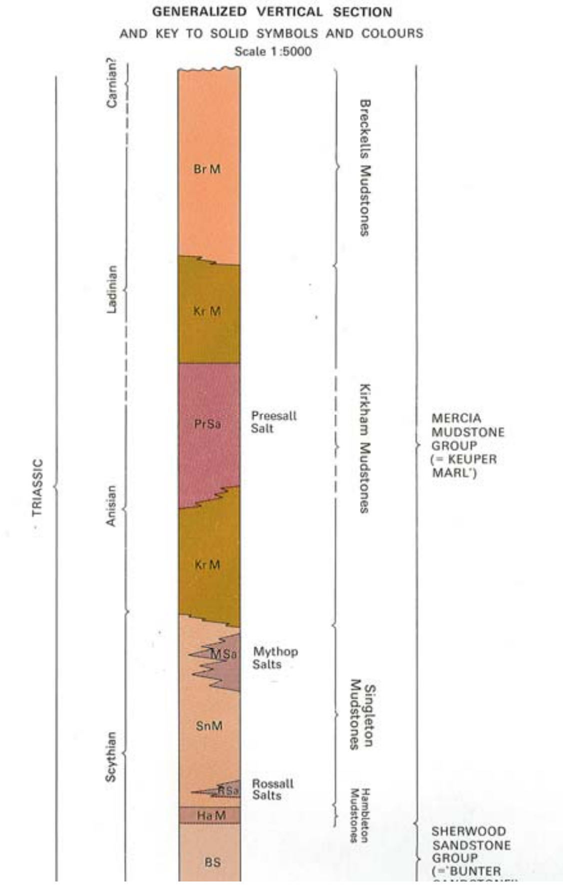


Figure 44 Generalised Vertical Section - geological Map of Blackpool – reproduced from the BGS 1:50,000 scale plan Sheet 66

Review of the geothermal map of the rocks in the United Kingdom shows that the Permo-Triassic rocks underlying the Blackpool area falls within areas identified with high heat flow potential in the Cheshire and West Lancashire basins (Downing and Gray, 1986, Geothermal Energy the potential in the United Kingdom).

Figure 45 shows that Blackpool is located on an area of average heat flow of 54mW/m2. The predicted temperatures at the base of the Mercia Mudstones in the Fylde area is approximately 30°C with approximate temperatures of 35°C at the base of the Permo-Triassic Sandstones. However, the predicted mean temperature gradients for the Cheshire and the West Lancashire Basins vary between 9°C/km to 23°C/km. Downing and Gray 1986 estimated that the total geothermal resource of the West Lancashire Basin is approximately 2.1 x 1018Joules.

From a review of the published information, it is considered that the Permo-Triassic rocks underlying the Blackpool area provides a potential for utilising deep boreholes to exploit the geothermal energy resource beneath the area. However, site specific investigation and trial would be required to confirm the actual potential in any given area, but this is likely to have significant cost implications.

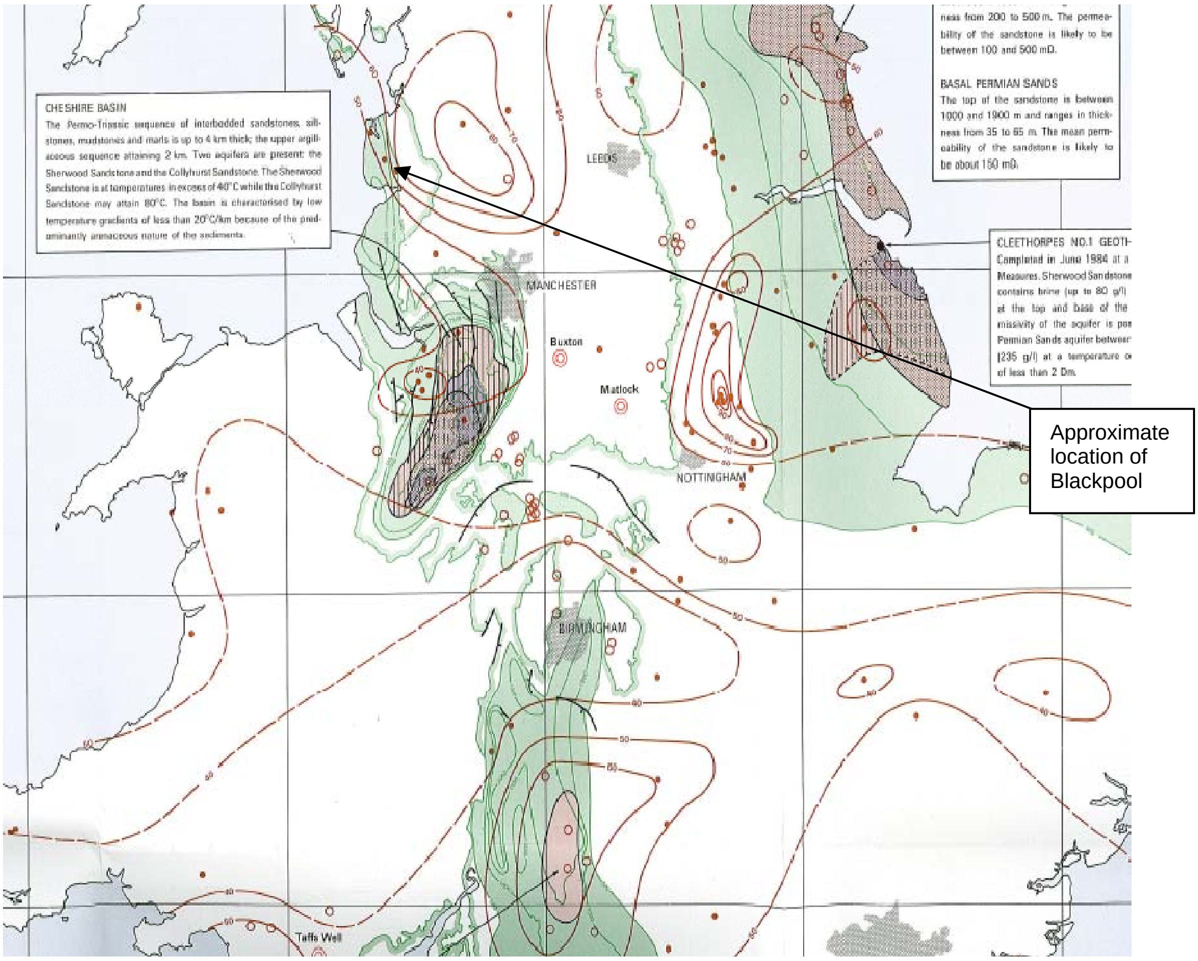


Figure 45 A section of the geothermal map of the UK showing Blackpool area– reproduced from the BGS 1:500,000 scale plan of geothermal map of the UK, (Downing and Gray, 1986)

Precedent delivery of geothermal energy in the UK

A precedent example of geothermal energy use exists in Southampton. The scheme was the first in the UK and was delivered as part of the Council's plan to create a self-sustaining city in energy generation. The scheme was developed in conjunction with French-owned company Utilicom Ltd, and the Southampton Geothermal Heating Company was established. In 1987 construction started on a well to draw water from the Wessex basin aquifer at a depth of 1,800 metres and temperature of 76 degrees. The scheme now heats several buildings in the city centres, including the Southampton Civic Centre and the West Quay shopping centre, by providing 8% of heat distributed by larger city centre heating system that includes other combined heat and power sources. Geothermal energy provides 16 GWh of heat per year.

This precedent example shows that a geothermal systems are deliverable in an urban context and could potentially be located in a city centre location in Blackpool. The location of the geothermal plant in Southampton is in an urban context and consists of a basic shed structure (approximately 30m x 30m) that houses pumping equipment. A similar building with a small footprint could house pumping equipment to draw up heat from the ground or underlying aquifers and distribute this energy via the district heating system.

Delivery considerations

Further investigations, including bore sampling would be required to confirm the geothermal potential in Blackpool, if found to be viable, geothermal could be used in conjunction with a district heating network to distribute heat around the LPA area. Geothermal should be considered as a source when investigating combined heat and power and district heating delivery options in Blackpool.

4.9 MICRO GENERATION POTENTIAL

The term micro-generation is used to describe small scale technologies (typically less than 50 kW electric and 100 kW thermal). These technologies are usually based in a building or on a small site, providing energy to one or more buildings. Micro-generation technologies include:

- Heat pumps
- Micro CHP
- Photovoltaics (PV)
- Solar thermal
- Small and micro wind

The installation of micro-renewables in new and existing homes will count towards national and regional targets, and therefore it is important to recognise how much of a contribution micro-generation is likely to make. Of the micro-technologies listed above, the adopted Regional Spatial Strategy (RSS) for the North West sets out 5-year targets for harnessing power from building-mounted micro-wind turbines and solar photovoltaics across the region. It is important to note that micro-generation technologies are likely to have significant cost implications associated with them.

The RSS sets an indicative regional target of 20,000 micro-turbines schemes and 50,000 photovoltaic installations by 2020, with a combined capacity of 20 MW and 100 MW respectively. Arup's 2008 regional renewables study for the North West sets out the following more conservative baseline which is derived from work carried out by Element Energy[12] for BERR in June 2008. The table below gives the BERR estimates of micro-generation potential in the North West based on the lowest 'baseline' scenario for up-take.

Table 31: BERR estimates of 'baseline level' Micro Generation Potential in the North West

Technology	**2015**	**2020**	**2030**
Ground source heat pump	100	100	100
Air source heat pump	200	3,100	10,300
Stirling Engine CHP	16,300	47,200	85,300
Fuel cell CHP	900	52,700	248,600
Biomass	100	1,200	1,600
Micro-wind	200	600	1,300
Solar PV	300	700	2,500
Solar hot water	15,900	28,700	53,500
Total Schemes	**34,000**	**134,300**	**403,200**
Total Renewable Heat (GWh)	-	116	244
Total Renewable Electricity (GWh)	-	2	5

Scale of potential

The study for BERR[13] modelled the UK market for micro-generation technologies out to 2050, by simulating the UK consumer base and technologies for both the residential and non residential sectors.

[12] The Growth Potential of Micro-generation in England, Wales, and Scotland. Element Energy, June 2008. BERR
[13] The Growth Potential of Micro-generation in England, Wales, and Scotland. Element Energy 2007. BERR

A number of assumptions are made based on regional surveys of consumer's attitudes to technologies and costs, and their likelihood of purchasing a technology depending on their current house / building type, the current energy price environment, and their "willingness to pay". The BERR study was undertaken at a time before the announcement of the proposed 'Feed-in tariff' on a national level which is expected to stimulate higher uptake of micro-renewables.
Hence the 'baseline' scenario used in the table above for the northwest projections may be an underestimate. Using modelling assumptions from the BERR work for a 'medium level' uptake of micro-generation in Blackpool, the installation of micro-generation as shown in the table below is expected. The table below sets out the total potential from a mix of micro-generation sources. The potential for solar energy, which varies due to location is discussed in more detail below.

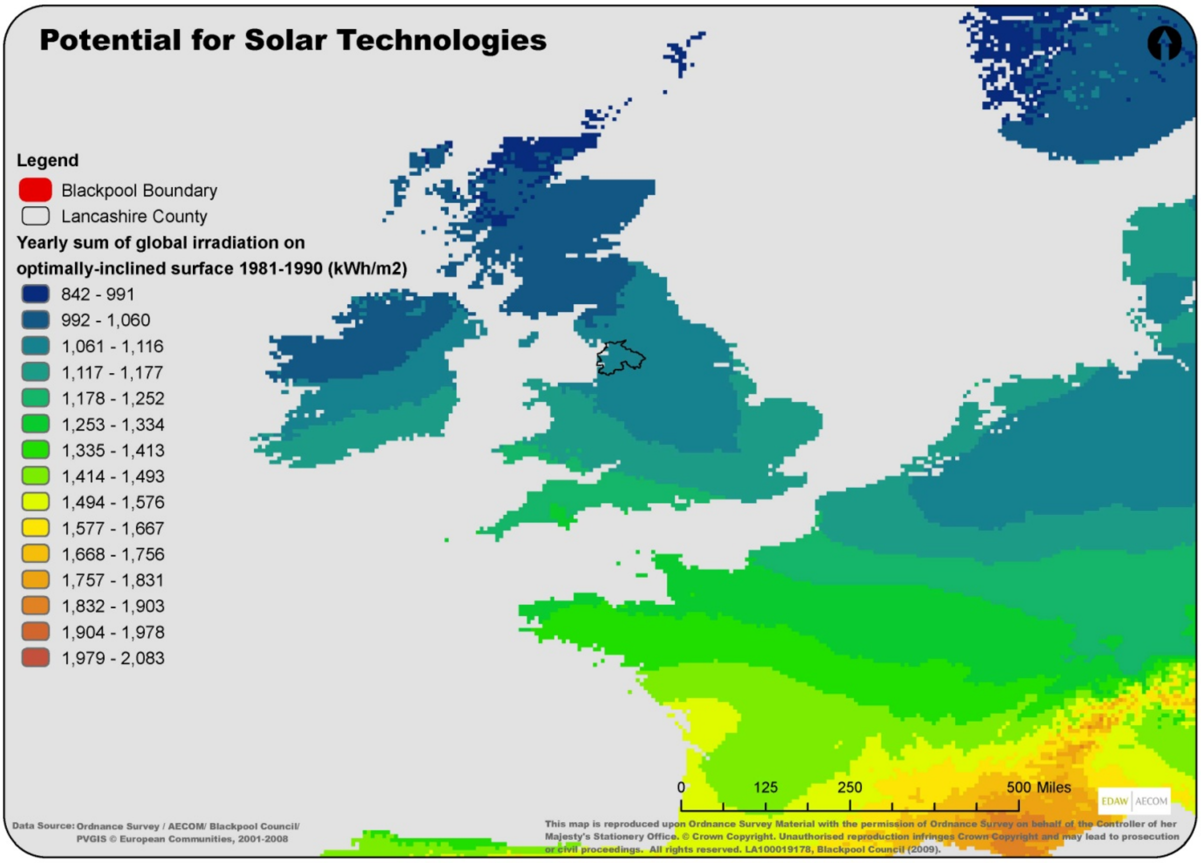
Table 32: Effect of introduction of substantial micro-generation in existing buildings

	2011	2016	2021	2026
Micro-generation Electricity Production (GWh/year)	0.25	0.67	2.32	6.45
Micro-generation Heat Production (GWh/year)	0.52	1.30	4.38	12.69
CO_2 Reduction due to Micro-generation in Existing Buildings (tonnes)	65	162	620	2,025

Potential and constraints for solar energy

Compared with the rest of the UK, the solar potential across the study area is average. However, on a global scale, solar technologies do not perform at high efficiencies in the UK as compared to say Colorado, nonetheless, parts of the North West receive as much or more solar irradiation as Germany, which has a large installed capacity of solar panels. The figure below shows the solar irradiation in the UK.

Figure 46: Potential for solar energy in Blackpool



There are two main types of solar technology that are generally delivered alongside built development. Photovoltaic panels produce renewable electricity can be mounted on structures or used in stand-alone installations. Solar thermal panels are commonly used to directly heat hot water in homes, but can also be used to assist heating.

Photovoltaics are currently expensive in comparison to other renewable energy options, but they are one of the few options available for renewable electricity production and are often one of the only on-site options to assist in CO_2 reduction associated with electricity use. Solar thermal panels are more space and cost effective and are well utilised technology for heating hot water.

Scale of potential of Solar Energy

There are around 70,000 houses in the study area[14]. Assuming 2 kWp or 12-16m² of panels per home was installed on half of all homes – the remainder being over shaded or sub optimally orientated, 50GWh of renewable electricity could be generated each year (equivalent to 7 large scale 3MW turbines). The table below gives an indication of the scale of potential from the introduction of photovoltaic arrays to an increasing number of homes.

Table 33: Energy potential from PV

Projection	No Homes with 2 kWp installation	No industrial 0.5 MW installations	KWp	GWh elec	~No homes electricity provision
2010	0	0.00	0	0	0
2015	1500	4.00	5500	4.4	1180
2020	2000	6.00	8000	6.4	1930

[14] Dwelling Numbers on Valuation List 2009 http://www.local.odpm.gov.uk/finance/stats/ctax.htm

Delivery considerations for micro-generation in Blackpool

Microgeneration technologies are widely available and will have a role to play in energy generation, especially on low density development with a substantial amount of exposed roof space and surrounding space allows the installation of additional infrastructure. Good design and location of micro-generation technologies is essential to ensuring micro-generation is effective. For example, to ensure that solar technologies are efficient, south facing roof space should be favoured in building design and masterplanning (through street orientation). When using small or micro-turbines, they should be sited to ensure they are placed in a clear air stream in favour of the prevailing wind direction to avoid inefficiencies associated with turbulence from surrounding structures and trees.

There is the potential for the Blackpool Authority to incentivise swifter uptake of renewable electricity in the area through a business information awareness campaign and through working with other partners to identify commercial/industrial businesses with larger areas of south facing roof who might either be interested in investing in micro-generation or who would be interested in linking up with an investment body.

Historically as with the rest of the UK, the take up of solar technologies has been limited by cost. Whereas before the role of micro-generation technologies was largely predicted to be restricted to small-scale on-site development, the introduction of feed-in tariffs could potentially make micro-generation technologies like photovoltaics of interest to investors.

Since the North West renewable targets were developed, the Government has published planned feed-in tariffs for the generation and export of renewable electricity for a range of micro generation renewables including photovoltaics as well as anaerobic digestion, biomass, small hydro and wind. The table below shows the potential feed in tariff for photovoltaics and the figure below provides more details as to how feed in tariffs operate.

Table 34: Feed in tariff for photovoltaics

PV Scale	Potential initial tariff (p/kWh)	Annual degression %
<4kW new build	31.0	7
<4kW retrofit	36.5	7
4-10kW	31.0	7
10-100kW	28.0	7
100kW-5MW	26.0	7
Stand alone system	26.0	7

Feed-in Tariffs

Feed-in Tariffs are to be introduced in April 2010 to replace the support provided by the Low Carbon Buildings Programme and stimulate increased vigour in the take up of installation of small-medium scale renewable electricity generation. The Government intends the FIT system will be simple and user-friendly in order to maximise take up.

The scheme will include:

- Fixed payment from the electricity supplier for every kWh generated (the “generation tariff”).
- A guaranteed minimum payment additional to the generation tariff for every kWh exported to the wider electricity market (the “export tariff”).
- Generators receiving FITs will also benefit from on-site use: where they use the electricity they generate on-site, they will be able to offset this against electricity they would otherwise have had to buy.
- Technologies included: wind, solar PV, hydro, anaerobic digestion, biomass and biomass CHP, no-renewable micro CHP.
- Tariffs will be paid for 20 years for new projects.
- The tariff levels proposed have been calculated to ensure that the total benefits an investor can be expected to achieve (from the generation tariff, the export tariff and/or the offsetting benefit) should compensate the investor for the costs of the installation as well as provide such a rate of return.
- The government intends to set tariffs at a level to encourage investment in small scale low carbon generation. The rate of return will be established between 5% and 8%.
- The proposed tariff levels for new projects will decrease by predetermined rates each year (“degression”). [The tariff rate agreed at the project outset will be maintained for the 20 year period – this therefore incentivises early take-up for maximum revenue return]

Figure 47: Feed-in Tariffs

4.10 EXPECTED DELIVERY OF RENEWABLE AND LOW CARBON ENERGY THROUGH NEW DEVELOPMENT

Carbon efficient new development will be delivered through a combination of energy efficiency measures and development driven renewable and low carbon energy infrastructure in-line with the Government’s commitment to zero carbon development in 2016.

This would require around a 70% reduction above the TER with the remaining 30% potentially picked up through a range of ‘allowable solutions’ to offset the remaining energy requirements. Consequently, new development will deliver a proportion of renewable and low carbon energy which can contribute to the LPA renewable energy targets.

Range and Potential of Technologies Expected for Inclusion with New Development

The selection of technologies included in new development will depend on the level of CO_2 reduction which can be achieved through energy efficiency, and the most cost effective energy generating technologies available for inclusion on-site to reach the required CO_2 reduction. The general range of technologies available for use in new development and their constraints is shown in the figure below.

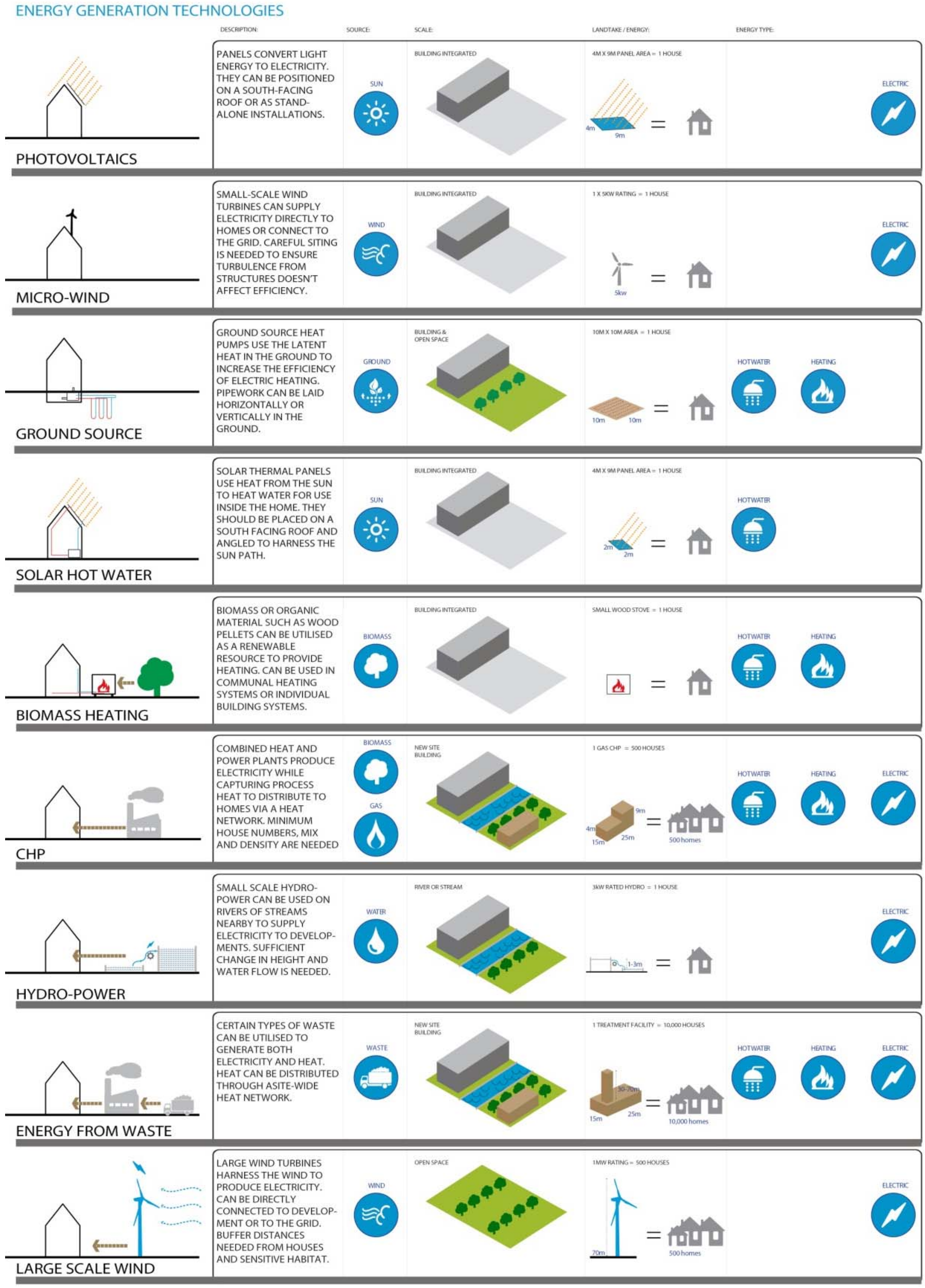
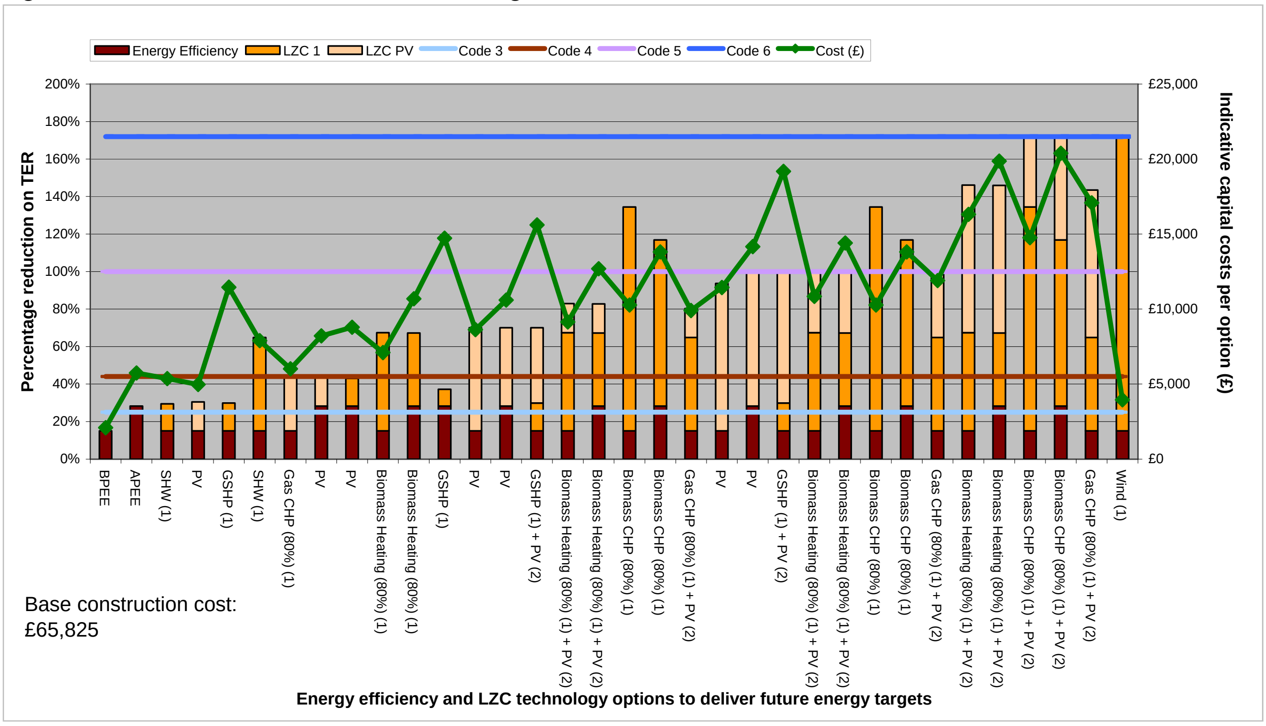


Figure 48: Range of renewable and low carbon technologies available for use in new development

The following figure demonstrates the various costs of combinations of technologies to deliver the energy requirements of level 3, 4 and 6 of the Code for Sustainable Homes. These correspond to expected requirements under building regulations, with the exception that 'zero carbon' under code level 6 requires all CO_2 reductions to be achieved on site (thus increasing cost significantly), while building regulations allow off-site CO_2 reduction through 'allowable solutions'.

Figure 49: Relative cost of different technologies for a terraced house to meet various code levels[15]



Key

BPEE = Best Practice Energy Efficiency

APEE = Advance Practice Energy Efficiency

SHW = Solar Hot Water

PV = Photovoltaics

GSHP = Ground/Air Source Heat Pumps

CHP = Combined Heat and Power

Scale of Potential

The figure sets out an expected mix of renewable and low carbon energy generation infrastructure to come forward within new development sites based on the cost profile of different technologies used in new development in order achieve Zero Carbon requirements as developed through research undertaken by AECOM. This has been used to predict the developer's choice of technology to use onsite. The predictions also take into account of urban character and the expected selection of technologies in the Blackpool area. The following figure relates the contribution on different technologies in terms of CO_2 reduction.

[15] Costs derived from in-house AECOM data

Figure 50: Expected use of renewable and low carbon technologies on new development sites in Blackpool

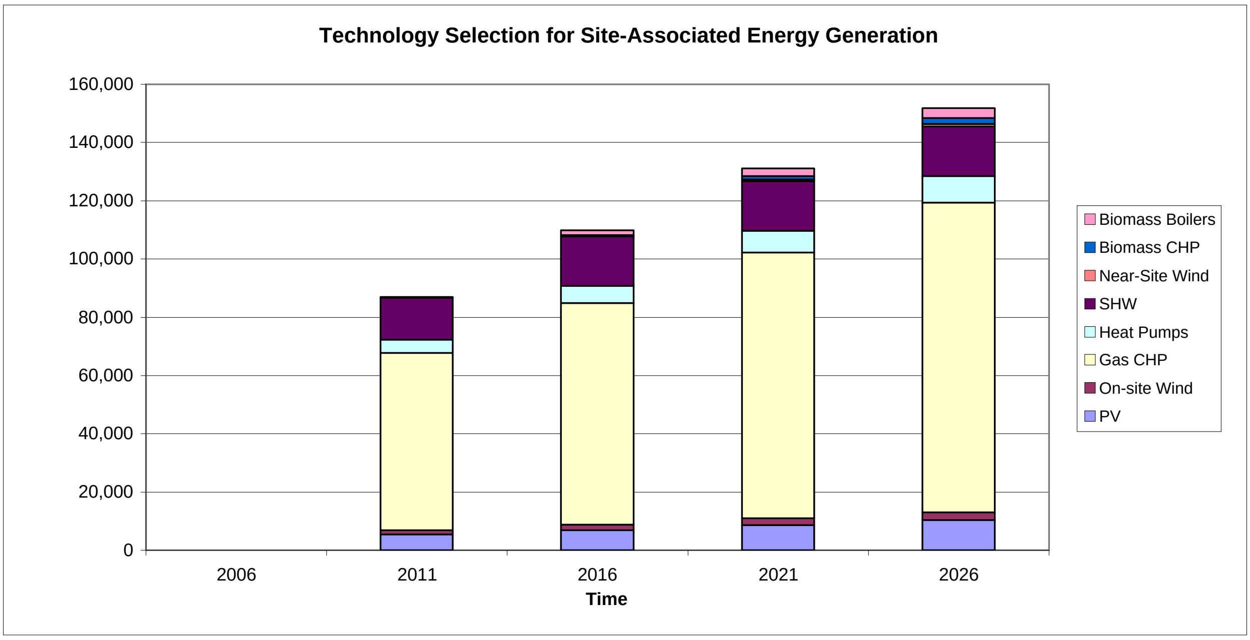
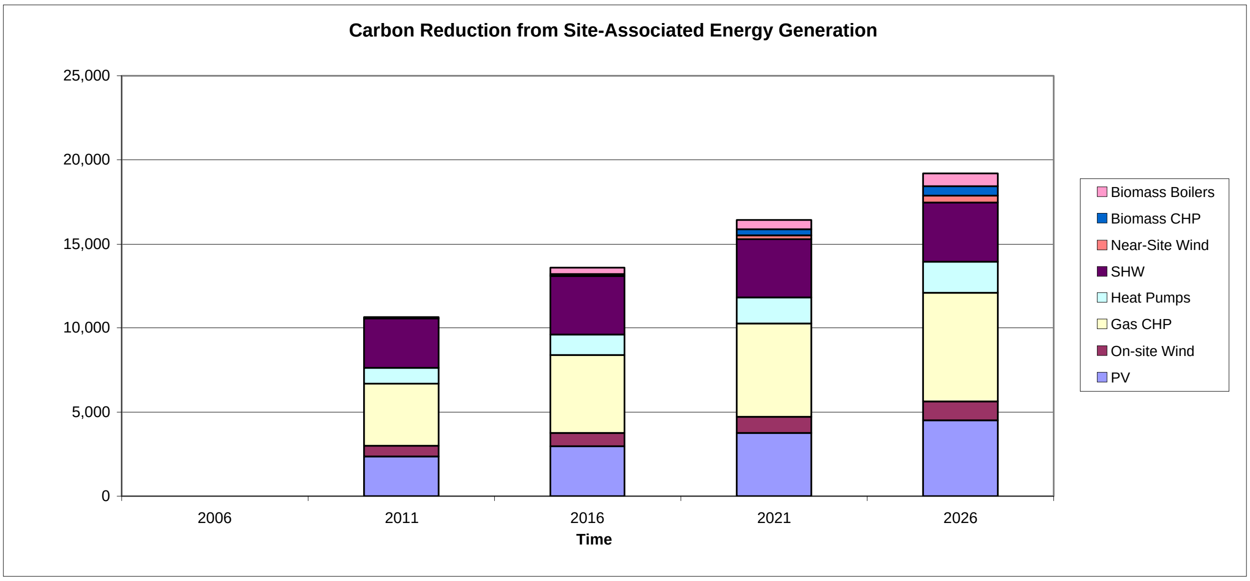


Figure 51: Carbon reduction through use of renewable and low carbon technologies on new development sites in Blackpool



The table below quantifies the expected on-site delivery of low carbon and renewable energy in response to expected changed to Building Regulations.

Table 35: Expected cumulative delivery of on-site low carbon and renewable energy through new development

	2011	2016	2021	2026
Electricity Production (GWh/year)	6.93	8.84	11.46	14.03
Heat Production (GWh/year)	19.21	24.45	27.05	29.49
Equivalent CO_2 Reduction (tonnes)	10,648	13,590	16,441	19,191

From our modelling of the likely selection of energy strategies by developers, we can expect the CO_2 reductions that will need to be met through allowable solutions to be equivalent to those in the table below. It can be seen that the scale of demand for CO_2 reduction is substantial and by 2026 is equivalent to:

- Introduction of gas CHP to 10% of the estimated 'viable' area of existing where strong heat demand intensities exist; or
- 7 large scale wind turbines (2MW rating).

It should be noted that this scale of contribution will only offset CO_2 increases from new development. The Council will need to consider these opportunities alongside those for the existing stock and strategic community-wide interventions. The table below sets out the expected off-site CO_2 reduction from new development based on growth outlined in Chapter 3. Potentially, allowable solutions will be charged at £100/tonne each year over a period of 30 years[16], resulting in significant amounts of funding as demonstrated below. The structure of allowable solutions are still being developed by government and currently the bodies who will control funding and the allowable solutions themselves, are unknown.

Table 36: Predicted cumulative demand for off-site CO_2 reduction through allowable solutions from new development (tonnes)

	2006	2011	2016	2021	2026
CO_2 reduction portion from allowable solutions (tonnes)	0	0	923	7,378	15,495
Equivalent annual funding arising from allowable solutions	0	0	92,300	737,800	1,549,500

Delivery Considerations for New Development

- **Good planning and design**: Large cost savings can often be made by planning in low carbon and renewable infrastructure at the start of the design process.
- **Different technologies for different types of development**: A range of technologies assures there are different types which are more suitable for different types of developments.
- **Enabling cost-effective and coordinated delivery**: Delivery of solutions is much easier and cost-efficient on a large scale. The Council are in a position to identify and coordinate delivery of good solutions in the area. Certainty and ease of renewables delivery will help to attract development in the area.

4.11 OFFSHORE ENERGY POTENTIAL

Blackpool is on the coast, and therefore it is important to realise the scale of potential that could be delivered through its coastal assets. It should be noted that installations beyond the low tide mark will not contribute to Blackpool's renewable energy targets. Nevertheless, Blackpool Council should support delivery of renewable energy on the coast. The Fylde Coast Multi-Area Agreement recognises that development of coastal renewable energy opportunities is a key initiative in the sustainable development of the area. The following sections consider the potential for offshore wind, wave and tidal energy generation off the coast of Blackpool.

[16] Impact Assessment of the Zero Carbon Homes Consultation, CLG, December 2008

Offshore Wind

The generation of energy by offshore wind installations have not been considered as a contributing renewable source within this study as the targets for the North West of England specifically split offshore and onshore wind and the offshore resource does not fall within the jurisdiction of Blackpool Council. However, as offshore wind could be important to the economic base in Blackpool, it is important to understand the scale of potential. The figure below demonstrates the potential for offshore wind in terms of wind speed. Other considerations including grid connections, sea depth and ground conditions also factor in offshore wind turbine siting.

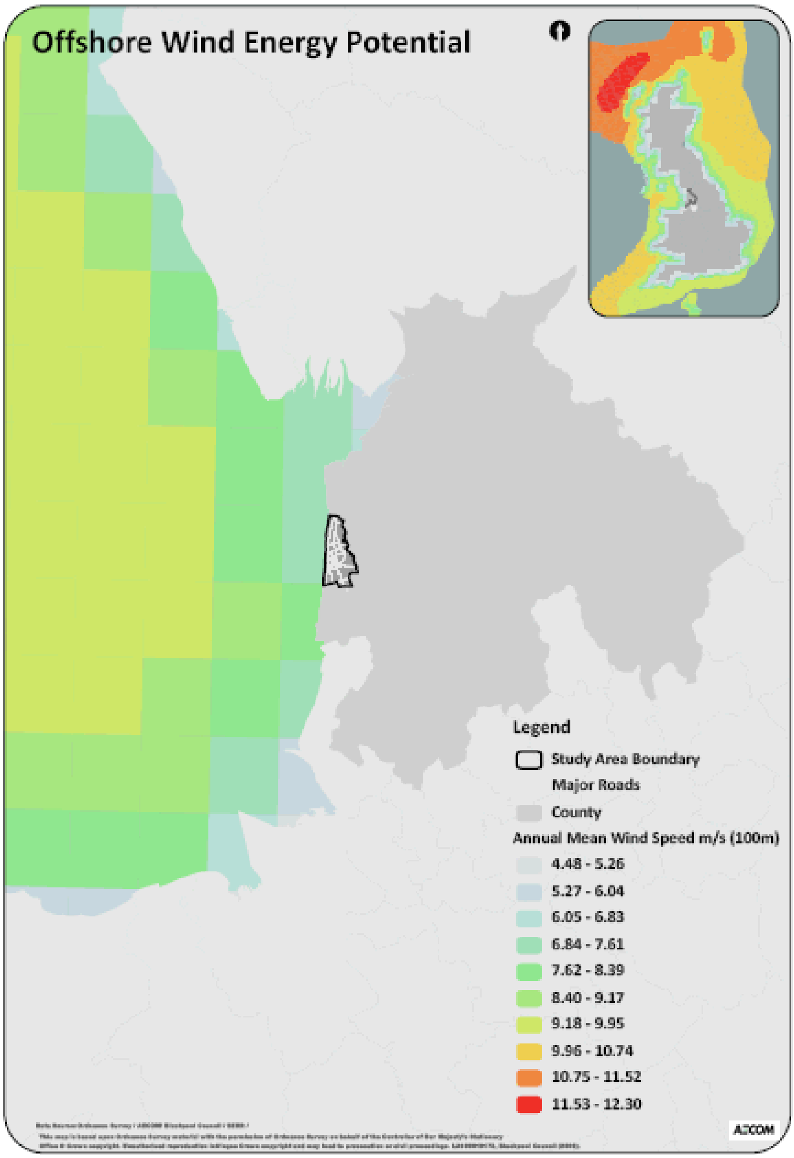


Figure 52: Offshore wind speeds

The unique ground conditions of the Blackpool coast combined with good access opportunities make offshore wind development favourable in the area. A series of wind turbines are currently being proposed offshore from Blackpool. The proposed wind farm (see figure below) will host 90 turbines in the Shell Flat area of Blackpool's coastal waters. Barrow Offshore wind farm will be located approximately 7km south west of Walney Island in the East Irish sea, near Barrow-in-Furness. Shell Flat is a natural sandbank, which extends westwards between Blackpool's north pier and Cleveleys. The proposed wind farm starts at 7.1km (4.4 miles) from the shore and continues to 19.5 km (12 miles).

This proposed wind farm will not assist Blackpool in meeting its energy targets, but the wind farm is a good opportunity to showcase Blackpool as a sustainable, forward thinking location, with the wind turbines in such close proximity.

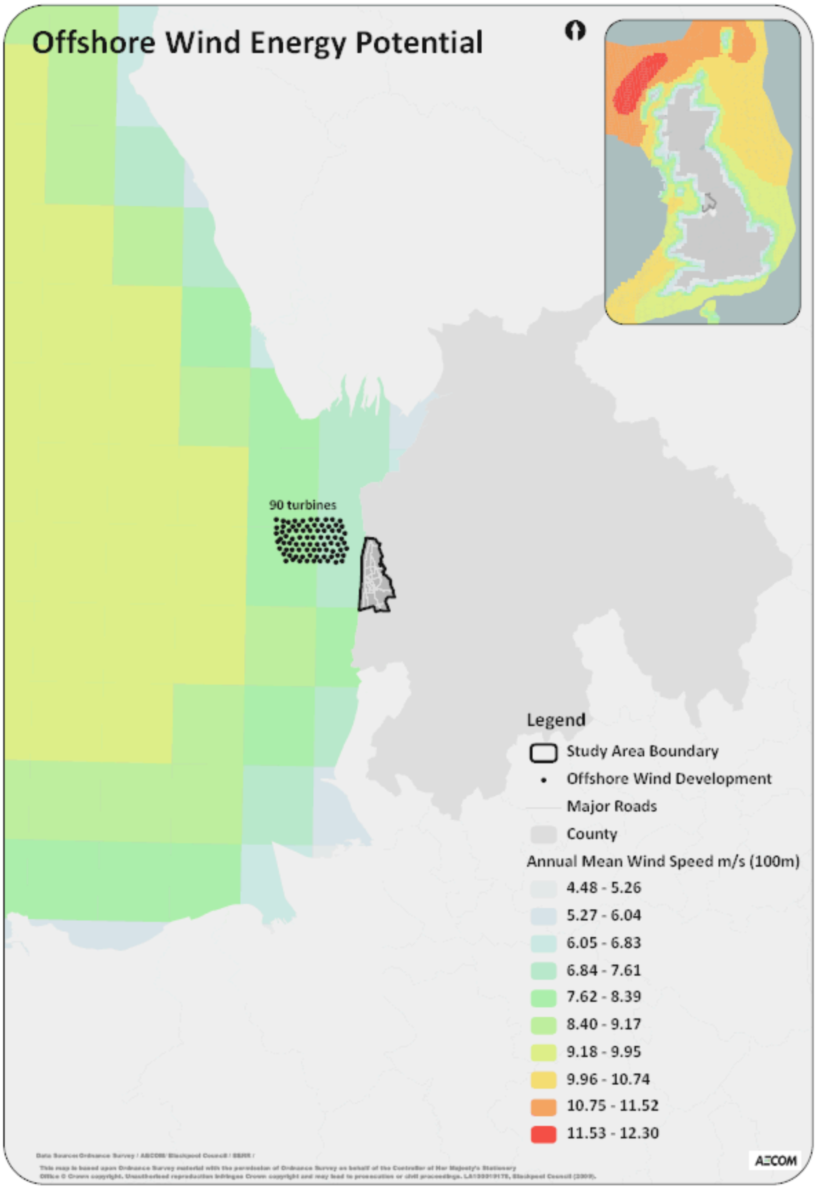


Figure 53: Proposed offshore wind farm

Wave energy

Mapping of wave energy potential is undertaken on a national scale. The figure below shows the relative potential off the coast of Blackpool. This data shows Blackpool has very low potential for wave power due to predominant westerly origin of waves being shielded by landmass and from the relatively low fetch on waves driven across the Irish Sea. Due to the potential damage of wave energy infrastructure, calmer areas may become viable in the future. However, it is considered wave energy is unlikely to be a source of significant power generation in the near future.

The Fylde Coast Multi-Area Agreement identifies that there may be potential for integration for wave power with flood defences in the area, however technologies for integration of this type are still in development.

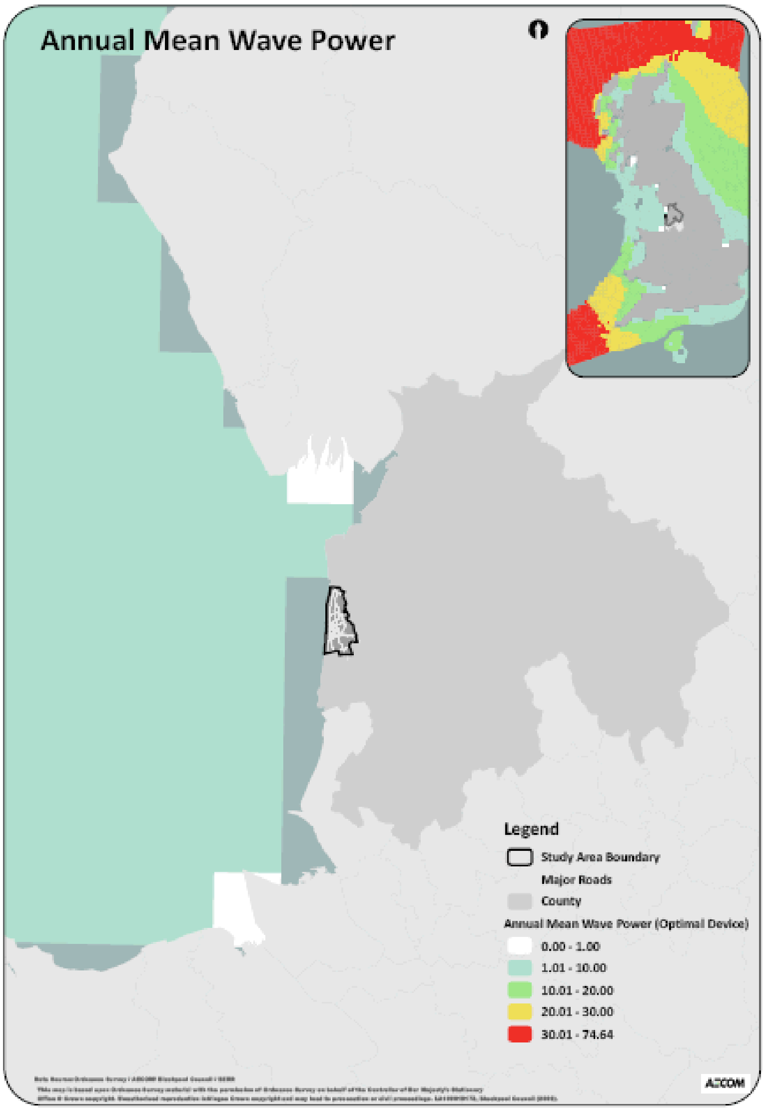


Figure 54: Wave power potential

Tidal Power

The figure below shows the comparative tidal potential in Blackpool. From the low tidal intensity it is evident that other locations across the UK would have better potential and better opportunities to explore and make use of tidal energy than Blackpool. The River Wyre Estuary, just north of Blackpool, has been identified as a key opportunity for a tidal barrage which could generate 133GWh of electricity[17]. Currently, other barrage locations are favoured elsewhere in the Country, but the Fylde Coast may be a focus in the future.

[17] Fylde Coast Multi-Area Agreement

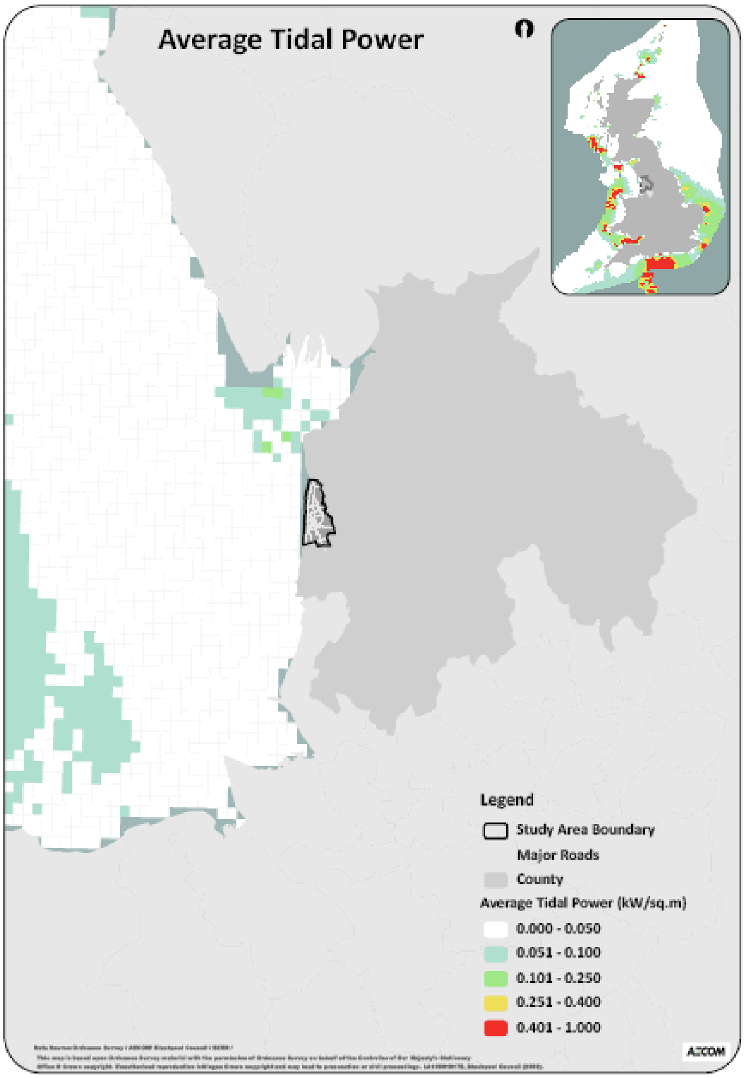


Figure 55: Tidal power potential

4.12 CONSIDERING BOROUGH-WIDE RENEWABLE ENERGY TARGETS

Through the analysis above, it is clear that there is substantial renewable and low carbon resource in Blackpool, particularly low carbon heat supply, due to the excellent potential for the integration of district heating networks (in both existing and new development). Opportunities for renewable electricity generation exist from use of combined heat and power networks (powered by biomass or geothermal or a mix of fuels) and through the installation of medium-large scale wind if suitable sites can be identified and delivered. Micro-generation related to existing homes and installation of renewables to supply heat within new development is also likely to make a significant contribution towards meeting renewable energy targets.

The opportunities in Blackpool are very clear, and hence lend themselves to focused delivery mechanisms and priorities (as discussed in Chapter 6). The dense urban nature of the Borough means that focussed initiatives and good planning could enable wide-spread delivery of district heating and micro-generation. The presence of large development sites in the area will also provide opportunities to drive renewable solutions on a wider scale.

The renewable potential of Blackpool is shown visually in the 'Energy Opportunity Map' in the next section.

As Blackpool has a large quantity of urban development, the delivery of their proportion of renewable heat based on the national target (around 12% of heat by 2020) should be adhered to. National targets are aiming towards 30% of our electricity on a UK wide basis being supplied by renewable sources by 2020. Some of this target will be met by nationally-driven projects for off-shore wind, wind-farms, tidal energy etc. Regardless, the scale of the challenge is very considerable, and the Blackpool LPA area will be expected to play a role in meeting that. Meanwhile, the North West Plan sets a target of 20% of electricity from renewables by 2020. While supply of 20% of electricity from renewable sources will be challenging in Blackpool, there is sufficient potential to meet the target if Combined Heat and Power can be delivered to a substantial proportion of the Borough (10-15% of viable areas) and fed by a renewable supply of heat such as biomass or geothermal. Significant contributions can also be achieved through delivery of wind power and micro-generation associated with both existing and new development. Therefore, we recommend the target of 12% heat is targeted, and 20% of electricity from renewable sources is maintained as the aspiration for Blackpool.

There are various scenarios and combinations of renewables that could be used to deliver against targets. The best scenario will be determined through delivery opportunities and partnerships over time. Delivery options and constraints are discussed in detail in Chapter 6.

4.13 ENERGY OPPORTUNITIES MAP

The analysis of renewable and low carbon energy opportunities discussed above, have been compiled to form an 'Energy Opportunities Map' (EOM) for the Blackpool LPA area. These plans are given in the figures below. EOMs can be used as a resource in policy and planning to guide key opportunities for consideration. This spatial plan will allow Blackpool to identify delivery opportunities both now, and as new development opportunities come forward.

The plan should also be used to inform policy making in the Sustainable Community Strategy and other corporate strategies, and investment decisions taken by the LPA and Local Strategic Partnerships. The EOM should be incorporated into supplementary planning guidance and corporate strategies so that it can be readily updated to reflect new opportunities and changes in feasibility and viability.

The EOM includes the following:

- Spatial distribution of opportunities and constraints relating to renewable resources including wind.
- Areas where the introduction of a district heating network likely to be viable due to the existing intensity of heat demand.
- Sites identified in the SHLAAs over 1ha (which may or may not come forward for development). Sites over 1ha are highlighted, as sites of that scale are likely to deliver a larger number of units (say 40+ under regional density targets). Where that scale of development is being delivered, energy opportunities are much greater. Communal systems such as district heating or connected supply from wind or ground/air source heat pumps for example become more viable than on smaller sites. Therefore, larger sites can be key triggers for delivery of CO_2 reduction, and there may be opportunities to expand district heating networks into neighbouring areas.
- Strategic sites analysed within this study.
- Urban areas where micro-generation technologies should be a focus for integration.
- The location of 'anchor loads' or large, consistent energy users which could form an anchor for district heating or CHP schemes.

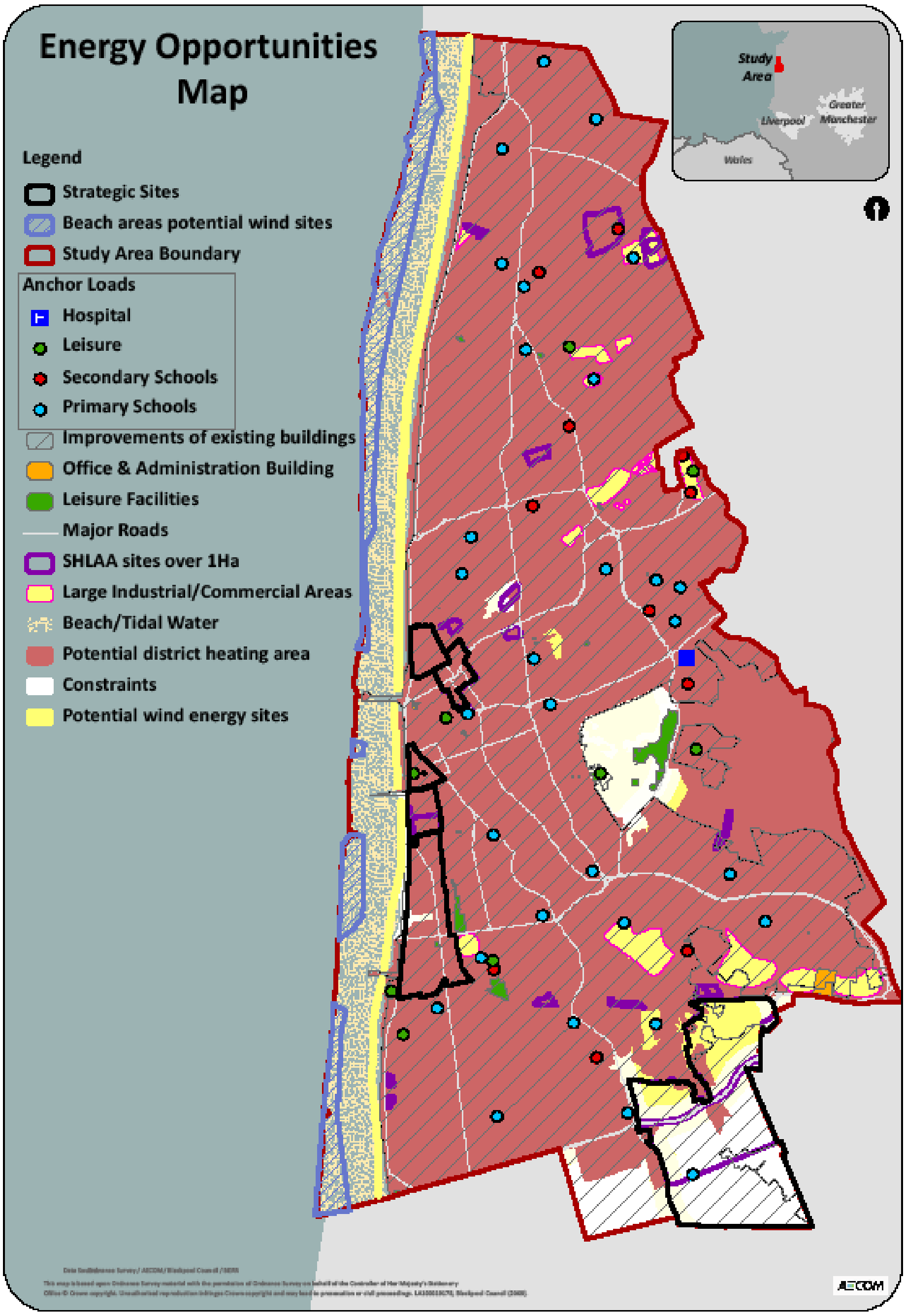


Figure 56: Energy Opportunities Map for Blackpool

4.14 KEY CONSIDERATIONS EMERGING FROM THIS CHAPTER

The sections above have considered the resource potential of Blackpool. Key considerations emerging from this chapter are:

- There are considerable renewable and low carbon resource opportunities, particularly surrounding low carbon heat in Blackpool;
- All opportunities are delivery dependant – resource potential in itself does not contribute to targets, therefore focus should be on enabling delivery; and
- An Energy Opportunity Map (EOM) has been produced as a planning resource which will allow assessment and prioritisation of delivery of opportunities.

5. Delivery Context: Strategic Sites

5.1 INTRODUCTION

PPS 1 Climate Change Supplement sets out a requirement that:

'…where there are particular and demonstrable opportunities for greater use of decentralised and renewable or low-carbon energy than the target percentage, bring forward development area or site-specific targets to secure this potential'

This chapter focuses on opportunities particular to five strategic development sites/types. It considers their potential to exceed the area-wide targets for low carbon energy and Code for Sustainable Homes and BREEAM standards.

Strategic sites, due to their size and/or location are often key delivery vehicles to achieving high carbon reductions in a borough. The following sites were selected for the Blackpool borough:

- Marton Moss (as part of the M55 Hub)
- Talbot Gateway
- Foxhall
- South Beach
- North Beach
- Conference & Leisure Quarter (Central Station site)
- Rigby Road Education Site

The sites were selected through consultation with Council representatives and represent the key site opportunities in the borough at this point in time. There are also likely to be other sites coming forward in the area, where higher targets may be achievable. The analysis and process of examination demonstrated here should be applied by the council as other sites come forward, and targets and site-specific policy should be set accordingly. In addition, a brief commentary has been provided on potential CO_2 reduction measures for typical suburban residential areas.

5.2 INFLUENCE OF SITE PROPOSALS

For the main development sites (including Marton Moss, Talbot Gateway, Foxhall, Conference & Leisure Quarter and the Rigby Road Education site), an indication of achievable CO_2 reductions are given, taking into consideration the identified resources in the surrounding area and the proposed building uses and floor areas expected to come forward over the Core Strategy period. While these masterplans are likely to progress, due to varying market demands and the specific developers coming forward for development, the exact building uses and split of floor areas may well evolve for some or all of the identified sites. However, the principles highlighted remain and it is expected that these principles will be applied to other key development sites across the Blackpool borough to ensure that no resource opportunities go unutilised.

Significant changes to the proposed building uses could have a substantial impact on the expected heat and electricity demands for the site; furthermore the phasing strategies will significantly impact the timing of energy demands and may affect the technical viability of some of the low and zero carbon solutions considered. Accordingly, it is recommended that viability of targets and policy should be tested through an energy strategy conducted alongside the planning application for each site.

As an illustrative example, a shift towards more residential development Talbot Gateway would have the effect of reducing the overall electricity demand and CO_2 emissions compared to a scheme of predominantly office and retail uses. This is illustrated by table 37, which shows gas, electricity and CO_2 benchmarks per m^2 for 5 standard building types. The traffic light shading shows where demands or emissions are high (red) or low (green).

The substantial variation in the figures on a m^2 basis highlights how significant the effect of changing the balance of building uses within a masterplan can be once the benchmarks are applied to total floor areas. It will therefore be important to iteratively review the energy demand estimates as the masterplans are developed.

This study looks to identify key areas of opportunity and set out the likelihood that the site is capable of meeting higher targets. Current information available for each strategic site has been used as an illustrative example for technologies and resources that could be used, resulting in significant reductions in CO_2 emissions. This evidence base can then be used to drive higher targets in these areas.

Varying energy benchmarks for different building types						
		Commercial				Residential
		General office	High street agency	General retail	Large non-food shop	Average residential
Gas	kWh/m^2	120	0	0	170	60 - 90
Electric	kWh/m^2	95	140	165	70	30 - 48
CO_2	kg/m^2	69	27	32	85	25 - 37

Table 37: Relative energy benchmarks (Gas and Electric) for different building types[18]

Also denser development is less energy intensive on a floor area basis due to reduced heat losses from properties built in a dense formation. Large detached homes have a much greater heat requirement and greater heat loss than terraced homes or flats in apartment buildings due to their increased surface to floor area ratio. Typically, a development where a greater proportion of the overall housing mix is apartments and terraced homes will have a lower energy demand than a development which consists more predominantly of detached homes.

Compact masterplans also facilitate a greater number of options for delivering heat and power to homes in a low carbon way. The higher density helps to make district heat and power options more economically viable, it also means that more space may be available for the siting of wind turbines onsite.

5.3 RENEWABLE AND LOW CARBON TECHNOLOGIES CONSIDERED

Detailed below is a description of the technologies that were considered as part of this assessment, along with issues relating to their technical and financial viability that determined whether they could be applied to the strategic sites. For each site a summary table has been produced to demonstrate the potential CO_2 emissions reductions achievable and an indication of the capital cost uplift associated with these improvements. CO_2 emissions savings are expressed in two ways in these summaries:

1. % Reduction in gross CO_2 emissions: This percentage is the saving achieved as a result of energy efficiency measures and LZC technologies expressed as a percentage of the complete building operational CO_2 emissions including fixed building services and equipment loads.
2. % Reduction in regulated CO_2 emissions: This percentage is the saving achieved as a result of energy efficiency measures and LZC technologies as a percentage of CO_2 emissions associated with fixed building services only, as used for Building Regulations calculations. This includes heating, cooling, lighting and fan/pump energy, but does not include equipment loads.

[18] Standards from AECOM modelling

For reference, the capital cost uplift is expressed as a percentage over the baseline cost and is intended to provide a relative comparison between a number of potential solutions. The percentage cost uplift is based on the results of analysis of tender prices of over 13,000 buildings showing an overall aggregated cost uplift for a range of building types and renewable technologies. The figures are based on the build cost of a development only and do not include other development costs such as external works, contingencies, fees, demolition, onsite clearance, Section 106 agreements, marketing and legal costs. The viability of a proposed solution will be dependent upon the above factors and so the cost uplift provided should be taken as a relative comparison only.

5.3.1 ENHANCED ENERGY EFFICIENCY

There are no site specific opportunities or constraints associated with this issue as enhancing energy efficiency does not have a spatial implication at a masterplan scale, but only affects the internal layout of buildings. There is however likely to be a financial constraint as energy efficiency measures beyond a certain standard progressively become a less cost effective way of achieving CO_2 reductions. The advantage of enhancing energy efficiency is that the need for onsite renewables and low carbon technologies to deliver carbon compliance levels will be reduced.

For non-residential buildings the improvements are likely to focus on the specification of more efficient services more than on building fabric changes as the CO_2 savings achievable with building fabric improvements are generally relatively limited. The savings achievable by careful specification of services within the building (e.g. lighting, ventilation) are very significant and generally can outweigh savings achievable by LZC technologies, unfortunately the extent of these savings are very difficult to estimate at such an early stage due to the immense variation possible in non-residential building types and designs.

Gas fired Combined Heat and Power (CHP)

CHP is most cost effective at a large scale, connected to a district heating network and serving a mix of building types with relatively consistent electricity and heating demands. CHP systems are generally coupled with district heating networks however these are typically only cost effective on developments of high density where the length of pipes required is low relative to the energy being distributed.

Solar Water Heating (SWH)

Solar water heating has been successfully used in various building types but has little CO_2 reduction potential in commercial building uses (e.g. offices, retail, leisure etc) where demand for hot water is low relative to the overall building energy demand. Solar water heating is more attractive for use in homes, where it is well proven and can contribute up to ~13% CO_2 saving. While SWH systems can achieve up to Code for Sustainable Homes (CfSH) Level 4 for CO_2 reduction, their limited potential to reduce CO_2 emissions further than this currently makes this technology unappealing in the long term as all new houses are required to be Zero Carbon from 2016. From 2016 onwards, it is more beneficial to supply a dwelling's heat demand through low carbon network solutions including technologies such as biomass heating and natural gas or renewable-fired CHP - all of which can contribute much higher levels of CO_2 saving. These technologies also meet energy demands for space heating and - in the case of CHP – with the added advantage of electricity generation. Considering this, SWH is an attractive and viable technology in areas where district heat networks are not likely to be considered in the near future.

Wind turbines

Micro (building mounted) wind turbines have not been considered for this assessment as early feedback from field trials (by BRE, Carbon Trust and EST) has shown limited energy outputs from small turbines installed in urban and sub-urban locations where wind conditions are turbulent.

The potential for large scale wind at a borough scale is discussed separately in Chapter 4.

It is worth noting that any potential large scale turbines will not in all cases help meet Code for Sustainable Homes or BREEAM targets for any of the strategic sites. This is because a direct connection to the site would be required via a private wire network, which is only generally financially viable within a distance of 1-2km. Opportunities exist at the M55 Hub to have a direct connection between large-scale wind turbines and new development, which would potentially allow a proportion of the development to be zero carbon depending upon the number of turbines built and the amount and type of development coming forward on this site. For the majority of other areas within Blackpool, it is not viable to connect large scale wind via private wire and therefore this resource would not be able to be used against BREEAM and CfSH targets under current regulations. The potential areas identified for small/medium scale wind turbines on the promenade could contribute to CO_2 savings against specific buildings where a private wire is secured between the turbines and the development.

Solar Photovoltaics (PV)

Other than wind turbines, photovoltaics (PV) are the only renewable energy technology that delivers electricity. PV is likely to play a major role in delivering future targets for onsite CO_2 reduction as replacing electricity has higher CO_2 saving potential than replacing heat; this is due to the fact that standard (fossil fuel powered) electricity generation and distribution is a very carbon intensive process. The energy output from PV is only limited by the amount of suitable area for accommodating panels, and by cost. Good design should be able to maximise the area which can be used for mounting PV panels, which need to face South at a 30^{o} pitch. Valley roofs or flat roofs can be used where conventional pitched roofs cannot be orientated to face South. PV is well suited both to residential and non-residential installations as all building types require electricity and demand profiles are not an issue as excess electricity can be sold to the Grid.

Photovoltaics have a high capital cost however they are becoming more competitive with other LZC technologies and the economics of the technology is likely to be further improved in the future with the introduction of Feed in Tariffs from April 2010.

Ground Source/Air Source Heat Pumps (GSHP/ASHP)

The technical viability of heat pumps for any of the strategic sites has not been considered in detail at this stage as this would require a detailed ground condition survey and the potential CO_2 savings from this technology are relatively low compared to other LZC options to make this worthwhile doing at this stage. For the assessed sites it has been assumed that ground conditions are suitable for installing the ground loops required for GSHPs.

In terms of spatial implications, GSHPs have limited impact on masterplans as the ground loop can be buried in a vertical borehole and the heat pump would only require a small space within the building. Where more space is available, for example where there are houses, the ground loop can be laid horizontally by burying it in the garden, which reduces installation costs. For flats it may be necessary to use vertical boreholes, which do not require large outdoor areas to be kept free from buildings. Air Source Heat Pumps only require a small unit above ground, and therefore may be a better option in urban areas. For the purpose of this discussion, heat pumps are discussed collectively as they have similar carbon reduction implications.

GSHP have particularly high potential in commercial buildings as they can meet both heating and cooling loads, however they do compete with other LZC technologies that are more effective at saving CO_2 such as CHP. In terms of financial viability, the capital cost of GSHPs is high, particularly if a vertical borehole is required, for this reason GSHP is generally only viable where heat densities are low and other cheaper technologies are not suitable.

More accurate details of the CO_2 savings potentially made by a GSHP are best determined once a particular building is in its early design stage and analysis can be carried out on the anticipated heating and cooling loads.

GSHPs can deliver Code Level 3 energy requirements (or Level 4 when combined with other technologies) for residential buildings, however much of the benefit from GSHPs is due to the technology taking advantage of the ‘fuel factor’ for electricity; this means that the calculated TER is higher than if the base case were gas heating, therefore making it easier to meet the target improvements set by the Code. The use of this fuel factor for heat pumps is being reviewed for future versions of Building Regulations[19], meaning that in future GSHPs may not be as advantageous as under current regulations. The effectiveness of GSHPs as a means of reducing CO_2 emissions is also heavily dependent upon the CO_2 emissions factor for grid-supplied electricity as this is the primary fuel used to power the system. While it is anticipated that the grid will be decarbonised in future years (due to increased use of large scale renewables and nuclear and phasing out of older coal-fired power stations), the revised Building Regulations for 2010 are expected to see a significant rise in the fuel emissions factor for electricity, therefore making GSHPs less appealing in terms of CO_2 reduction.

Air source heat pumps could also be considered as a means of providing low carbon heating and cooling although the efficiencies of air source systems can be less than that of a well designed ground source system with good ground conditions. Despite this, considerable CO_2 savings can still be made with air source systems and they are often more feasible than ground source systems, particularly in built-up areas where land is at a premium and the capacity for drilling boreholes is heavily limited. Comments made throughout this document that refer to ground source systems can therefore be assumed to be approximately equivalent to air source systems in terms of CO_2 emissions savings.

Biomass heating and CHP

While there has been some extent of land identified as potentially suitable for biomass growth in the wider area surrounding Blackpool, there are still substantial shortfalls in the supply chain, with many suppliers already committing their supplies to existing uses. There are also issues with transporting biomass, in particular relating to the distance travelled in order to maintain the sustainability of the fuel as well as accessibility issues for many of the town centre sites in Blackpool. There is potential for biomass use in areas to the east of the borough, where there is better vehicular access from the wider North West area. Further details on Blackpool's biomass fuel supply can be found in Chapter 4.

Biomass heating is well suited for low density housing as this type of development has relatively high heating demands and most likely will have sufficient space to accommodate solid fuel storage. This technology can generally achieve Code Level 4 on its own, without need for additional renewable technologies. It is however not very well suited to non-residential buildings as these generally have high electric loads but relatively low heating loads, furthermore they often have plant room accessibility limitations. There are however some non-residential building types with high heating demands (e.g. schools, hospitals, clinics) that can be well suited to biomass heating.

Biomass CHP and gas CHP are best suited for large, dense, mixed developments and is the LZC technology discussed here with the highest potential for on-site CO_2 savings. It can meet the energy requirements of Code for Sustainable Homes Level 5 (100% reduction on regulated emissions) and can deliver greater savings if sized to meet the development's electrical demand – although this does mean that some of the heat generated may be wasted, if no suitable end uses for it can be found. This is due to the heat to power ratio associated with CHP engines.

5.4 USING BREEAM AND CODE FOR SUSTAINABLE HOMES

Code for Sustainable Homes and BREEAM as assessment methods are discussed in Chapter 2 of this document. It is important to remember that although the energy requirements for BREEAM and 'Code for Sustainable Homes' assessments are very stringent and are often the limiting factor to achieving higher ratings/levels, they are not the only item covered under the assessment schemes. Other issues include:

- Water
- Materials
- Waste
- Pollution

[19] Energy efficiency requirements for new dwellings, A forward look at what standards may be in 2010 and 2013
http://www.communities.gov.uk/documents/planningandbuilding/pdf/Energyefficiencyrequirements.pdf

- Health & Wellbeing
- Management
- Ecology
- Transport (BREEAM only)

In the case of the Code, in order to achieve Levels 5 and 6 there is an onerous mandatory requirement to reduce internal water consumption to 80 litres per person per day. This would involve the use of rain and grey water recycling systems, which are generally implemented on a dwelling by dwelling or block by block basis. Because of their local implementation, there are no foreseen spatial constraints associated with achieving this target in any of the five strategic sites, however there would be a financial implication. It may be possible to reduce the need for individual systems and therefore cost implications on any of the sites if a non-potable groundwater source is available and can be distributed across the site for low grade uses. A water study would be required to investigate this opportunity.

Other categories do not generally have a significant spatial implication and when they do (i.e. ecology, transport), they are not mandatory and therefore if necessary they can generally be avoided by targeting other areas. This means that there are no foreseen spatial issues in any of the strategic sites that would preclude achieving Code Level 4 or BREEAM Very Good. However it is worth noting that when higher levels/ratings are being targeted, there is progressively less flexibility in losing credits in favour of others. Therefore, although achieving a high score in ecology is not compulsory in order to achieve Code Level 5, not doing so may make it very difficult to meet the overall score if, for example, the unit design means that daylighting credits cannot be achieved. These credits can be achieved in a more cost-effective manner if sustainable design is introduced in the early site planning stages.

With regards to BREEAM, the latest version (2008) sets very stringent requirements for energy consumption reduction in order to achieve an Excellent rating; however in commercial buildings LZC technologies cannot often achieve the required CO_2 savings alone as internal services specifications have a far greater impact on total building CO_2 emissions. This means that the limiting factor for achieving BREEAM ratings higher than 'Very Good' is generally a financial one, for example, how much money is available to specify the most efficient building services, rather than a spatial one, i.e. how much PV fits on the roof or is there enough space for a wind turbine to be installed on site. There is insufficient evidence at this stage to show the total capital cost uplift associated with delivering BREEAM 2008 targets, for this reason the introduction of a policy target requiring non-residential buildings to achieve BREEAM Excellent is not recommended until further investigation is undertaken on financial viability.

5.5 STRATEGIC SITE 1: MARTON MOSS (AS PART OF THE M55 HUB)

5.5.1 BACKGROUND AND PROPOSED DEVELOPMENT

The M55 Hub is seen as one of Blackpool and Fylde's major potential development areas and is key in helping to meet RSS targets for new homes for both Blackpool and Fylde. The scale of the Hub lands creates the opportunity for a mix of uses surrounding a local centre, including residential, schools, community buildings, health facilities, shops and cafes along with key open spaces and parks.

David Lock Associates have produced a *Prospectus for Development* for the M55 Hub which provides a high level study of the proposals and the key features. The vision is to provide growth and enhancement with a focus on sustainable development and neighbourhoods.

Figure 57 shows an indication of the M55 Hub lands and proposed development uses in the area. Key elements to this masterplan are the expansion of the employment area shown in purple and a large number of new houses surrounding the employment area with infill developments in the Marton Moss area. It is important to note that the M55 Hub masterplan shown here is indicative only and should not be taken as a final plan of development. The maps shown are used purely to demonstrate how energy demands could be met given a particular scenario for development.

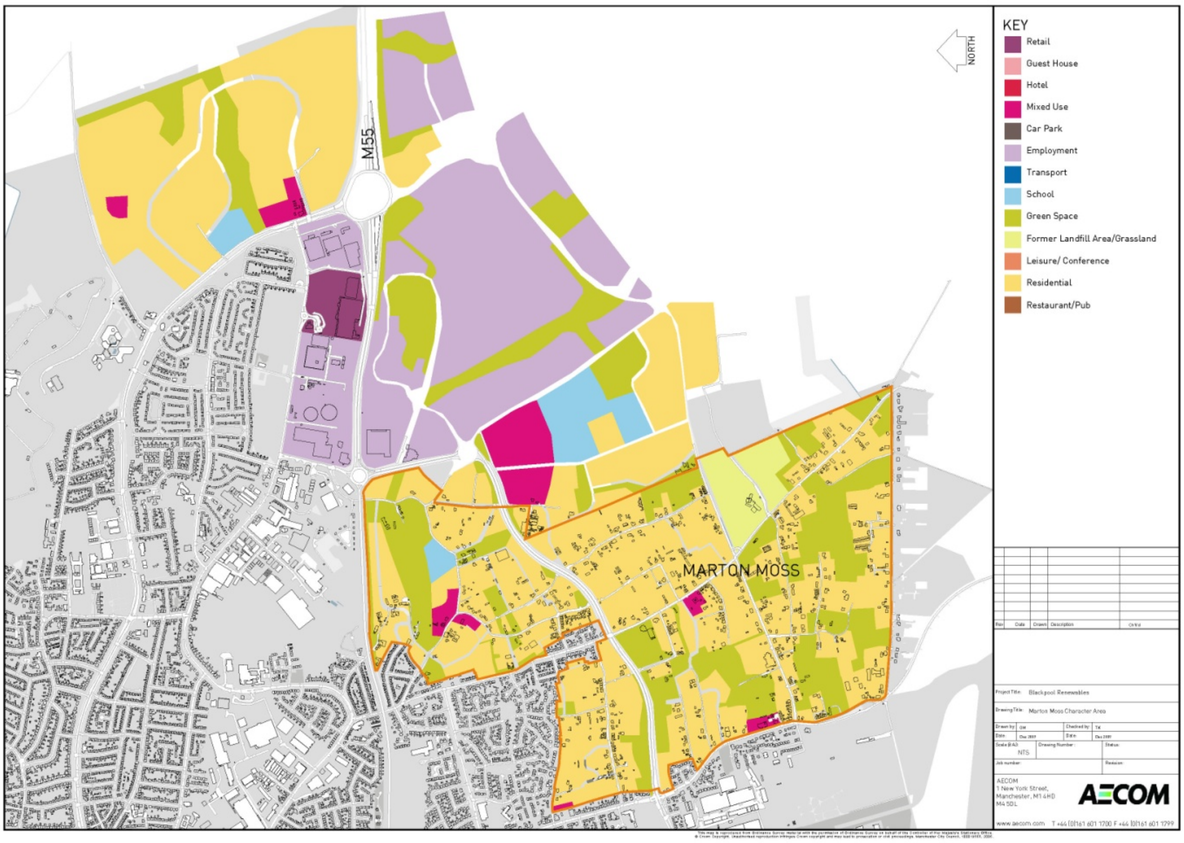


Figure 57: M55 Hub proposed land use

Up to 7,000 new homes are expected in total across the M55 Hub, with around 2,700 expected in the Blackpool borough boundary (within the Marton Moss area). This housing development is expected to be complemented by a number of schools, community services and expanded employment area, with a focus on sustainability in terms of buildings, transport and lifestyle.

While the M55 Hub *Prospectus for Development* document gives an indication of the types and approximate quantities of development coming forward, a scheme of this size is likely to see significant evolution as market conditions change and developers come forward to start on site. For the purposes of this assessment, a number of assumptions were made as to the quantities of buildings expected to be developed to allow an illustrated example to be evaluated for energy and resource opportunities. The principles highlighted in this assessment will hopefully no doubt advise and inform the masterplan's evolution until development begins. The assumed development coming forward for the M55 Hub area is summarised in table 38.

Building Name	Building Type	Floor Area (m2)
Primary school [Whyndyke Farm]	Primary School	4,000
Mental Health Unit [Whyndyke Farm]	Mental Health Unit	2,000
Detached Dwellings [Whyndyke Farm]	Detached houses	165,000
Whyndyke Farm Wind Turbine	-	-
Primary school [Whitehills]	Primary School	4,000
Dwellings [Whitehills] (500 terraced)	Terraced Housing	40,000
Dwellings [Whitehills] (500 semi-detached)	Semi-Detached Housing	40,000

Dwellings [Whitehills] (500 apartments)	Apartments	40,000
Employment Land 1 (25 Ha) [Whitehills] (25,000m2 office)	Offices	25,000
Employment Land 1 (25 Ha) [Whitehills] (25,000m2 workshop)	Light Industry	25,000
Dwellings [Moss House] (Bennetts Lane/Progress Way) (500 semi-detached)	residential houses	40,000
Dwellings [Yeadon] (Yeadon Way/Progress Way) (500 terraced)	residential houses	40,000
Dwellings [Yeadon] (Yeadon Way/Progress Way) (500 apartments)	residential houses	40,000
Dwellings [Progress] (Progress Way/School Road) (600 semi-detached)	residential houses	48,000
Dwellings [Progress] (Progress Way/School Road) (600 terraced)	residential houses	48,000
Primary school [Yeadon]	Primary School	4,000
Primary school [Progress]	Primary School	4,000
Secondary school [Progress]	Secondary School	12,000
Local Shops [Progress]	General Retail	2,000
Pubs & bars	Public House	500
Restaurants & cafes	Restaurant	500
Other community services buildings	Community Buildings	1,000
Employment Land 2 (25 Ha) [Whitehills] (25,000m2 office)	Offices	25,000
Employment Land 2 (25 Ha) [Whitehills] (25,000m2 workshop)	Light Industry	25,000

Table 38: Assumed development types for the M55 Hub

5.5.2 OPPORTUNITIES, CONSTRAINTS & PROPOSAL

The proposed developments shown in table 38 above are strongly focussed around residential uses. Residential properties generally have a high demand for heat compared to other building types due to relatively high external surface to floor area ratio and substantial demands for domestic hot water. Detached houses in particular have a large heat demand due to larger heat losses compared to terraced houses and apartments which benefit from a number of party walls to adjacent properties. Despite the reduced heat demand per dwelling for terraced houses and apartments, the closer proximity to each other results in a high heat density ideally suited to a district heating network. Where this high heat density can be combined with other building types, diversified daily loads can create an extremely viable proposition for a low carbon heat network with significant savings in CO_2 emissions.

To the south of the M55 hub lies a strip of green belt land that covers the flight path into Blackpool airport. This strip of land is crucial in defining the boundary between the Blackpool and Fylde Authorities. Furthermore, this boundary creates a constraint with respect to wind turbines and other tall structures. Further constraints also include the likely habitats of wildlife within the Hub lands and ground conditions identified as containing peat and boulder clay. This requirement for deeper foundation piles could potentially be offset by the opportunity for ‘energy piles’ which make use of the ground work costs associated with deep foundation piles as a ground-coupled energy system used for heating and cooling.

Enhanced energy efficiency - improved fabric and services specifications

High standards of energy efficiency can result in substantial CO2 savings for new residential properties, while energy efficiency improvements in commercial building types are generally less beneficial due to lower heating demands for these buildings. However CO2 savings can still be made through well insulated and air tight building constructions. The benefits achieved from high standards of insulation on commercial buildings vary considerably depending upon building type. Offices and retail buildings generally have a low demand for heat and therefore benefit the least from high standards of insulation, while hospitals, nursing homes and hotels typically have a high demand for heat and can therefore benefit substantially from improved fabric standards. It is expected to be highly beneficial to retrofit high insulation standards to existing homes in the Marton Moss area, particularly older detached homes that have a large demand for heat. For these large detached properties, CO2 emissions are likely to be predominantly dominated by heating energy.

Gas fired Combined Heat and Power (CHP)

Where building density is high enough then demands for heat are sufficient to justify the use of gas CHP on a heat network. This is particularly beneficial for high density residential plots that are located near to other building types to offer diversity in daily heat demands. This diversity allows benefits in payback times as the peak capacity for a network can be reduced compared to the sum of individual peak loads due to these peak loads occurring at different times in the day. Gas CHP also makes use of offsetting high CO2 grid electricity for each unit of heat that is generated and therefore buildings with large heat demands attract large CO2 savings due to the substantial amount of grid electricity that is offset.

In areas where dwelling densities are greater than around 40 dwellings per hectare, it is proposed that gas CHP networks are implemented, with substantial CO2 emissions reductions achievable with this technology. Developers and masterplanners should be encouraged to design sympathetically to maximise the uptake of CHP heat networks where possible and to minimise the costs associated with heat mains travelling extended distances to serve only a small number of dwellings.

Solar Water Heating (SWH)

Solar water heating is an effective technology in reducing boiler usage and therefore CO2 emissions for domestic hot water. Solar thermal technologies are particularly suited to large properties in low density neighbourhoods where district heating systems are not viable and where domestic hot water demand tends to be higher. These 'fuel rich' neighbourhoods are often liberal with their use of domestic hot water with high energy bills and associated CO2 emissions.

Solar thermal systems are therefore suitable for installation on new low density properties as well as retrofitting on existing properties that are not suitable for connection to an extended heat network. Solar thermal systems are expected to become more viable from April 2011, when the Government introduces the Renewable Heat Incentive – a scheme that will enhance the financial benefits to solar thermal systems and encourage the uptake of this technology. It is recommended that Blackpool Council promotes this scheme to identified 'fuel rich' households at the M55 Hub to encourage retrofitting. For new properties, solar thermal technologies are unlikely to be sufficient to achieve beyond Code level 3, making this technology unsuitable on its own for new dwellings beyond 2013.

Wind Turbines

In general, small scale wind turbines are not cost effective, particularly in urban locations where wind speeds are typically low and air flows are often very turbulent. However the rural nature of the land at the M55 Hub creates a potential opportunity for wind turbines, provided that they are large enough to make significant reductions in CO2 (small roof-mounted wind turbines are established as being extremely ineffective at generating a useful amount of energy). There are potential issues with locating wind turbines towards the south of the site near to the flight path area for Blackpool airport, however the Whyndyke Farm area further north creates an ideal opportunity for one or more medium/large scale community wind turbines which could be owned and operated by the surrounding community. This model of ownership has been shown to be effective in both acceptance and wider sustainability habits at a number of case study locations across the UK, including Lowestoft in Suffolk and Ashton Hayes in Cheshire. A single 2MW wind turbine could offset around 1,850 tonnes CO2 per year, enough to make approximately 800 semi-detached homes effectively zero carbon if combined with advanced practice energy efficiency and a solar water heating installation. Alternatively, a single 2MW community turbine could be sufficient to allow approximately 1,800 semi-detached homes to hit Code level 5 with advanced practice energy efficiency and solar water heating.

While there are a number of obstacles that could potentially jeopardise the viability of a community wind turbine in the Whyndyke Farm area (including opposition from Blackpool airport due to radar interference and opposition from local residents due to visual and noise issues) the community ownership model has been proven to be most effective at getting 'buy-in' from local residents to allow such a scheme to work, particularly where Feed in Tariff payments are likely to increase the turbine's annual financial return to generate funds that can be reinvested into the community.

Photovoltaics (PV)

PV has the potential to achieve Code Level 3 and possibly Level 4 (with advanced energy efficiency measures), depending on the amount of suitable roof area available. Even in a medium density development it is highly unlikely that sufficient roof space could be provided to achieve Code Level 5 with energy efficiency and PV alone. The particular appeal of PV relates to the high CO2 savings generated through offsetting grid-supplied electricity and the flexibility of being able to combine this technology with almost any other technology without detrimental conflict (unlike conflicting technologies such as SWH and gas CHP, where both technologies rely upon a base heat demand to be effective in offering CO2 emissions savings).

While PV installs are currently expensive, the proposed Feed in Tariff coming into force in April 2010 is expected to significantly reduce the payback times of PV systems making them more appealing for homeowners to install. It should be noted that, while the Feed in Tariff is expected to provide substantial returns for homeowners, the capital cost to developers for the initial install is still expected to be relatively high.

Ground Source Heating (GSHP)

The effectiveness of GSHP systems at reducing CO2 emissions is heavily influenced by the CO2 emissions factor for grid-supplied electricity. A GSHP's CO2 reduction potential is determined by its high coefficient of performance which, if designed correctly, allows the system to emit less CO2 per unit of heating or cooling output than a typical gas-fired boiler system. While grid-electricity CO2 emissions factors are expected to reduce over the next 5-10 years, the short-term increase in electricity fuel emissions factor for the Part L 2010 Regulations makes GSHP systems a less attractive option. The ground conditions at the M55 Hub are also identified as being particularly abundant with peat and boulder clay. While this potentially increases the ground work costs of a ground-coupled system, the potential to incorporate ground loops into the foundation piles to create 'energy piles' opens up an opportunity to offset the groundwork costs of a GSHP system against the increased capital costs of the foundation piles. Further ground surveys would need to be carried out across the Hub region to determine the suitability of ground-coupled systems in particular development areas.

It is worth noting that GSHP systems usually operate in conjunction with a low temperature heating emitter system (e.g. underfloor heating) within a building to make use of the 'low grade' heat produced from a ground-coupled system. This heating setup could be problematic in buildings with very high heat loads where underfloor heating systems may struggle to provide the peak heating capacity required. For a very well insulated new dwelling, underfloor heating supplied via GSHP should be able to achieve Code Level 4 offering CO2 reductions of around 50% in total. While it is possible to distribute low temperature ground sourced heat with a radiator system, in real terms this is often impractical due to the large size of radiator required to achieve the an equivalent heat output of a conventional boiler/radiator system.

Biomass heating and CHP

In high density residential areas, a biomass-fuelled heat network creates the opportunity for large reductions in CO2 emissions, particularly where the volume of development is sufficient to justify the use of biomass CHP. Biomass CHP is best justified in areas where the heat density is high and where there are a range of building types to diversify daily demand patterns. The proposed clusters of housing surrounding schools in the M55 hub area create an ideal opportunity to diversify daily heating demands while demanding a sufficiently high heat density to justify a low carbon heat network. With the M55 Hub consisting of mainly open land at present, there is an ideal opportunity to develop clusters of housing surrounding schools to suit a biomass-fuelled district heating network. Provision could also easily be made for suitable biomass storage and access – something that is not always straight forward when retrofitting a biomass system to an existing development.

The use of biomass throughout the entire M55 Hub area is not likely to be viable due to areas of lower housing density and areas with constrained access in addition to difficulties in sourcing sufficient local biomass fuel supply for such a large development. This said it should be feasible to develop a high density region of the site with a biomass heat network to provide a substantial amount of CO2 reduction to the core of the development.

The area shown as connecting to a biomass CHP network in figure 58 gives an overall regulated CO2 reduction for this area of 165% when combined with good levels of energy efficiency and some use of PV. Depending on the building type, individual building regulated CO2 reductions of 120%-289% are possible through the use of biomass CHP with good standards of energy efficiency and the maximum roof area of PV. While extent of low carbon technologies may not be financially viable, this demonstrates the potential savings that biomass CHP offers, particularly when combined with complementary technologies such as PV.

Summary - Opportunities and constraints for low and zero carbon technologies

The M55 Hub contains three key areas for development, each making use of different resources as determined by the development type, energy demands and resources and constraints of the area. Figure 58 shows a summary of these three key areas and a proposed solution for maximising CO2 emissions.

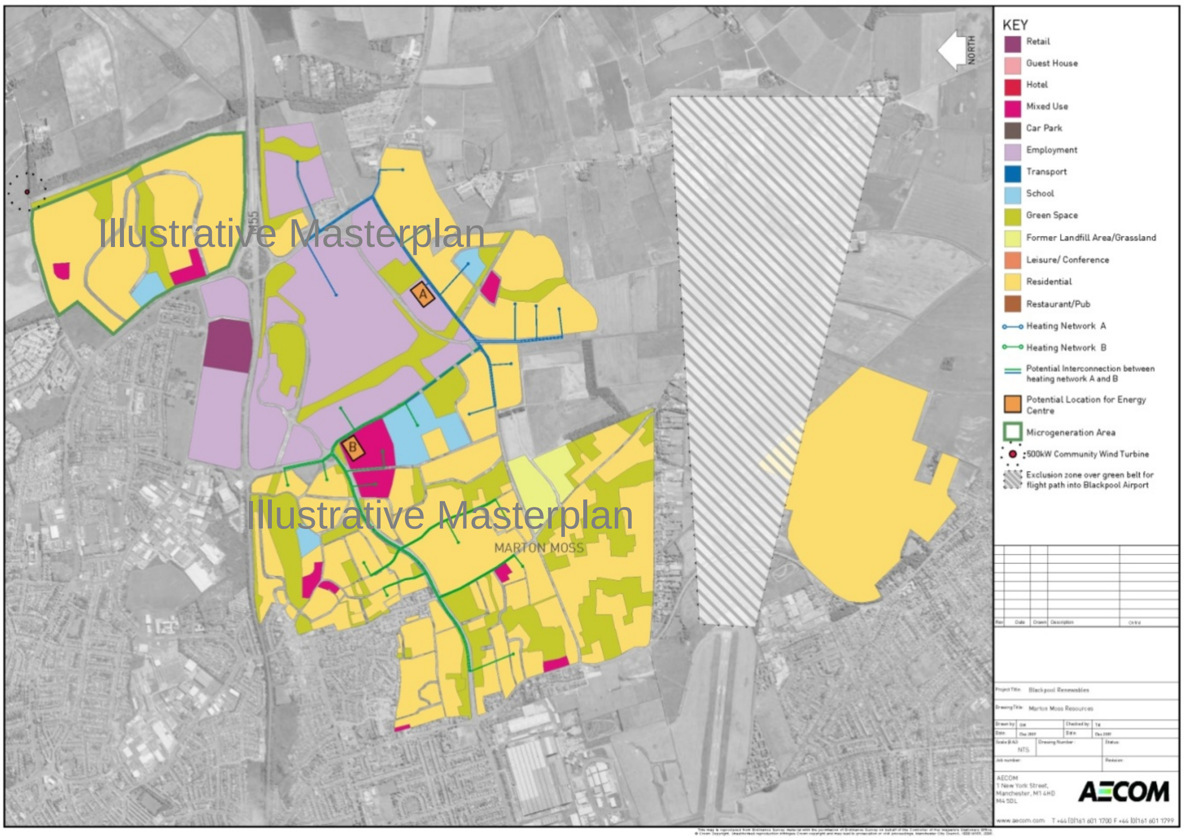


Figure 58: Proposed low carbon solution for the M55 Hub

The blue heating network shows the areas that could be served by biomass CHP. These areas should include the highest density residential (apartments and terraced housing) as well as linking to some of the key employment area. This portion of the site has been chosen for a biomass-fuelled network due to its good accessibility to the M55, with biomass imports to Blackpool coming in from this side of the borough. Depending on the phasing of the development, this biomass CHP network could be extended towards the M55 Hub local centre where building density is expected to be at its highest with community facilities and adjacent primary and secondary schools.

The heat network indicted in green in figure 58 is proposed to cover a large amount of the high and medium density housing, as well as the main local centre including community facilities, shops and schools. The construction of this network is likely to begin from the outset of the M55 Hub development, with connections to the main local centre areas and expansion to the east as development progresses. It will also be possible to connect this gas CHP network to the biomass-fuelled network to allow further benefits of diversified loads and increased benefits from prioritising the lower carbon biomass CHP system, using the gas CHP system as a top-up boiler at times of higher demand.

The third key area on the M55 Hub site is the Wyndyke Farm area, which is proposed to make use of microgeneration solutions with a community wind turbine. While the M55 hub Prospectus for Development shows this area as having medium to high density housing, from an energy perspective it is more effective to site lower density housing here, where a community wind turbine could be used to create a low/zero carbon neighbourhood. Where housing densities are lower than 30-40 dwellings per hectare, heat networks become less viable due to a higher capital cost per unit of heat delivered. Therefore for most detached housing developments the housing densities do not justify the capital cost of a heat network installation. In this area, microgeneration technologies can be pursued to achieve Code level 3 or 4, however these microgeneration technologies generally fail to achieve the CO2 reductions required to exceed Code level 4. An alternative means of achieving high reductions in CO2 emissions is through the implementation of a community wind turbine. Such a scheme would involve ownership and operation of the turbine by surrounding residents, with the opportunity to receive financial benefits from the sale of electricity to the grid and Feed in Tariff payments. With constrained green belt land to the south of the M55 Hub site where the aircraft flight path zone exists, siting large scale wind turbines in this region is not likely to be feasible. The Whyndyke Farm area, however, lies approximately 2km away from this flight path exclusion zone and therefore maximises the potential CO2 reductions available on low density residential properties.

For these reasons, it is therefore recommended that the location of higher density housing is reconsidered to tie in with the suitability for meeting energy demands through sustainable means. This is of particular importance to the proposed higher density residential area at Whyndyke Farm, where this location provides an opportunity for community wind turbines that would work well with lower density residential development. Higher density residential development is better suited to areas nearer to the flight path zone where heat networks are likely to be considered due to restrictions on the use of wind turbines. Note that higher density residential areas assume housing densities of at least 40-50 dwellings per hectare. In general across the Hub lands, housing densities should be sufficient to encourage the use of district heating. These requirements will contribute to encouraging the uptake and implementation of renewable technologies in the M55 Hub area, however there are a number of non-energy related issues which should be considered and may contradict the requirements for specific housing densities in various areas of the Hub lands. Considerations for energy consumption should therefore be made when proposing areas of higher and lower housing densities in this area.

Tables 39-41 show indicative results for the three key resource areas of the M55 Hub. These tables show an indication of the CO_2 emissions reductions potential, along with the approximate uplift in capital cost for expected development across the site.

Building Name	Authority	Building Type	Floor Area (m2)	Network Phase	Technology Proposed	% Reduction in CO2		Indicative % Increase in Capital Cost over BCIS Base cost.
						Gross	Over 2006 Part L	
Primary school [Whyndyke Farm]	Fylde	Primary School	4,000	Microgeneration / Community Wind Turbine	Micro Gas CHP + PV	100	164	29
Mental Health Unit [Whyndyke Farm]	Fylde	Mental Health Unit	2,000	Microgeneration / Community Wind Turbine	Micro Gas CHP + PV	100	167	67
Detached	Fylde	Detached	165,000	Microgeneration	PV	100	179	29

Dwellings [Whyndyke Farm]		houses		/ Community Wind Turbine				
			Average for Microgeneration area:			100	178	29

Table 39: Indicative CO_2 reductions and capital cost uplift for microgeneration area of M55 Hub – NOTE: indicative capital cost uplift is expressed as a percentage over the BCIS base build cost. These figures are provided to allow a relative comparison between different technologies and cannot be used to assess viability due to the large number of varying factors affecting viability.

Building Name	Authority	Building Type	Floor Area (m2)	Network Phase	Technology Proposed	% Reduction in CO2		Indicative % Increase in Capital Cost over BCIS Base cost.
						Gross	Over 2006 Part L	
Primary school [Whitehills]	Fylde	Primary School	4,000	Network A: Biomass CHP	Biomass CHP + PV	176	289	47
Dwellings [Whitehills] (500 terraced)	Fylde	Terraced Housing	40,000	Network A: Biomass CHP	Biomass CHP + PV	102	193	50
Dwellings [Whitehills] (500 semi-detached)	Fylde	Semi-Detached Housing	40,000	Network A: Biomass CHP	Biomass CHP + PV	104	196	50
Dwellings [Whitehills] (500 apartments)	Fylde	Apartments	40,000	Network A: Biomass CHP	Biomass CHP + PV	75	142	32
Employment Land 1 (25 Ha) [Whitehills] (25,000m2 office)	Fylde	Offices	25,000	Network A: Biomass CHP	Biomass CHP + PV	65	135	22
Employment Land 1 (25 Ha) [Whitehills] (25,000m2 workshop)	Fylde	Light Industry	25,000	Network A: Biomass CHP	Biomass CHP	91	120	30
Average for Biomass CHP Network area:						91	165	39

Table 40: Indicative CO_2 reductions and capital cost uplift for Network A area of M55 Hub – NOTE: indicative capital cost uplift is expressed as a percentage over the BCIS base build cost. These figures are provided to allow a relative comparison between different technologies and cannot be used to assess viability due to the large number of varying factors affecting viability.

Building Name	Authority	Building Type	Floor Area (m2)	Network Phase	Technology Proposed	% Reduction in CO2		Indicative % Increase in Capital Cost over BCIS Base cost.
						Gross	Over 2006 Part L	
Dwellings [Moss House] (Bennetts Lane/Progress Way) (500 semi-detached)	Blackpool	Semi-Detached Housing	40,000	Network B: Gas CHP	Gas CHP +PV	56	106	45
Dwellings [Yeadon] (Yeadon Way/Progress Way) (500 terraced)	Blackpool	Terraced Housing	40,000	Network B: Gas CHP	Gas CHP +PV	57	108	45
Dwellings [Yeadon] (Yeadon Way/Progress Way) (500 apartments)	Blackpool	Apartments	40,000	Network B: Gas CHP	Gas CHP +PV	33	62	28
Dwellings [Progress] (Progress Way/School Road) (600 semi-detached)	Blackpool	Semi-Detached Housing	48,000	Network B: Gas CHP	Gas CHP +PV	56	106	45
Dwellings [Progress] (Progress Way/School Road) (600 terraced)	Blackpool	Terraced Housing	48,000	Network B: Gas CHP	Gas CHP +PV	57	108	45
Primary school [Yeadon]	Blackpool	Primary School	4,000	Network B: Gas CHP	Gas CHP +PV	78	128	29
Primary school [Progress]	Fylde	Primary School	4,000	Network B: Gas CHP	Gas CHP +PV	78	128	29
Secondary school [Progress]	Fylde	Secondary School	12,000	Network B: Gas CHP	Gas CHP +PV	78	128	29
Local Shops [Progress]	Fylde	General Retail	2,000	Network B: Gas CHP	Network Gas CHP with Absorption Cooling	43	58	17
Pubs & bars	Fylde	Public House	500	Network B: Gas CHP	Gas CHP +PV	62	102	40
Restaurants & cafes	Fylde	Restaurant	500	Network B: Gas CHP	Gas CHP +PV	71	117	32
Other community services buildings	Fylde	Community Buildings	1,000	Network B: Gas CHP	Gas CHP +PV	59	93	32
Employment Land 2 (25 Ha) [Whitehills] (25,000m2 office)	Fylde	Offices	25,000	Network B: Gas CHP	Gas CHP +PV	35	73	19
Employment Land 2 (25 Ha) [Whitehills] (25,000m2 workshop)	Fylde	Light Industry	25,000	Network B: Gas CHP	Gas CHP +PV	78	102	59
Average for Gas CHP Network area:						55	98	40

Table 41: Indicative CO_2 reductions and capital cost uplift for Network B area of M55 Hub – NOTE: indicative capital cost uplift is expressed as a percentage over the BCIS base build cost. These figures are provided to allow a relative comparison between different technologies and cannot be used to assess viability due to the large number of varying factors affecting viability.

5.6 STRATEGIC SITE 2: TALBOT GATEWAY

5.6.1 BACKGROUND AND PROPOSED DEVELOPMENT

Blackpool's Talbot Gateway is a key development area, aiming to create 'an impressive arrival experience' into the town centre, housing major transport links (access via train, bus and coach) as well as providing car parking for visitors by road. The scale of the development is large, with buildings up to14 storeys at the centre of the region, with building heights decreasing towards the periphery of the development to integrate with the existing grain.

A significant amount of land in the area is owned by the Council, creating the opportunity for a well-balanced mixed use development with a range of uses potentially including a supermarket, retail, cafes, hotels, new police headquarters, combined county and magistrates court, new council offices, private sector offices, community uses, residential development and a new square with high quality public realm, and landscaping and the redevelopment of Blackpool North Railway station.

A number of areas of the site are currently derelict and are in urgent need of redevelopment. It is hoped that redevelopment in the Talbot gateway area will also improve the wider area through increased footfall and business opportunities in the region. The figure below shows the current land uses on the Talbot Gateway site and the following photographs show a number of key areas of the development, highlighting the current character of the area.

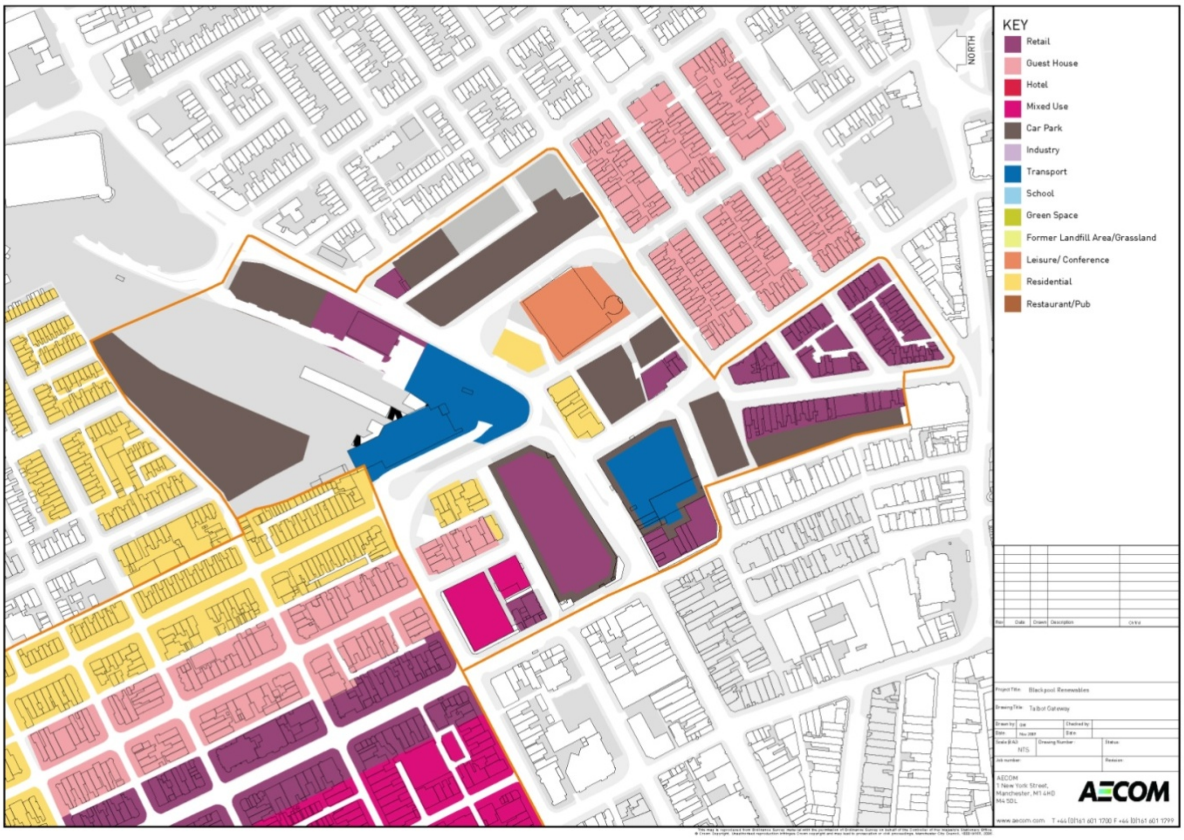


Figure 59: Talbot Gateway existing land use

Figure 60: Typical 2-storey residential properties on the corner of banks Street and Exchange Street

Figure 61: Derelict retail in urgent need of renewal on the corner of Cookson Street and Charles Street

Figure 62: Derelict Rock Club on Cookson Street

Figure 63: Funny girl's nightclub on Dickson Road to be retained

A mixture of uses is proposed for the Talbot Gateway site with a number of Council properties playing a fundamental role in the success of this development in terms of security and drivers for sustainable development. While there is likely to be some change in the floor areas of the various proposed buildings within the development, assumptions have been made based on information available to date on the expected building types and their respective floor areas to allow an illustration of the sorts of renewable technologies that could be used at Talbot Gateway and an indication of their potential CO2 reductions. The assumed development coming forward is summarised the table below as based on information available from Blackpool Council and the Talbot Gateway Public Consultation (Nov 2009).

Building Name	Development/ Redevelopment/Demolition	Building Type	Land ownership	Floor Area (m2)	Phase	Expected Start Year	Expected Completion Year
New supermarket	Development	Supermarket	Council	8,710	1a	2011	2013
Retail development	Development	General Retail	Council	7,343	1a	2011	2013
Residential development (14 residential houses)	Development	Residential apartments / housing	Council	1,400	1a	2011	2013
Doctors surgery as part of general community uses building	Development	-	Council	1,000	1a	2011	2013
12 storey 130 bed hotel	Development	Hotel	Council	9,100	1a	2017	2019
New offices (4 storeys)	Development	Office	Council	4,625	1b	2013	2015
New Council offices (5 storeys)	Development	Office	Private	9,520	1b	2013	2015
New transport interchange	Development	-	Council	-	1b	2013	2015
5 storey 130 bed hotel	Development	Hotel	Council	9,100	2	2015	2017
Prudential Building	Refurbishment and Renewal	Office	Private	4,625	3	2017	2019
End of topping street	Demolition	-	Private	-	3	2017	2019

7 storey 80 bed hotel	Development	Hotel	Private	5,600	4	2019	2021
Wilkinson's	Refurbishment and Renewal	Retail	Private	7,343	4	2019	2021
Redevelopment of Blackpool North Railway Station	Refurbishment and Renewal	-	Other public ownership	2,000	5	2021	2023
14 storey 120 bed hotel	Development	Hotel	Other public ownership	8,400	5	2021	2023
Cafes & Restaurants	Development	Restaurant	Other public ownership	1,817	5	2021	2023
Pubs & Bars	Development	Pub	Other public ownership	1,817	5	2021	2023
Combined County & Magistrates Court Building (5 storey)	Development	Court	Private	7,000	6	2023	2025
New police HQ (4 storeys)	Development	Office	Private	4,625	6	2023	2025

Table 42: Assumed development types for the Talbot Gateway

5.6.2 OPPORTUNITIES, CONSTRAINTS & PROPOSAL

Enhanced energy efficiency - improved fabric and services specifications

Energy efficiency is the fundamental starting point on any development, but this is especially important for improvement areas where retrofitted measures restrict the possibilities for making cost-effective CO2 reductions. Where there is significant new development, as is the case here at Talbot Gateway, minimum energy efficiency standards are already dictated by Building Regulations, ensuring that a reasonable standard of insulation and airtightness is achieved. It is recommended, however, that developments are specified beyond the minimum standards of insulation required under Building Regulations as the first step of the 3 step approach to sustainable building design (be lean, be clean, be green). A well designed building should be able to achieve at least 25-30% beyond the minimum Building Regulation values for insulation and air tightness.

Gas fired Combined Heat and Power (CHP)

Gas CHP is expected to play a significant role in meeting energy requirements at Talbot Gateway. The requirement for heat is large across the relatively small footprint of this development (due to the density of development proposed), therefore the heat densities are high, making a low carbon district heating scheme a very viable opportunity. Combining this with the diversity of daily demands created as a result of mixed uses and the redevelopment of large areas of public realm, the installation of a heat main connecting these buildings to a central energy centre is well justified. The diversified daily demands are created as a result of differing building types demanding heat at different times in the day (e.g. retail areas that are open during the day time and hotels that are predominantly used at night time). This combination of demands helps smooth the demand peaks and reduces the overall heating system capacity required, allowing a smaller system to be installed than would otherwise be required if each building was served by its own individual boiler. This smoothed demand profile reduces payback times (due to reduced capital costs of the heating system) and creates a stable base heat load on which to design and operate a CHP system). Furthermore, retail buildings that have a significant demand for cooling could make use of the low carbon heat by using absorption chillers to provide space heating with typically lower associated CO2 emissions than for a conventional electric chiller. This again stabilises the diversity of the heat demand, providing a demand for heat in the summertime (to supply the absorption chillers) which results in CO2 savings over conventional cooling systems and promotes a shorter payback period for the gas CHP unit.

Solar Water Heating (SWH)

Because of the high suitability for Talbot Gateway to use a low carbon district heating network, it is not recommended that solar thermal systems are installed in this area. Where heat densities do not justify low carbon heat networks (or where infrastructure costs are prohibitively high and cannot be offset against any other scheduled maintenance works), solar thermal systems can be an effective method of significant CO2 reductions when combined with high standards of energy efficiency. However, it would not be cost effective to install both solar thermal systems and a low carbon heat network as the solar thermal system would reduce the demand for domestic hot water and therefore diminish the benefits and the effectiveness of the gas CHP heat network. This would increase capital costs and increase the payback periods for these technologies.

Wind Turbines

Small scale wind turbines are generally regarded as ineffective both in terms of generating a useful amount of energy and offering attractive payback periods due to inefficiencies at a small scale and turbulent air in built-up residential areas. The high density and urban nature of the Talbot Gateway site makes it unsuitable for wind turbines of any scale. It could be feasible to install one or more wind turbines on the roofs of the 12 and 14 storey hotels, however the contribution they would make compared to the low carbon heat network would be miniscule and it is suggested that funds would be better invested in a low carbon heat network.

Photovoltaics (PV)

PV panels are highly flexible in that they operate almost completely independently of other renewable technologies. While the savings achievable are relatively small in comparison to technologies such as gas CHP and biomass, the contribution made by PV cannot be ignored and this technology should be considered where building design permits suitable mounting positions. It is recommended that PV arrays be considered, particularly for electrically intense buildings such as offices, where the benefits of low carbon heating are smaller than for buildings with higher heat demand such as hotels. The development should seek to optimise the positioning of PV arrays to obtain a southerly orientation and in a location that minimises overshading from surrounding buildings. Where this optimisation involves coordination between developers, Blackpool Council should assist in this coordination to ensure the best possible result (e.g. it may be more beneficial to mount PV panels on the unshaded higher hotel roofs but connect these arrays to an adjacent office building that may otherwise fall short of CO2 reduction targets for development on this site). The Government's proposed Feed in Tariff is likely to assist in the uptake of PV panels, ultimately increasing demand and driving down capital costs.

Ground Source Heating (GSHP)

Ground source heating systems are not recommended at Talbot Gateway as any ground-coupled installations would detract from the benefits of a gas CHP heat network. The high density of development also leaves very little land to locate bore holes for the ground loops, therefore restricting the overall capacity that could be installed. Buildings designed to be operated from a ground source heat pump generally make use of low temperature heating systems (e.g. underfloor heating) to maximise the benefits of the ground coupled system. The installation of a specific heating emitter type (such as underfloor heating) may affect the future viability of connecting a building to a heat network and therefore should be avoided to allow maximum CO2 reductions to be achieved both now and in the future.

Biomass heating and CHP

While biomass would be ideally suited to a high density development using a shared heat network, there are a number of issues that prevent biomass from being feasible as the main heating fuel at Talbot Gateway. The main reasons for this are:

- High density development means fuel storage is likely to be limited

- Pedestrian-only areas and revived public gateways don't lend themselves well to regular biomass deliveries from large vehicles
- Blackpool's biomass resource is limited and so any biomass that is available is better used in areas nearer to the M55 with better access and storage facilities.

Hydro

There are no potential hydro schemes identified in the Talbot Gateway area. Blackpool's tidal resource could be considered but is better exploited as part of a solution linked to Promenade developments or as a standalone solution that is completely independent from development onshore.

Summary - Opportunities and constraints for low and zero carbon technologies

High standards of energy efficiency must be the starting point for the Talbot Gateway development; developments should be aiming to improve upon the minimum insulation and airtightness standards set out in Part L of the Building Regulations by at least 25%. On a cost per tonne of CO2 basis, energy efficiency should offer the greatest benefits for a small increase in capital cost of a Building Regulations compliant building.

The main potential feature identified for Talbot Gateway is a gas CHP heat network which would ultimately connect all of the buildings that form this development with the possibility of extending this network beyond the site red line into other areas (e.g. an extension of the network onto High Street of the North Beach area). Extension of this network would allow substantial CO2 reductions in areas such as North Beach, with reduced capital costs as a result of the infrastructure that would already be present at Talbot Gateway. This would present a significant opportunity to reduce the CO2 emissions of the existing building stock.

The network illustrated in the figure below is expected to develop in 3 phases as represented by the green, blue and red illustrated heat mains for phases 1, 2 and 3 respectively. Phases 2 and 3 could then be extended into the North Beach area once the Talbot Gateway development reaches a suitable stage in the construction process following the connection of the new transport interchange and food and drink establishments to the north of Blackpool North Railway Station. The retrofitting of heat exchangers and heat meters on High Street should be scheduled at a time where boilers would otherwise be replaced in this area to allow this capital cost to be absorbed against the replacement cost of a conventional house boiler system.

Building types that have particularly high electrical loads should also make use of Photovoltaic panels and these should be sited in the best possible positions on the Talbot Gateway site considering orientation, overshading from surrounding buildings & structures and access for maintenance. Owners, occupiers and developers should be made aware of the Government's proposed Feed in Tariff expected in April 2010 and the financial benefits that could arise from installing PV cells on a property. The added value of this income source could increase the end value of the development therefore allowing a developer to invest in PV at little additional cost.
The figure below shows an illustration of how a heat network may be routed in line with the proposed phasing at Talbot Gateway. The map shows three key network development stages with the potential to extend beyond the red line into the North Beach area once heat mains are installed in the northern part of Talbot Gateway.

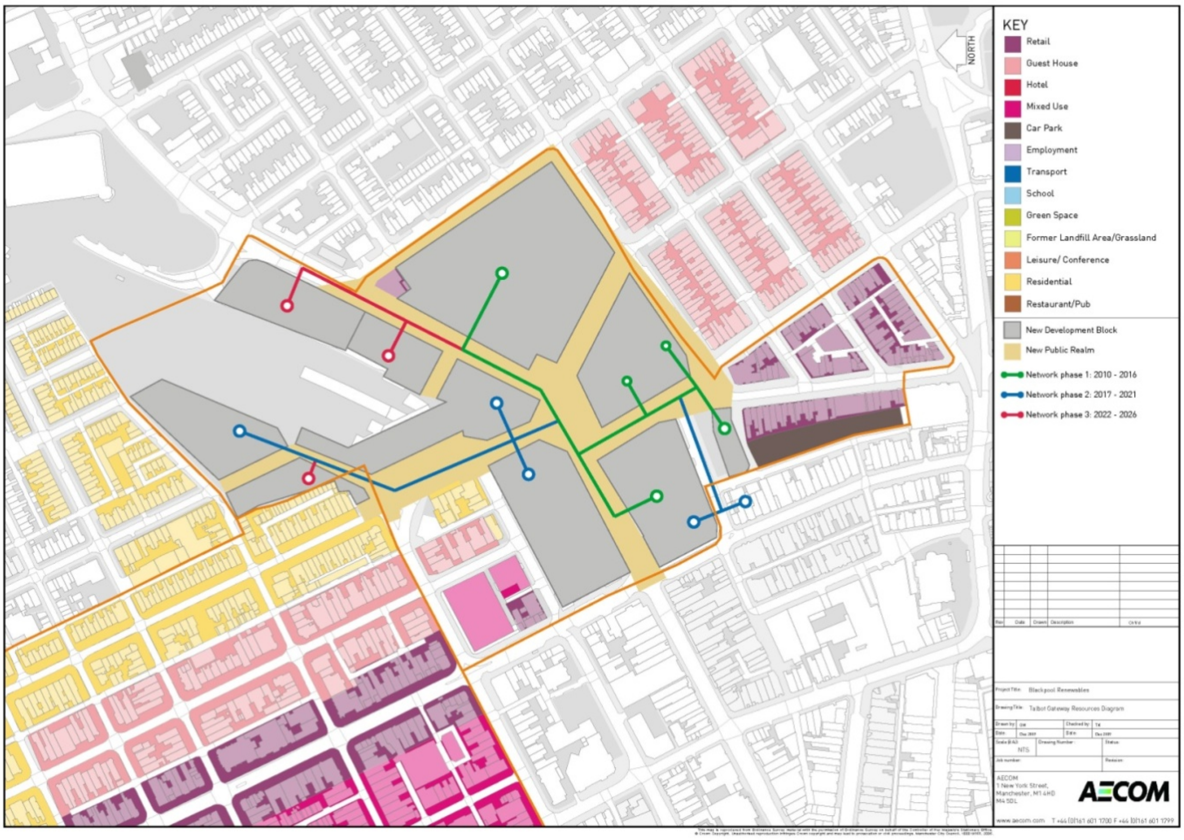


Figure 64: indicative proposals for low carbon technologies at Talbot Gateway

Table 43 shows the potential CO2 reductions achievable at Talbot Gateway for the proposed new development. These indicative figures are based on the assumption of a phased heat network as shown in the figure above.

Building Name	Development/ Redevelopment/ Demolition	Building Type	Land ownership	Floor Area (m2)	Technology Proposed	% Reduction in CO2		Indicative % Increase in Capital Cost over BCIS baseline cost
						Gross	Over 2006 Part L	
New supermarket	Development	Supermarket	Council	8,710	Network Gas CHP	5	7	13
Retail development	Development	General Retail	Council	7,343	Network Gas CHP with Absorption Cooling	35	47	22
Residential development (14 residential houses)	Development	Residential apartments / housing	Council	1,400	Network Gas CHP + PV	57	108	46
Doctors surgery as part of general community uses building	Development	Clinic	Council	1,000	Network Gas CHP + PV	59	93	32
12 storey 130	Development	Hotel	Council	9,100	Network Gas	69	78	43

bed hotel					CHP + PV			
New offices (4 storeys)	Development	Office	Council	4,625	Network Gas CHP + PV	35	73	19
New Council offices (5 storeys)	Development	Office	Private	9,520	Network Gas CHP + PV	35	73	19
5 storey 130 bed hotel	Development	Hotel	Council	9,100	Network Gas CHP + PV	69	78	43
7 storey 80 bed hotel	Development	Hotel	Private	5,600	Network Gas CHP + PV	69	78	43
14 storey 120 bed hotel	Development	Hotel	Other public ownership	8,400	Network Gas CHP + PV	69	78	43
Cafes & Restaurants	Development	Restaurant	Other public ownership	1,817	Network Gas CHP + PV	71	117	32
Pubs & Bars	Development	Pub	Other public ownership	1,817	Network Gas CHP + PV	45	73	27
Combined County & Magistrates Court Building (5 storey)	Development	Court	Private	7,000	Network Gas CHP + PV	35	57	19
New police HQ (4 storeys)	Development	Office	Private	4,625	Network Gas CHP + PV	35	73	19
Aggregate for Talbot Gateway site:						40	56	25

Table 43: Indicative CO_2 reductions and capital cost uplift for Talbot Gateway – NOTE: indicative capital cost uplift is expressed as a percentage over the BCIS base build cost. These figures are provided to allow a relative comparison between different technologies and cannot be used to assess viability due to the large number of varying factors affecting viability.

5.7 STRATEGIC SITE 3: FOXHALL

5.7.1 BACKGROUND AND PROPOSED DEVELOPMENT

Foxhall has traditionally been one of Blackpool's most successful areas in the tourism market, with shops, entertainment and guesthouses within close access to the main town centre attractions. Since the overall decline in UK tourism over recent decade, this area has suffered a loss of trade and consequently the building stock has fallen into poor condition with a number of guesthouses now serving as Homes in Multiple Occupation (HMOs).

The vision is to transform Foxhall from a declining resort area into a thriving mixed use neighbourhood. To the south of Princess Street there is a strong emphasis on redevelopment to create new neighbourhood offering high quality and sustainable buildings, streets and new spaces. In Foxhall Village to the north, there is a more mixed approach that seeks to conserve the best and replace poorer quality buildings, with an increasing emphasis on quality businesses, including accredited guest houses, high quality hotels, tourism and leisure uses which sustain year round activity. These would be complemented by safe and attractive residential streets (through property upgrading and renewal; and public realm improvements). The figure below shows the current land use in the Foxhall region and the photographs below show an image of York Street - a traditional guesthouse street in Foxhall.

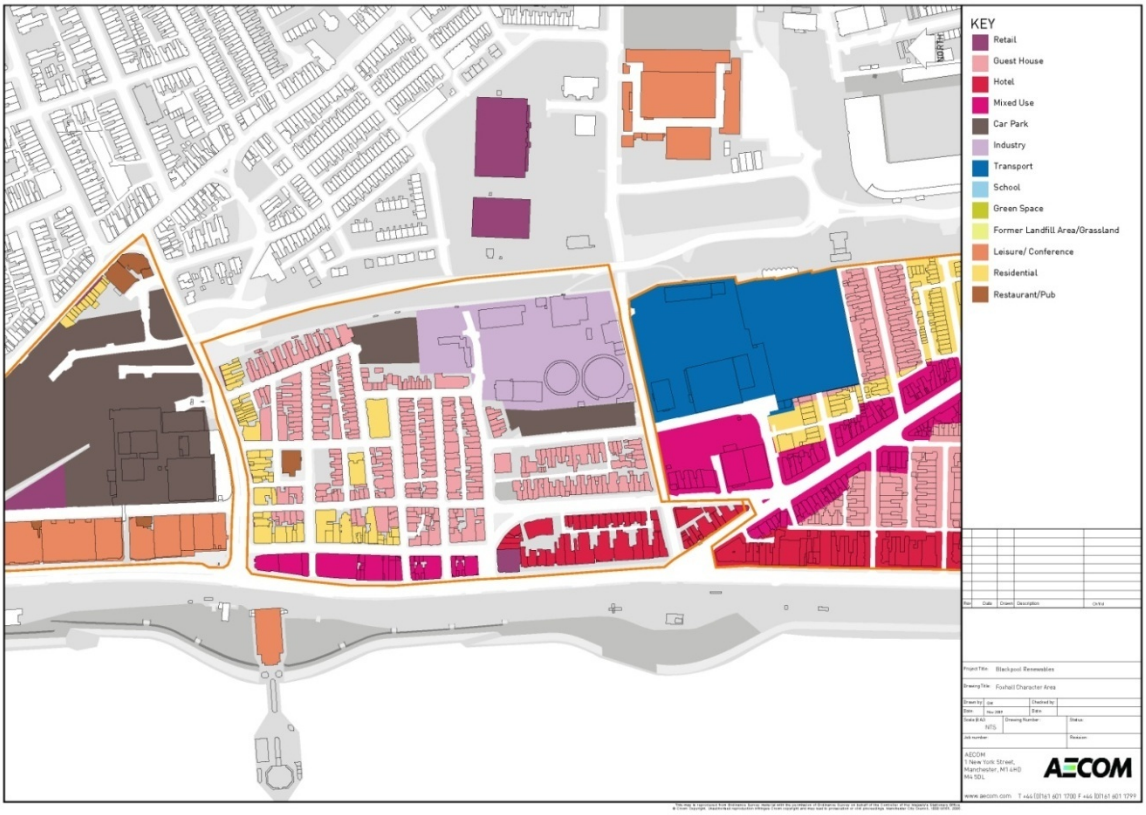


Figure 65: existing land use

Figure 66: Traditional street of guesthouses in Foxhall

The Foxhall Area Action Plan outlines nine key sub-areas with Foxhall, each representing a different character of existing use and each having a separate vision for redevelopment and improvement. These key areas are broken down as follows:

1. Foxhall Square Development: Creation of a new pedestrian-friendly hub with a mixture of improvements to existing stock and mixed-use redevelopment
2. Residential South: Comprehensive redevelopment to create a major new owner-occupied residential neighbourhood, with a mix of high quality family homes and apartments, attractive streets and green spaces.

3. Manchester Square Development: Key gateway area both within Foxhall (connecting the Residential South region to the Promenade along with Foxhall Square) and to the wider area (forming a key gateway to along Lytham Road with South Beach). Building types are expected to be ground floor commercial with residential apartments above.
4. Promenade South: Improvements to existing large seafront hotels in line with surrounding regeneration.Some redevelopment may be appropriate.
5. Guesthouse Clusters: Conservation-led and improvements to traditional guesthouses with an emphasis on family accommodation. These streets would lie at the heart of a new Conservation Area.
6. Promenade North: Currently characterised by declining or defunct businesses. This area is expected to benefit from comprehensive commercial redevelopment as a result of the anticipated major leisure development on the Central Station site.
7. Chapel Street: Also heavily dependent upon development at the Central Station site, Chapel Street is expected to see mixed use development of tourism-related commercial uses and residential apartments. A number of key buildings will be retained and improved.
8. Residential North: Predominantly poor quality residential at present with a number of ex-guesthouses that have become HMOs. Redevelopment and improvement is expected to convert these properties back into lawful residential apartments and houses.
9. Shannon Street: The Car Park provides the opportunity to combine new residential development with a split level car park for residents and visitors with improved access to Seasiders Way. The existing substation is expected to be retained on site but visually improved.

The main area of development that is considered in this study is the major residential development in sub-region 2, however reference will be made to renewable technologies suitable in other sub-regions within Foxhall. A summary of the expected development is shown in the table below.

Building Name	No.	Sub-Region	Development/ Redevelopment / Demolition	Building Type	Floor Area (m2)	Expected Start Year	Expected Completion Year
Part of sub-area 2 redevelopment plans	1	Foxhall Square	Redevelopment	Residential	-	2012	2017
Site A - 80 dwellings	2	Residential South	Redevelopment	Residential apartments	5,850	2012	2017
Site B - 144 dwellings	2	Residential South	Redevelopment	Residential terraces	13,464	2012	2017
Site C - 70 dwellings	2	Residential South	Redevelopment	Residential terraces	7,025	2012	2017
Site D - 70 dwellings	2	Residential South	Redevelopment	Residential apartments	5,140	2012	2017
Site E - 17 dwellings	2	Residential South	Redevelopment	Residential apartments	1,178	2012	2017
Site F - 13 dwellings	2	Residential South	Redevelopment	Residential apartments	923	2012	2017
Site H - 34 dwellings	2	Residential South	Redevelopment	Residential apartments	2,536	2012	2017
Part of sub-area 2 redevelopment plans	3	Manchester Square	Redevelopment	Residential	-	2012	2017
Redevelopment of sea-front hotels as part of sub-area 2 residential plans	4	Promenade South	Redevelopment	Hotels	-	2012	2017

Conservation of traditional guesthouses	5	Guesthouse Clusters	Conservation & Improvements	Hotels	-	2012	2024
Likely to form part of Central Station site development of high quality commercial uses	6	Promenade North	Redevelopment	Mixed commercial	-	2012	2024
Part of Central Station site development but used as attractive link to Foxhall	7	Chapel Street	Redevelopment & Conservation / Improvements	Mixed commercial & Residential	-	2012	2024
Residential	8	Residential North	Conservation & Improvements	Residential	-	2012	2024
Residential + Car Parking	9	Shannon Street	Development	Residential + Car Parking	TBC	2017	2024

Table 44: Assumed development types

5.7.2 OPPORTUNITIES, CONSTRAINTS & PROPOSAL

Enhanced energy efficiency - improved fabric and services specifications

Energy efficiency is the first place to focus attention on any new development, but this is especially important for improvement areas where retrofitted measures restrict the possibilities for making cost-effective CO2 reductions. The major development at Residential South will require a minimum standard of energy efficiency as dictated by Building Regulation Part L. It is recommended, however, that the Residential South development is specified beyond the minimum standards of insulation required under Building Regulations as the first step of the 3 step approach to sustainable building design (be lean, be clean, be green). A well designed building should be able to achieve at least 25-30% beyond the minimum Building Regulation values for insulation and air tightness. Improved energy efficiency standards are especially important for residential developments where heat demand is generally high.

Gas fired Combined Heat and Power (CHP)

Gas CHP is expected to be the main potential low carbon technology in use at Foxhall. The proposed new residential development at Residential South provides a substantial demand for heat with dwelling densities sufficient to justify the installation of a community heat network. The scale of proposed development in this sub-region creates an ideal opportunity for installing the infrastructure required for a district heating system and gas CHP is expected to be the most feasible technology for supplying heat to this network. Proximity to the existing substation adjacent to the proposed residential site may also enhance this opportunity and minimise costs associated with exporting electricity to the grid. The substation site would therefore be an ideal location for a district energy centre and could also form part of the works to improve the aesthetics of this sub-region in line with Foxhall's regeneration and vision for the overall area.

Hotels located towards the south west of the Foxhall region in the Manchester Square and Promenade South sub-regions are also ideally located for extension to either the proposed South Beach Heat network along Lytham Road, or an extension to the new Residential South heat network. The suitability of these buildings for connecting to an adjacent heat network will be dependent upon the scale of redevelopment and improvement in this area. Where it is decided that only small fabric improvements will be made, it may not be viable to adapt these properties for connection to a heat network. However if the redevelopment in these areas include the modernisation of building services, this would create an ideal opportunity to replace individual building boilers with heat exchangers and heat meters for connection to a district heat main. Where this connection can be incorporated into other development works, the capital cost associated with this heat network connection is likely to be relatively small, making this technology good value per tonne of CO2 saved.

The Promenade North and Chapel Street sub-regions are expected to be redeveloped in accordance with the large-scale development on the adjacent Central Station site. These sub-regions are therefore ideally suited to forming an extension of the district network serving the buildings on this site. The mix of uses proposed on the Central Station site would be complemented well by tourism and residential uses proposed in the Promenade North and Chapel Street sub-regions.

Residential and guesthouse areas towards the centre of Foxhall are potentially suited to a heat network connection depending upon the scale of improvements made in these areas. Where it is decided to make only small improvements, connection to an adjacent heat network is likely to be unviable, however if these areas are subject to substantial redevelopment, this creates an opportunity to connect to an adjacent heat network at reduced capital cost as some of the cost can be offset against works that would otherwise have been carried out.

Solar Water Heating (SWH)

Because of the suitability and expected predominance of district gas CHP in the Foxhall area, it is not recommended that solar thermal systems are installed. Solar thermal systems can be an effective method of significant CO2 reductions when combined with high standards of energy efficiency, however it would not be cost effective to install both solar thermal systems and a low carbon heat network as the solar thermal system would reduce the demand for domestic hot water and therefore diminish the benefits and the effectiveness of the gas CHP heat network.

Wind Turbines

Small scale wind turbines are generally regarded as ineffective in terms of both generating a useful amount of energy and offering attractive payback periods due to inefficiencies at a small scale and turbulent air flows in built-up residential areas. The Promenade area adjacent to Foxhall includes the South Pier and a headland located at the end of Rigby Road where a number of wind turbines could potentially be sited. Trials of Promenade wind turbines have already taken place in other areas of the Promenade at Blackpool with reasonable success. Promenade-mounted wind turbines make use of relatively high wind speeds from the Irish Sea as well as qualitative benefits associated with promoting renewable energy as a feature at Blackpool. It should be noted however that the CO2 reductions associated with a small number of Promenade-mounted turbines is likely to be substantially less than the savings that could be achieved from gas CHP network. Any wind turbines that are located on the Promenade would have to be directly connected via private wire to the Foxhall development in order for associated CO2 emissions savings to be offset against these buildings for the purposes of Building Regulations and consequently BREEAM and Code for Sustainable homes assessments.

Photovoltaics (PV)

PV panels are highly flexible in that they operate almost completely independently of other renewable technologies. While the savings achievable are relatively small in comparison to technologies such as gas CHP, the contribution made by PV cannot be ignored and this technology should be considered where building design permits suitable mounting positions. The proposed residential properties in the Residential South sub-region of Foxhall should be sympathetically designed to accommodate south-facing Photovoltaic panels avoiding overshading from surrounding buildings. The Government’s proposed Feed in Tariff is likely to assist in the uptake of PV, ultimately increasing demand and driving down capital costs. The Feed in Tariff payments made for Photovoltaic panels will contribute significantly to reducing residents’ energy bills, creating an ideal basis for affordable housing.

PV panels should also be considered in improvement areas where the scale of works is limited. PV panels are relatively easy to retrofit and Feed in Tariff payments for Photovoltaics are highest for retrofitted installations helping to offset the higher capital costs associated with inverters and other electrical equipment required to connect a Photovoltaic system.

Ground Source Heating (GSHP)

Ground source heating systems are not recommended at Foxhall as any ground-coupled installations would detract from the benefits of a gas CHP heat network which is expected to be viable based on the proposed development. Buildings designed to be operated from a ground source heat pump generally make use of low temperature heating systems (e.g. underfloor heating) to maximise the benefits of the ground coupled system. The installation of a specific heating emitter type (such as underfloor heating) may affect the future viability of connecting a building to a heat network and therefore should be avoided. Potential investment into ground source heating would be better spent on connecting to a nearby district heating network than on a ground source system.

Biomass heating and CHP

While biomass would be ideally suited to a major residential development using a shared heat network, biomass isn't suitable for use as the main fuel due to Blackpool's limited biomass resource and restricted access for fuel deliveries in the Foxhall area. It may be feasible for a number of individual biomass units, however it is recommended that funds would be better spent on investment in a nearby gas CHP network.

Hydro

There have been no potential hydro schemes identified in the immediate surrounding area, however there is a potential tidal energy resource on Blackpool's beach. Further investigation would be required to assess the feasibility of a tidal energy system, including details of optimum north/south location, distance out from the shoreline and the particular energy harnessing method used. Any proposed tidal energy scheme would have to be designed and installed to be sympathetic to marine wildlife and visual impacts which may affect tourism in the area. A tidal energy system must also consider issues relating to sand movement and appropriate distribution means for transportation of energy back to the shore and into the electricity grid. It should also be noted that an offshore tidal energy system is not likely to be counted as part of a building's Building Regulation CO2 emissions and therefore wouldn't help improve the BREEAM or Code for Sustainable Homes score, however any reduction in CO2 emissions could be used as part of Blackpool's Local Authority targets.

Summary - Opportunities and constraints for low and zero carbon technologies

High standards of energy efficiency should be the starting point for any new development or improvement works. New developments should aim to improve upon the minimum insulation and airtightness standards set out in Part L of the Building Regulations by at least 25%. On a cost per tonne of CO2 basis, energy efficiency should offer the greatest benefits for a small increase in capital cost over a Building Regulations compliant building.

The main potential feature identified for Foxhall is a gas CHP district heating network for the proposed new residential development in the Residential South sub-region and potential extensions to adjacent heat networks at the Central Station site and at South Beach. District heat networks supplied by gas-fired CHP units are expected to create significant CO2 savings at Foxhall for new development and crucially for the existing building stock for which it is traditionally difficult to achieve substantial CO2 savings. The extent to which the CO2 emissions associated with the existing building stock can be reduced will be dependent upon the scale of improvements proposed and whether these improvements justify the connection to a district heating network.

Photovoltaic panels should be considered for all new build elements and residential properties should be designed to allow for south-facing PV arrays to be installed in unshaded areas. PV should also be considered as a retrofit solution to properties that are to undergo fabric improvements. Blackpool Council should publicise the benefits to owners and occupiers of the new Feed in Tariff expected in April 2010 which creates a financial incentive for the generating renewable electricity.

The figure below shows an illustration of how a heat network may be routed in line with the proposed redevelopment and improvements at Foxhall. The map shows a key heat network area for the new residential properties at Residential South, Residential North and Shannon Street, as well as potential network expansion areas at Manchester Square, Promenade South, Promenade North and Chapel Street with additional potential connections for retained buildings at Residential North and the Guesthouse Clusters.

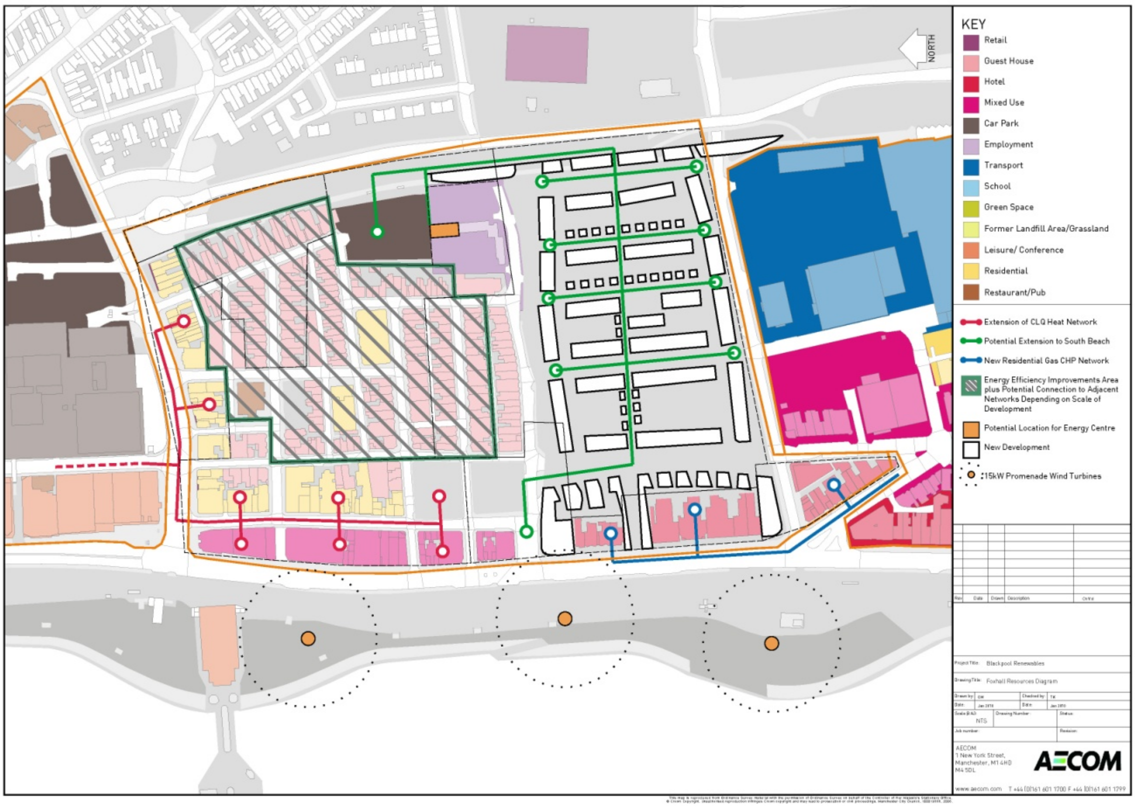


Figure 67: indicative proposals for low carbon technologies at Foxhall

Table 45 shows the potential CO2 reductions achievable at Foxhall for the proposed residential redevelopment at Residential South. The scale of redevelopment in other sub-regions is still largely undefined at this stage and so has not been considered in these calculations.

Building Name	Development/ Redevelopment/ Demolition	Building Type	Sub-Area	Floor Area (m2)	Technology Proposed	% Reduction in CO2		Indicative % Increase in Capital Cost over BCIS baseline cost.
						Gross	Over 2006 Part L	
Site A - 80 dwellings	Re-development	Residential apartments	South	5,850	Gas CHP +PV	33	62	28
Site B - 144 dwellings	Re-development	Residential terraces	South	13,464	Gas CHP +PV	57	108	45
Site C - 70 dwellings	Re-development	Residential terraces	South	7,025	Gas CHP +PV	57	108	45
Site D - 70 dwellings	Re-development	Residential apartments	South	5,140	Gas CHP +PV	33	62	28
Site E - 17 dwellings	Re-development	Residential apartments	South	1,178	Gas CHP +PV	33	62	28

Site F - 13 dwellings	Re-development	Residential apartments	South	923	Gas CHP +PV	33	62	28
Site H - 34 dwellings	Re-development	Residential apartments	South	2,536	Gas CHP +PV	33	62	28
Aggregate for Residential South development:						47	88	38

Table 45: Indicative CO2 reductions and capital cost uplift for new development at Foxhall – NOTE: indicative capital cost uplift is expressed as a percentage over the BCIS base build cost. These figures are provided to allow a relative comparison between different technologies and cannot be used to assess viability due to the large number of varying factors affecting viability.

5.8 STRATEGIC SITE 4: SOUTH BEACH

5.8.1 BACKGROUND AND PROPOSED DEVELOPMENT

The South Beach area of Blackpool is another victim of declining tourism in the UK, with a large number of guesthouses turning into HMOs and falling into disrepair. The South Beach Area Action Plan separates the area into 10 sub-areas, each with a key character and role to play. A number of proposals are currently out for public consultation with options ranging from minor renovation works to complete redevelopment of sub-areas.

The options taken forward aim to tackle established issues of deprivation which include poor health, unemployment and a lack of engagement with the community. The development options are likely to include an adjustment in the mix of building types to realign these building types with current demands. The development is likely to reduce the amount of holiday accommodation and increase the number of residential units as well as increasing employment opportunities that are not wholly dependent upon seasonal tourism. There is, however, still an aspiration to retain some of the holiday accommodation in the area, with proximity to the seafront and the new promenade headlands giving this region a better potential future. This holiday accommodation is expected to develop in tandem with increased activity on the Promenade “capitalising on the light and sounds of the busy commercial seafront”.

The northern end of the South Beach region borders with Foxhall, where there is expected to be significant redevelopment of the housing stock in this area. This creates a potential opportunity for redevelopment of existing stock in the northern region of South Beach as part of the Foxhall development works. The southern areas of this region borders Blackpool Pleasure Beach, but the current entrance to the Pleasure Beach in this region is underused and could benefit from redevelopment. Improvements to Pleasure Beach access from the north is likely to benefit hotels and services located in the South Beach area as the transition between these two areas becomes more seamless.

Existing land uses at South Beach are shown in the figure below. There are clearly key corridors of use types which follow the main access routes in the region. These are:

- Hotel uses on the promenade
- Mixed uses (predominantly retail) on Lytham Road and Waterloo Road
- Guesthouses on infill streets to the north
- Mixed use on infill streets to the south, predominantly residential but with smaller guest house clusters

Figure 68 provides a representation of the character of the South Beach area and predominant land uses..

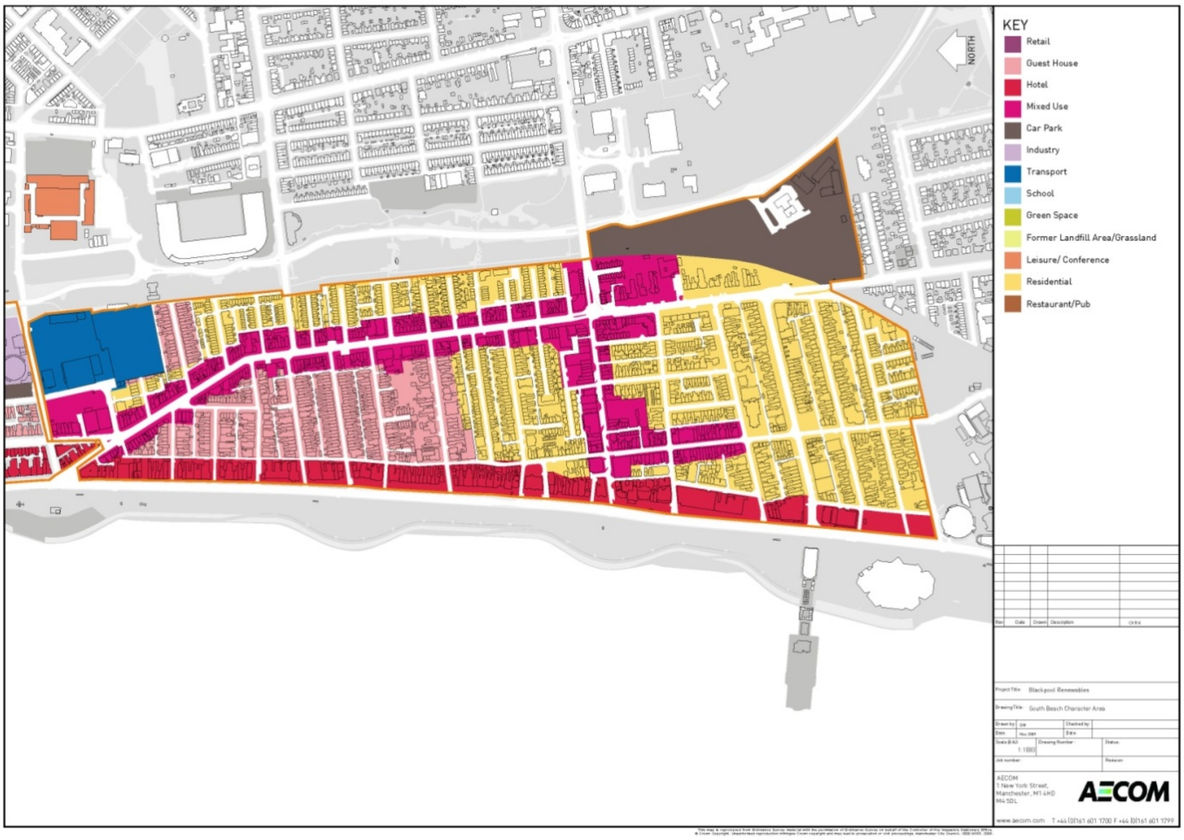


Figure 68: Existing land use

The potential development assumed to be coming forward for this study is summarised in the table below.

Building Name	**Sub-Region**	**Development/ Redevelopment / Demolition**	**Building Type**	**Floor Area (m2)**
Details from SHLAA - 200 residential apartments on seafront	The Promenade	Redevelopment	Residential Apartment	12,000
Redevelopment of hotels on Promenade between Headlands and Burlington Road	The Promenade	Redevelopment	Hotel	50,000

Table 46: Proposed Development

5.8.2 OPPORTUNITIES, CONSTRAINTS & PROPOSAL

Enhanced energy efficiency - improved fabric and services specifications

High standards of energy efficiency should be the first step to reducing CO2 emissions associated with operational energy as this is almost always the easiest and cheapest way of reducing energy consumption. This is the case for areas that are expected to undergo redevelopment (although the minimum standards for energy efficiency are defined by Building Regulations) as well as areas that are to be retrofitted with improvements. Energy efficiency is always seen as the first place to focus attention on any development, but this is especially true for redevelopments. Here, a large number of other factors are already constrained and are likely to be expensive to replace and upgrade unless such works can be carried out as part of a scheduled maintenance programme. Fabric improvements to the existing stock are likely to reduce CO2 emissions substantially in the South Beach area, where heat density is high due to the predominance of residential and guesthouse uses.

Gas fired Combined Heat and Power (CHP)

The heat density at South Beach creates a viable proposition for community based gas CHP which offers substantial CO2 emissions reductions. The current levels of uncertainty over the scale of redevelopment, however, doesn't allow a potential community CHP scheme to be proposed with any certainty as the capital costs associated with retrofitting a community CHP system would be prohibitively high. However where a community CHP scheme could be proposed in conjunction with infrastructure redevelopment and building improvements in the surrounding area, some of the capital cost could be offset against other infrastructure and improvement works.

The largest potential for community CHP schemes are in areas where daily loads are diversified through mixed uses. In particular, these regions lie on the main transport routes around Lytham Road, Waterloo Road and the Promenade. Daily demands are diversified through connection to a mix of retail, residential and hotel uses in these areas. The cost effectiveness for these areas could be improved if heat mains could be installed in coordination with roadway maintenance. Smaller heat distribution pipework could then be installed on minor streets spurring off from the larger heat mains. These smaller spurs could be scheduled in conjunction with other roadway maintenance/infrastructure works and when sufficient end users are identified and converted to accept a district heating connection.

Solar Water Heating (SWH)

Solar thermal collectors are typically sized to supply 50% of the annual domestic hot water demand for a building, depending on restrictions on the roof area. Solar hot water systems generally should not be used in conjunction with other low carbon heating systems (such as CHP) as this reduces the financial viability of both systems as they compete and conflict with each other. Where heat densities do not justify low carbon heat networks (or where infrastructure costs are prohibitively high and cannot be offset against any other scheduled maintenance works) microgeneration solutions should be combined with improved insulation standards. Solar thermal collectors are relatively simple and easy to install and provide tangible savings in gas bills for homeowners. With the introduction of the renewable heat incentive in April 2011, it is expected that a significant number of homes will begin to consider installing such technologies. Blackpool Council should proactively promote this upcoming scheme and provide technical assistance and reassurance where possible to ensure that as many solar thermal systems are installed as possible in areas that are unsuitable for connection to a heat network in the short to medium term. Solar thermal systems are ideally suited to guesthouses and hotels where the demand for domestic hot water is high. A solar thermal collector on the roof of a typical Blackpool guesthouse should be able to supply around 50% of the annual hot water demand.

Wind Turbines

Small scale wind turbines are generally regarded as ineffective both in terms of generating a useful amount of energy and offering attractive payback periods due to inefficiencies at a small scale and turbulent air in built-up residential areas. Large scale wind however is generally accepted as being one of the most cost-effective means of offsetting

CO_2 emissions, albeit at a scale that is limited by the location of sufficient wind speeds and sufficient distance from surrounding properties.

It is not considered feasible to install wind turbines within the main residential streets of the South Beach area, however the Promenade provides an ideal location for wind turbines in terms of wind speeds, distance from residential properties and implementing a solution that creates a visible statement for Blackpool.

A number of Proven turbines have been trialled on the Promenade near to the Solaris Centre at Blackpool and early indications suggest that wind speeds offer the potential for relatively high energy yields given their limited size and peak capacity. With the Government's upcoming Feed in Tariff scheme, payments of 23p/kWh are expected for energy generated by wind turbines between 1.5kW and 15kW in capacity. This additional income is likely to reduce payback times significantly from previously, making Promenade wind turbines an appealing option. It is estimated that six 15kW wind turbines could save around 100 tonnes CO_2 per year.

Photovoltaics (PV)

Photovoltaic cells are a highly versatile installation being arguably the easiest technology to retrofit, with little consideration required for existing building services systems within a building. The high CO_2 emissions factor associated with grid-displaced electricity benefits PV in terms of CO_2 reductions making them a very cost-effective resource per tonne of CO_2 saved, despite their capital costs still remaining high at present. The Government's proposed Feed in Tariff is likely to see a large surge in demand for PV arrays, particularly for retrofit installations, where the proposed tariff payments are highest (36.5p/kWh generated for a retrofitted PV array <4kWp). The increased demand for PV installations should drive a reduction in capital costs and therefore encourage further uptake of the technology.

PV arrays are particularly appealing for lower density housing or areas that aren't feasible or viable for low carbon heating networks. Typically, a domestic installation could be fitted for less than £10,000 with minimal maintenance and an expected payback time of around 10-12 years with Feed in Tariff payments. The 2 and 3 storey properties that are predominant in the South Beach area should have sufficient roof area to accommodate a substantially-sized domestic PV system. Properties lying on streets perpendicular to the promenade are particularly well suited to PV or solar thermal technologies because of the orientation of their roofs to the south. A large number of properties in the South Beach area are orientated on this axis. Properties located on the promenade, Bond Street and Lytham Road, however are likely to require additional supports to ensure that solar technologies are orientated towards the south (or at least within 45˚ of the southerly direction).

Because of the relative ease of exporting excess generated electricity compared to exporting excess generated heat, Photovoltaic cells can be installed independently of any other low carbon technology to provide additional CO_2 reductions. This contrasts with solar hot water systems, where these should not be combined with other technologies providing low carbon heat.

Ground Source Heating (GSHP)

Ground source heating systems are unlikely to be viable for the South Beach area where open land is relatively limited and the buildings already have a heating system installed which isn't likely to be directly compatible with a low temperature heating source. Furthermore, where the scale of development for the area as a whole is relatively small (with a large proportion of the region benefiting only from retrofitted improvements rather than complete redevelopment), it is not possible to locate the necessary number of ground loops within the ground area available.

Ground-coupled systems could potentially be installed in areas of redevelopment on the Promenade, however it is recommended that low carbon heat network solutions are prioritised over GSHP solutions as a more cost effective measure offering higher reductions in CO_2 emissions and greater potential for allowing CO_2 emissions reductions in the existing building stock.

As a retrofit solution, ground source systems are generally unviable due to high groundwork costs and prohibitive costs of changing heating emitters within the building. As a redevelopment solution, ground source systems may be feasible depending on local ground conditions and the proposed use of the mill building.

Biomass Heating and CHP

Biomass heating is extremely effective in reducing CO2 emissions because of the biomass absorbed by the wood fuel during its lifetime as a growing plant. Facilities for delivery and storage are essential for a biomass-fuelled system to be operated and managed effectively. The properties in the South Beach area are generally confined in terms of street access for biomass fuel deliveries as well as space for secure storage areas. The biomass resource potential in Blackpool is limited and the small potential supply that is available is better used for areas with improved transport access and located nearer to the main vehicle access route on the M55 motorway. As such, it is not recommended that large scale biomass heating is introduced in the South Beach area, although this isn't to say that a small number of individual biomass heating systems could be used to reduce the CO2 emissions of a small number of dwellings or guesthouses. Biomass CHP is generally only suitable for large heat networks where the peak demand for heat is at least several Megawatts. Due to a lack of supply, it is not recommended that Biomass CHP be considered for the South Beach area.

Hydro

There have been no potential hydro schemes identified in the immediate surrounding area, however there is a potential tidal energy resource on Blackpool's beach. Further investigation would be required to assess the feasibility of a tidal energy system, including details of optimum north/south location, distance out from the shoreline and the particular energy harnessing method used. Any proposed tidal energy scheme would have to be designed and installed to be sympathetic to marine wildlife and visual impacts which may affect tourism in the area. Any tidal energy system must also consider issues relating to sand movement and a distribution system for the transportation of energy back to the shore and into the electricity grid. It should also be noted that an offshore tidal energy system is not likely to be counted as part of a building's Building Regulation CO2 emissions and therefore wouldn't help improve the BREEAM or Code for Sustainable Homes score, however any reduction in CO2 emissions could be used as part of Blackpool's Local Authority targets.

Summary - Opportunities and constraints for low and zero carbon technologies

Improvements to insulation standards should be the first step towards reducing energy consumption and CO2 emissions for the South Beach area. The residential and guesthouse uses in the area mean that the demand for heat is significant, resulting in improved energy standards making substantial savings in CO2 emissions. These improvements should be taken forward through a combination of loft insulation and cavity wall insulation (or solid wall insulation where applicable) as well as an education programme for local residents and guesthouses to encourage and support home improvements.

Since much of the South Beach area is not expected to see large scale redevelopment, it is unlikely that the construction of an extensive district heat network will be financially viable due to the costs associated with retrofitting such a system. However it is recommended that key areas with diversified daily loads should be considered for a community heating scheme as the most viable areas as and when other infrastructure is upgraded. This will allow some of the capital cost to be offset against other works and will reduce the financial burden for installing a low carbon heat network in these areas. This is a particular opportunity on the Promenade, Lytham Road and Waterloo Road, where mixed uses present increased benefits from energy sharing. Once this key infrastructure has been established, it may then be financially viable to connect individual rows of houses as and when other infrastructure redevelopment creates a viable opportunity. There is an additional opportunity to connect the existing Palatine Leisure Centre and Sports College buildings located on St Anne's Road. These anchor buildings could provide an ideal opportunity to extend a heat network further east along Waterloo Road, creating an opportunity for connecting a number of existing residential neighbourhoods in this area.

Any future works on the school site as part of the BSF programme should consider this heat network connection as an opportunity for reducing CO2 emissions both on site and in the wider area. The potential redevelopment of hotels and new residential apartments on the Promenade to the south of South Beach also presents a particular opportunity for shared community energy as systems in these buildings can be designed specifically for a community heating scheme (i.e. the installation of heat exchangers, heat mains and central plant area for gas CHP).

Areas that are not immediately viable for community heating should be encouraged to install photovoltaic panels, particularly those properties with south-facing roofs where installation should be cheaper and easier than east/west-facing roofs. The arrangement of streets in the South Beach area means a large number of homes are feasible for south-facing PV installations. Owners and occupiers of such properties should be made aware of the Government's proposed Feed in Tariff expected in April 2010 and the financial benefits available from installing PV cells on a property.

The Promenade hotel redevelopments should also consider the use of a "feature technology" that can be used to reduce CO2 emissions, as well as making a statement to tourists that Blackpool is serious about reducing the impact of buildings on the environment. A series of small to medium scale wind turbines is likely to be the best option for this given Blackpool's wind resource on the Promenade however it may be possible for developers to contribute to a larger tidal energy scheme if such a scheme is deemed viable.

The figure below shows a map indicating how various regions of South Beach could use a mixture of low carbon technologies and strategies to reduce CO2 emissions. This map shows three distinct technology areas:

1. Community heat network area along Lytham Road and Waterloo Road (potential connection to the north with community schemes at Foxhall)
2. Microgeneration and potential heat network expansion area in infill streets
3. Promenade "feature" energy area with microgeneration and potential community schemes for blocks of hotels/guesthouses.

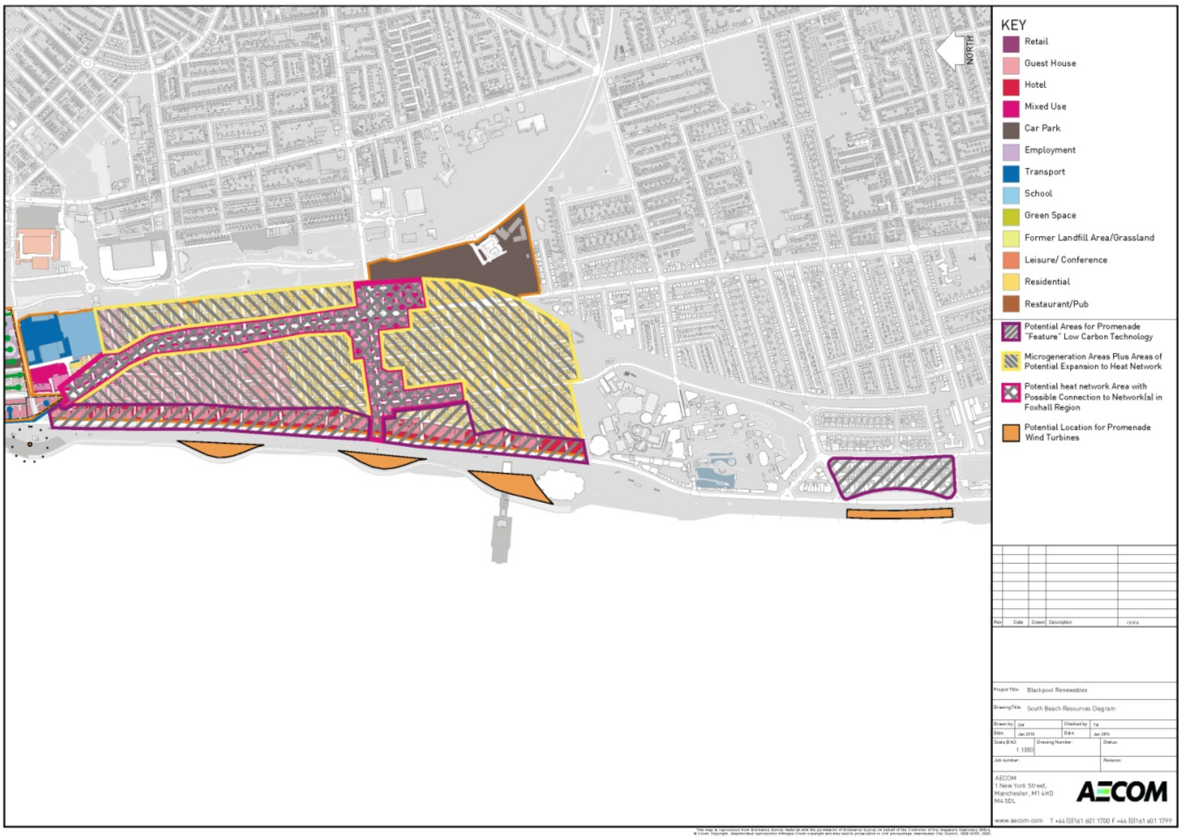


Figure 69: Indicative proposals for low carbon technologies in the South Beach area

The table below shows the potential CO2 reductions achievable for the new Promenade hotels and residential apartments if connected to a community gas CHP scheme and connected directly to wind turbines on the Promenade.

Building Name	Development/ Redevelopment/ Demolition	Building Type	Sub-Area	Floor Area (m2)	Technology Proposed	% Reduction in CO2		Indicative % Increase in Capital Cost over BCIS baseline cost
						Gross	Over 2006 Part L	
Details from SHLAA - 200 residential apartments on seafront	Redevelopment	Residential Apartment	The Promenade	12,000	Gas CHP	14	27	20
Redevelopment of hotels on Promenade between Headlands and Burlington Road	Redevelopment	Hotel	The Promenade	50,000	Gas CHP	29	33	12
6no. 15kW Wind Turbines	-	-	The Promenade	-	Wind Turbines	99 tCO_2	-	£135,000
Average for South Beach Region (excluding wind turbines)						26	32	14

Table 47: Indicative CO_2 reductions and capital cost uplift for new development at South Beach – NOTE: indicative capital cost uplift is expressed as a percentage over the BCIS base build cost. These figures are provided to allow a relative comparison between different technologies and cannot be used to assess viability due to the large number of varying factors affecting viability.

New development is expected to achieve an average regulated CO2 emissions reduction of 32% which is equivalent to Code level 3 for domestic properties. The CO2 emissions savings from the six 15kW Promenade wind turbines account for just 3% of the total regulated CO2 emissions associated with the hotel and apartments development shown above and is therefore insufficient to increase CO2 savings beyond Code level 3 equivalent.

5.9 STRATEGIC SITE 5: NORTH BEACH

5.9.1 BACKGROUND AND PROPOSED DEVELOPMENT

The North Beach region of Blackpool is yet another area suffering from a decline in tourism, with a large number of guesthouses falling into disrepair as HMOs. The North Beach area has been identified as an area in urgent need of regeneration. The aim for North Beach is to become a cohesive mixed use neighbourhood that forms a transition between Blackpool Town Centre, the major hotels along the promenade and the residential areas of North Blackpool. It is hoped that the redevelopment of Talbot Gateway will also drive regeneration in this area, with Dickson Road providing a focal point linking the transport facilities at Talbot gateway to the main hotel frontage at North Beach.

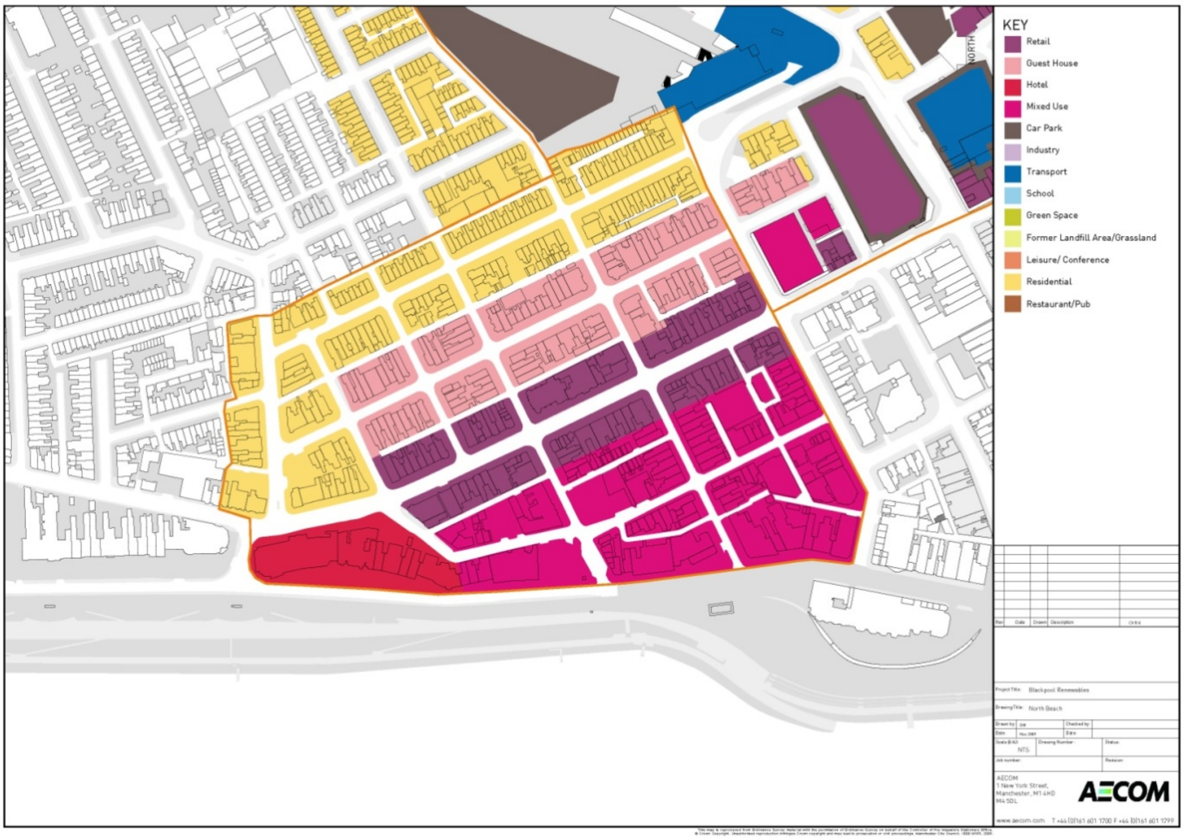


Figure 70: Existing land use at North Beach

There are no firm plans as yet for specific building types and floor areas to be developed in the North Beach area however a number of key areas have been identified as requiring redevelopment and/or improvement. The main areas of redevelopment are expected to take place in the following areas:

- The Promenade: Potential for change and improvement through high quality residential and mixed use development
- General Street: Potential for change and improvement through residential and mixed use development
- High Street: Preference for residential uses and some mixed use.

Other areas within the North Beach area are expected to see improvements rather than larger scale redevelopment. Key areas expected to see improvement measures are:

- Key Promenade hotel frontage towards the north of this region
- Improvements to guesthouses on Lord Street
- Improvements to Dickson Road to promote a safe and attractive route to and from the town centre
- General public realm improvements across the area along key gateways and corridors.

Table 47 illustrates typical building types that could form a part of the redevelopment works in the North Beach area. This assumed development is then evaluated to highlight the potential CO2 reductions achievable through making use of suitable low carbon resources and technologies.

Building Name	Building Type	Floor Area (m2)
100 seafront residential apartments	Residential Apartments	8,000
1,000m^2 seafront large non-food retail	Retail	1,000
10 townhouses in Walker Street improvement area	Townhouses	900
100m^2 bar in Walker Street improvement area	Bar/Pub	100
200m^2 fitness suite in Walker Street improvement area	Sports/Fitness Centre	200
500m^2 office in Walker Street improvement area	Office	500
100m^2 restaurant in Walker Street improvement area	Restaurant	100
50 townhouses in High Street residential redevelopment area	Townhouses	4,500

Table 48: Assumed development types

5.9.2 OPPORTUNITIES, CONSTRAINTS & PROPOSAL

Enhanced energy efficiency - improved fabric and services specifications

High standards of energy efficiency should always be the first step to reducing CO2 emissions associated with operational energy as this is almost always the easiest and cheapest way of reducing energy consumption. This is the case for areas that are expected to undergo major redevelopment (although the minimum standards for energy efficiency are defined by Building Regulations) as well as areas that are to be retrofitted with improvements. Energy efficiency is always recommended to be the first place to focus attention on any development, but this is especially true for redevelopments, where a large number of other factors are already constrained (e.g. building form, adjacency to surrounding buildings, etc.) and are likely to be expensive to replace and upgrade unless such works can be carried out as part of a scheduled maintenance programme. As with the South Beach area, fabric improvements are likely to reduce CO2 emissions substantially in the North Beach area, where heat density is high due to the predominance of residential and guesthouse uses across a substantial proportion of this area.

Gas fired Combined Heat and Power (CHP)

The heat density at North Beach creates a viable proposition for community based gas CHP which would offer substantial CO2 emissions reductions. At present, only an outline of areas to be improved and redeveloped have been highlighted, with no firm details on specific types and scale of development in the region. From suggestions made in the North Beach Interim Planning Statement, there are two key development areas that could be of substantial scale to justify the installation of a community CHP network. Where this installation could be done as part of a redevelopment scheme, some of the initial capital outlay could be offset against other plant equipment that would otherwise have been needed (e.g. replacing individual boilers in buildings with heat exchangers and heat meters). Redevelopment of public spaces can also be used as an opportunity to install heat mains at a reduced capital cost compared to a completely retrofitted solution.

Therefore the two areas with greatest potential for a heat network are the redevelopment in the area surrounding General Street and the Promenade and the residential area along High Street. It is likely that properties in between these two key areas are also suitable for connection to a low carbon heat network. However where these properties are subject to retrofitting and the replacement of existing heating plant, the capital costs associated with installing a low carbon heat network become very high. It is therefore recommended that these areas are connected to the network when other infrastructure works are scheduled and/or when households are due to upgrade their individual boiler systems. Properties connected to a heat network on High Street could also be connected to the adjacent Talbot Gateway site which is proposed to contain a range of uses creating diversified daily heat demands and improving the financial appeal of a community network. The development at Talbot Gateway is an ideal candidate for a shared energy scheme and, lying adjacent to the properties on High Street, an extended network covering these properties is a logical progression.

Solar Water Heating (SWH)

Solar thermal collectors are typically sized to meet 50% of the annual domestic hot water demand for a building, depending on restrictions on the roof area. Therefore solar hot water systems generally should not be used in conjunction with other low carbon heating systems (such as CHP) as this reduces the financial viability of both systems as they compete and conflict with each other. Where heat densities do not justify low carbon heat networks (or where infrastructure costs are prohibitively high and cannot be offset against any other scheduled maintenance works) microgeneration solutions should be combined with improved insulation standards. Solar thermal collectors are relatively simple and easy to install and provide tangible savings in gas bills for homeowners. With the introduction of the renewable heat incentive in April 2011, it is expected that a significant number of homes will begin to consider installing such technologies. However with the good potential for a low carbon heat network in the area, it is not recommended that solar thermal systems be taken forward as a large take-up of this technology in the area is likely to hinder the potential benefits of using a district gas CHP system, therefore making such a scheme potentially unviable and losing the opportunity for substantial CO2 savings.

Wind Turbines

Small scale wind turbines are generally regarded as ineffective both in terms of generating a useful amount of energy and offering attractive payback periods due to inefficiencies at a small scale and turbulent air flows in built-up residential areas. Large scale wind however is generally accepted as being one of the most cost-effective means of offsetting CO2 emissions, albeit at a scale that is limited by the location of sufficient wind speed and sufficient distance from surrounding properties.

It is not considered feasible to install wind turbines within the confined streets of the North Beach area, nor is there sufficient space for Promenade-mounted turbines therefore making this technology unsuitable for the North Beach area.

Photovoltaics (PV)

Photovoltaic cells are a highly flexible installation being arguably the easiest technology to retrofit, with little consideration required for existing systems within a building. The high CO2 emissions factor associated with grid-displaced electricity benefits PV in terms of CO2 reductions making PV a cost-effective resource per tonne of CO2 saved, despite their capital costs still remaining high at present. The Government's proposed Feed in Tariff is likely to see a large surge in demand for PV arrays, particularly for retrofit installations, where the proposed tariff payments are highest (36.5p/kWh generated for a retrofitted PV array <4kWp). The increased demand for PV installations should drive a reduction in capital cost and therefore encourage further uptake of the technology.

PV arrays are particularly appealing for lower density housing or areas that aren't feasible or viable for low carbon heating networks. Typically, a domestic installation could be fitted for less than £10,000 with minimal maintenance and an expected payback time of around 10-12 years with Feed in Tariff payments. The 2 and 3 storey properties that are predominant in the North Beach area should have sufficient roof area to accommodate a substantially-sized domestic PV system although with a large number of properties lying on a north-east/south-west axis, there may be issues with mounting PV arrays in a suitable position to yield sufficient energy to justify their cost. An assessment would have to be made on individual properties to determine their suitability for roof-mounted PV and whether or not it would be feasible to install an additional supporting structure to optimise the orientation of the PV array.

Significant benefits are expected to be achieved through educating owners and occupiers and encouraging them to make energy efficiency improvements and consider retrofitting PV panels. Where a suitable list of reliable local suppliers and installers could be pulled together, this would reassure and inspire homeowners to consider PV systems and would potentially reduce the capital cost to purchasers.

Ground Source Heating (GSHP)

Ground source heating systems are unlikely to be viable for the North Beach area where open land is relatively limited and the buildings already have a heating system installed which isn't likely to be directly compatible with a low temperature heating source. Ground-coupled systems could potentially be installed in areas of redevelopment on the Promenade, General Street and High Street, however it is recommended that low carbon heat network solutions are prioritised over GSHP solutions as a more cost effective measure offering higher CO2 emissions savings and the potential to extend to existing properties which are identified as being particularly difficult to address in this area.

Biomass heating and CHP

Biomass heating is extremely effective in reducing CO2 emissions because of the CO2 emissions absorbed by the wood fuel during its lifetime as a growing plant. Facilities for delivery and storage are essential for a biomass-fuelled system to be operated and managed effectively. The properties in the South Beach area are generally confined in terms of street access for biomass fuel deliveries as well as space for secure storage areas. The biomass resource potential in Blackpool is limited and the small potential supply that is available is better used for areas with improved transport access and located nearer to the main vehicle access route on the M55 motorway. As such, it is not recommended that large scale biomass heating is introduced in the North Beach area, although this isn't to say that a small number of individual biomass heating systems couldn't be used to reduce the CO2 emissions of a small number of dwellings or guesthouses. Biomass CHP is generally only suitable for large heat networks where the peak demand for heat is at least several Megawatts. Due to a lack of supply, it is not recommended that Biomass CHP be considered for the North Beach area.

Hydro

There have been no potential hydro schemes identified in the immediate surrounding area however there is a potential tidal energy resource on Blackpool's beach. Further investigation would be required to assess the feasibility of a tidal energy system, including details of optimum north/south location, distance out from the shoreline and the particular energy harnessing method used. Any proposed tidal energy scheme would have to be designed and installed to be sympathetic to marine wildlife and visual impacts which may affect tourism in the area. Any tidal energy system must also consider issues relating to sand movement and transportation of energy back to the shore and into the electricity grid. It should also be noted that an offshore tidal energy system is not likely to be counted as part of a building's Building Regulation CO2 emissions and therefore wouldn't help improve the BREEAM or Code for Sustainable Homes score, however any reduction in CO2 emissions could be used as part of Blackpool's Local Authority targets.

Summary - Opportunities and constraints for low and zero carbon technologies

Improvements to insulation standards should be the first step towards reducing energy consumption and CO2 emissions for the North Beach area, particularly in improvement areas that are likely to be more restricted in the choice of low carbon technologies they can use. The large number of residential and guesthouse properties in the area means that the demand for heat is significant, resulting in improved energy standards making substantial savings in CO2 emissions. These improvements should be taken forward through a combination of loft insulation and cavity wall insulation (or solid wall insulation where applicable) as well as an education programme for local residents and guesthouse owners.

Following fabric upgrades, much of the region's CO2 reductions are expected to arise from a low carbon gas CHP network. This is expected to consist of two discrete networks: one serving the Promenade and General Street areas and the other acting as an extension from the Talbot Gateway network to serve residential properties that are expected to be redeveloped on High Street. Here, the residential uses on High Street complement the mixed uses at Talbot Gateway. It is expected that additional blocks of properties could be connected in the future in line with other scheduled maintenance.

Areas that are not immediately viable for community heating should be encouraged to install photovoltaic arrays, particularly those properties with south-facing roofs where installation should be cheaper and easier than east/west-facing roofs. Owners and occupiers of such properties should be made aware of the Government's proposed Feed in Tariff expected in April 2010 and the financial benefits that are available from installing PV cells on a property.

The figure below shows a map indicating how various regions of North Beach could use various low carbon technologies and strategies to reduce CO2 emissions. This map shows three distinct technology areas:

- Community heat network area along the Promenade and General Street
- Community heat network area along High Street (as an extension/in conjunction with the Talbot Gateway shared energy scheme)
- Microgeneration infill areas with potential for future network connection.

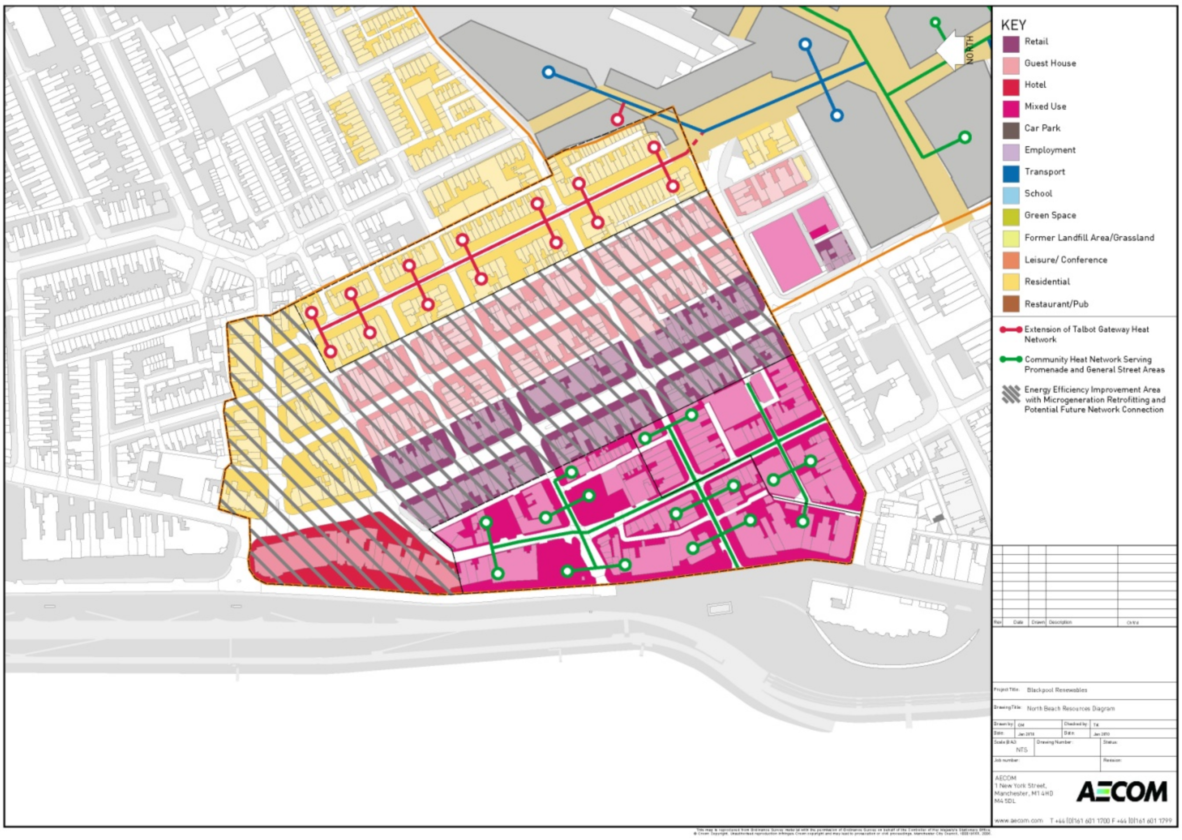


Figure 71: Indicative proposals for low carbon technologies in the North Beach area

The table below shows the potential CO2 reductions achievable for the gas CHP heat network areas identified. The average CO2 savings potential for redevelopment in the North Beach area is 29% which is equivalent to Code level 3 for domestic properties. Only restaurants & cafes with high heat demand have the potential to achieve beyond Code level 3 equivalent without the use of supplementary technologies such as Photovoltaic cells.

Building Name	Building Type	Floor Area (m2)	Technology Proposed	% Reduction in CO2		Indicative % Increase in Capital Cost over BCIS Baseline cost
				Gross	Over 2006 Part L	
100 seafront residential apartments	Residential Apartments	8,000	Promenade and General Street Community Gas CHP Network	14	27	20
1,000m^2 seafront large non-food retail	Retail	1,000	Promenade and General Street Community Gas CHP Network	26	35	18
10 townhouses in Walker Street improvement area	Townhouses	900	Promenade and General Street Community Gas CHP Network	15	29	24
100m^2 bar in Walker Street improvement area	Bar/Pub	100	Promenade and General Street Community Gas CHP Network	27	41	11
200m^2 fitness suite in Walker Street improvement area	Sports/Fitness Centre	200	Promenade and General Street Community Gas CHP Network	27	39	14
500m^2 office in Walker Street improvement area	Office	500	Promenade and General Street Community Gas CHP Network	18	37	11
100m^2 restaurant in Walker Street improvement area	Restaurant	100	Promenade and General Street Community Gas CHP Network	32	52	9
50 townhouses in High Street residential redevelopment area	Townhouses	4,500	High Street Community Gas CHP Network	15	29	24
Average for North Beach Region				16	29	21

Table 49: Indicative CO_2 reductions and capital cost uplift for redevelopment in the North Beach area– NOTE: indicative capital cost uplift is expressed as a percentage over the BCIS base build cost. These figures are provided to allow a relative comparison between different technologies and cannot be used to assess viability due to the large number of varying factors affecting viability.

5.10 STRATEGIC SITE 6: CENTRAL STATION SITE

5.10.1 BACKGROUND AND PROPOSED DEVELOPMENT

Located at the heart of Blackpool, the Central Station site is arguably Blackpool's most important development area in terms of scale and intensity of development and the benefits that this development is expected to bring to the wider area. The site has the potential to bring transformation to Blackpool by creating a landmark conference and leisure quarter, lying adjacent to the Foxhall development site and nearby to strategic development areas at North Beach, Talbot Gateway and South Beach. Development at the Central Station site was originally intended to exploit the benefits associated with Blackpool gaining rights for the development of a Casino. Unfortunately this opportunity has not materialised for Blackpool, but the Central Station site is still intended to be a large leisure attraction that will drive regeneration in the wider resort as well as the immediate areas surrounding the Central Station site.

The Central Station site development aims to enhance the tourism market in Blackpool while decoupling this market from seasonal fluctuation – a problem that has resulted in many areas falling into decline. Developing a year-round economy is seen as crucial for Blackpool's success.

The existing site is made up predominantly of car park area and leisure uses. The most northerly block of the site known as 'The Palatine' contains the Coral Island amusement arcade and retail units at ground floor level with a nightclub and gym above the retail areas. The central portion of the site is heavily dominated by open air car parking with a number of buildings located on the periphery of this car parking area including Bonny Street market, law courts and police headquarters and a number of seafront amusements including The Sea Life Centre, the Dr Who Experience and the Louis Tussaud's Wax Works as well as other retail units. Areas surrounding the Central Station site contain a mix of uses including town centre retail and leisure to the north and holiday accommodation to the south and east.

The various sub-regions of the Central Station site are predominantly owned by Blackpool Council, The Noble Organisation and Leisure Parcs Ltd. The large area of Council ownerships increases the potential for this site to become a highly sustainable development. The figure below shows the existing land uses at the Central Station site.

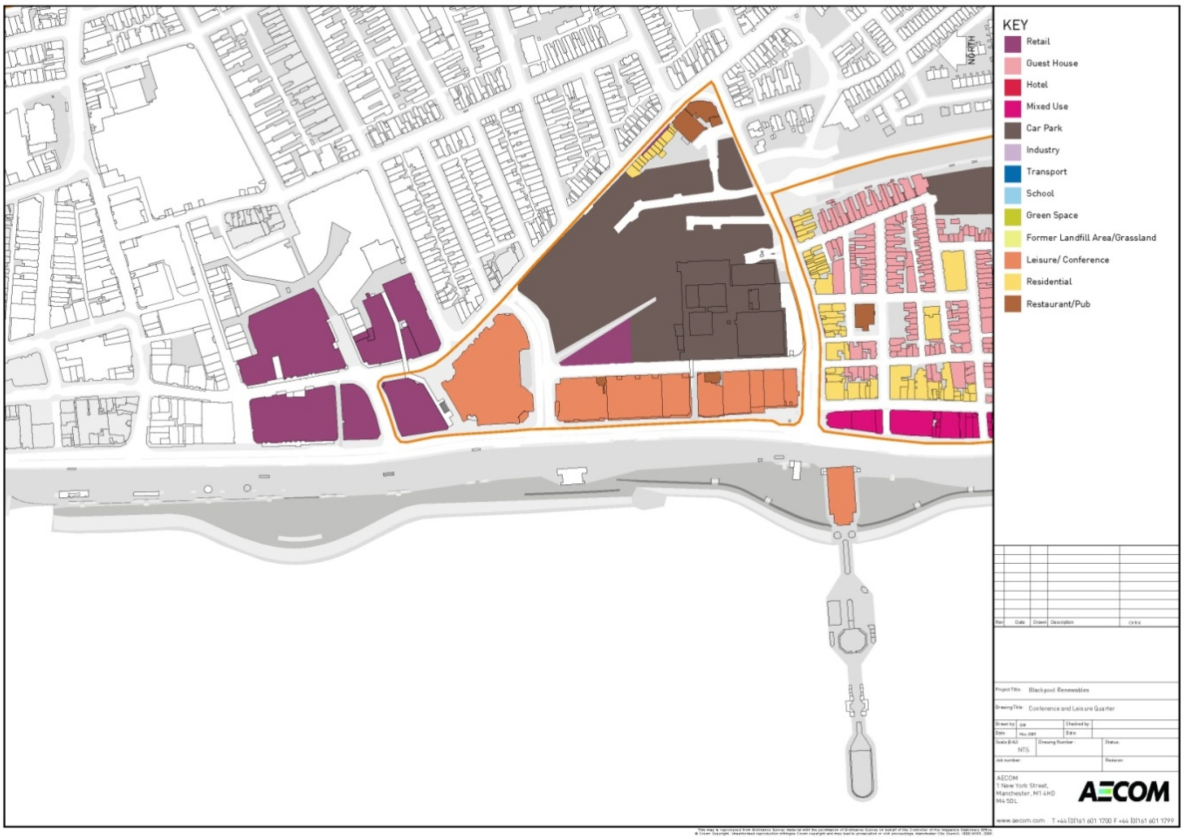


Figure 72: Existing land use

The feature attraction at the Central Station site is expected to be a large snow dome development with associated developments accompanying this attraction. These accompanying developments are expected to consist of a conference & exhibition centre, a number of 3*, 4* and 5* hotels, shops, restaurants and bars & clubs. The site also includes for a number of retained elements including the King Edward VII Cinema and sea front attractions on the Promenade. As yet there are no firm proposals on expected floor areas for development however assumptions have been made as shown below for the purposes of this preliminary analysis. The assumed development coming forward is summarised in the table below.

Building Name	Floor Area (m2)
Snow Dome	15,000
Conference/Exhibition Centre	25,000
Hotels	5,000
Shops	10,000
Restaurant	1,000
Pubs/Bars	1,000
Snow Dome (15,000m^2 total)	25,000

Table 50: Assumed development types

5.10.2 OPPORTUNITIES, CONSTRAINTS & PROPOSALS

Enhanced energy efficiency - improved fabric and services specifications

Energy efficiency should be the first consideration for any development, but this is especially important for improvement areas at the seafront attractions and the King Edward VII buildings where retrofitted measures are limited, restricting the possibilities for making cost-effective CO2 reductions. Where there is significant new development, as is the case here at the Central Station site, minimum energy efficiency standards are already dictated by Building Regulations, ensuring that a reasonable standard of insulation and airtightness is achieved. It is recommended, however, that developments are specified beyond the minimum standards of insulation required under Building Regulations as the first step of the 3 step approach to sustainable building design (be lean, be clean, be green). A well designed building should be able to achieve at least 25-30% beyond the minimum Building Regulation values for insulation and air tightness. This is especially true for the proposed snow dome, where the total building energy demand is heavily influenced by the insulation standards of the chilled activity area. The proposed snow dome is likely to be a significant consumer of electrical energy (with high associated CO2 emissions) and therefore the exemplar design of this building should be fundamental to the philosophy of design at the Central Station site.

Gas fired Combined Heat and Power (CHP)

Gas CHP is expected to play a significant role in meeting energy demands at the Central Station site. The requirement for heat is expected to be large based on proposals for leisure and conference uses. The mixed uses proposed on this site also creates diversified daily demands which is beneficial to a community heating scheme through reducing the overall heating capacity required serving these buildings (therefore minimising the capital cost of heating plant equipment) as well as creating a stable base heat demand on which to base a combined heat and power system. The large scale of development expected at the Central Station site creates the opportunity to install heat network infrastructure as part of other infrastructure improvement works on site. The opportunity for combining the installation of a heat network with other works minimises the capital cost associated with a heat network, therefore increasing its viability and its effectiveness in terms of tonnes of CO2 saved per £ of capital cost invested.

The unique energy demands for the proposed snow dome means that a large amount of cooling will be required, with consequently a large amount of heat being rejected from these cooling systems to the atmosphere. Where a district heating network is installed, this ‘waste’ heat could potentially be utilised and supplied to surrounding buildings where there is a demand for heat. This reduces the demand for energy from the CHP unit therefore reducing CO2 emissions and fuel costs. Without a low carbon heat network connecting the proposed buildings on this site, it would be difficult to utilise this rejected heat and distribute it to areas of heat demand.

While the current proposals outline a number of retail uses, the scale of this retail development will affect the viability of using absorption chillers supplied with heat from a heat network. Where retail uses are expected to make up a significant proportion of buildings on the Central Station site, the cooling demand for these buildings will be substantial, therefore justifying the use of absorption cooling to minimise the CO2 emissions associated with cooling. The financial viability of absorption cooling for these areas will be dependent upon the demand for cooling from retail and office areas. For retail areas, the CO2 savings made by tri-generation (gas CHP with absorption cooling) can be substantial over traditional retail building services which are often served by electric heating and cooling with high associated CO2 emissions. Blackpool Council should ensure that low carbon infrastructure is developed to encourage heat sharing and, where a substantial demand for cooling exists, absorption cooling should be encouraged.

Solar Water Heating (SWH)

Because of the high suitability for the Central Station site to use a low carbon district heating network, it is not recommended that solar thermal systems are extensively used in this area. It would not be cost effective to install both solar thermal systems and a low carbon heat network as the solar thermal system would reduce the demand for domestic hot water and therefore diminish the benefits and the effectiveness of the gas CHP heat network. This would increase capital costs and increase the payback periods for these technologies. For retained buildings that will not see extensive renovation of their heating and cooling systems, solar thermal systems could be considered where domestic hot water demand is sufficient.

Wind Turbines

Small scale wind turbines are generally regarded as ineffective both in terms of generating a useful amount of energy and offering attractive payback periods due to inefficiencies at a small scale and turbulent air flows in built-up residential areas. The scale of development proposed at the Central Station site will make free-standing turbines unlikely due to the value of land on this site. It may be feasible, however, for a number of wind turbines to be mounted on the roofs of taller buildings on this site (potentially mounted on the snow dome as a demonstration of sustainability at the site), however these turbines are likely to make only a small contribution to the site-wide CO2 emissions reductions. A number of coastal development areas within Blackpool have been identified for potentially making use of Promenade ‘feature’ technologies as a show case for sustainable development. Wind turbines located on the Promenade should be considered for the Central Station site, as well as for other identified sites including North Beach, Foxhall and South Beach. Further investigation would have to be carried out following initial tests that have been carried out for Promenade wind turbines near to the Solaris Centre in the southern area of Blackpool’s Promenade.

Photovoltaics (PV)

PV panels are highly flexible in that they operate almost completely independently of other renewable technologies. While the savings achievable are relatively small in comparison to technologies such as gas CHP, the contribution made by PV cannot be ignored and this technology should be considered where building design permits suitable mounting positions. It is recommended that PV arrays are considered as a supplementary technology to the main low carbon heating system, although it should be noted that, as with small scale wind turbines, the contribution from this technology is likely to be much smaller than that from a gas CHP heating network.

The development should seek to optimise the positioning of PV arrays to obtain a southerly orientation and in a location that minimises overshading from surrounding buildings. Where this optimisation involves coordination between developers, Blackpool Council should assist in this coordination to ensure the best possible result (e.g. it may be more beneficial to mount PV panels on the snow dome roof but connect these arrays to an adjacent building that may otherwise fall short of targeted CO2 emissions reductions). The potential take-up of solar technologies on this site may influence the orientation of the snow dome to create a large south-facing platform for solar technologies. The Government’s proposed Feed in Tariff is likely to assist in the uptake of this technology, ultimately increasing demand and driving down capital costs.

Ground Source Heating (GSHP)

Ground source heating systems are not recommended at the Central Station site as any ground-coupled installations would detract from the benefits of a gas CHP heat network. While the scale of development on this land creates the opportunity to install ground loops under the proposed new buildings (or using 'energy piles' as part of the foundation structure), the use of this technology would conflict significantly with a low carbon heat network. The proposed changes to Building Regulation Part L for 2010 will also make ground source technologies less appealing due to the proposed increase to the electricity CO2 emissions factor.

Biomass heating and CHP

While biomass would be ideally suited to a high density development using a shared heat network, Blackpool's limited biomass resource and the urban location of this site makes it unsuitable for using biomass as the main heating fuel. Access for deliveries to this site would involve a number of key tourist access routes. Biomass fuel would be better used in areas located nearer to the main M55 transport network to the south east of the Central Station site.

Hydro

There are no potential hydro schemes identified on or around the Central Station site, however there is a potential tidal energy resource on Blackpool's beach. Further investigation would be required to assess the feasibility of a tidal energy system, including details of optimum north/south location on the beach, distance out from the shoreline and the particular energy harnessing method used. Any proposed tidal energy scheme would have to be designed and installed to be sympathetic to marine wildlife and visual impacts which may affect tourism in the area. Any tidal energy system must also consider issues relating to sand movement and transportation of energy back to the shore and into the electricity grid. It should also be noted that an offshore tidal energy system is not likely to be counted as part of a building's Building Regulation CO2 emissions and therefore wouldn't help improve the BREEAM or Code for Sustainable Homes score, however any reduction in CO2 emissions could contribute to Blackpool's Local Authority targets.

Other

The Sea Life Centre building located on the Promenade as part of the Central Station site contains a sea water pumping system that was used originally used when this building served as a public swimming baths. This pumping system is now used by the Sea Life Centre for water replenishment as part of their saltwater marine tanks. It may be possible to use this unique system as a source of 'free cooling' through circulating cool sea water as a free resource of chilled water. There are potential implications of using salt water as a circulating fluid within a cooling system (the corrosive properties of salt water would required specifically-designed pipework to avoid deterioration), however the system is identified as a potential resource which could be exploited further given additional investigation and study. Depending on the scale of this system, it may also be feasible to extract heat from the pumps as they circulate water from the sea to the Central Station site. The potential scale and suitability of this resource for use on the Central Station site should be investigated as part of a separate study.

Summary - Opportunities and constraints for low and zero carbon technologies

High standards of energy efficiency must be the fundamental starting point for the Central Station site development. As with any new development on strategic sites in Blackpool, developers should aim to improve upon the minimum insulation and airtightness standards set out in Part L of the Building Regulations by at least 25%. On a cost per tonne of CO2 basis, energy efficiency should offer the greatest benefits for a small increase in capital cost of a Building Regulations compliant building.

The main potential feature identified for the Central Station site is a gas CHP heat network which would ultimately connect all of the new buildings that form this development with the possibility of extending this network to a number of retained buildings on site, depending upon the scale of redevelopment in these buildings. Extension of this network to a number of retained buildings (e.g. the amusement areas located on the Promenade and the retained King Edward VII buildings) would allow substantial CO_2 reductions for the site, although it should be noted that these reductions would not be able to be offset against the new buildings as part of the Building Regulations, BREEAM and Code for Sustainable Homes assessments. The extension of the proposed heat network to serve the retained buildings on site is likely to be determined by scheduling this work at a time where boilers would otherwise be replaced to allow the capital cost of retrofitting heat exchangers and heat meters to be absorbed against the replacement cost of a conventional boiler system.

Building types that have particularly high electrical loads should also make use of Photovoltaic panels and these should be sited in the best possible positions on the Central Station site considering orientation, overshading from surrounding buildings & structures and access for maintenance. Owners, occupiers and developers should be made aware of the Government's proposed Feed in Tariff expected in April 2010 and the financial benefits that could arise from installing PV panels on a property.

Some of the high demand for electricity could also be offset using roof-mounted wind turbines on the taller buildings across the site. Along with PV panels, these could form a statement for the site as a demonstration of sustainable design for this development. Roof-mounted wind turbines would be ideally located within a green roof creating an exemplar design that would help improve the BREEAM score of the new development while contributing to the site's energy supply.

The vision for the Central Station site includes a substantial amount of external lighting to illuminate this area as the key leisure area within Blackpool. Efforts should be made to address the CO_2 emissions associated with this external display lighting through renewable technologies. While the emissions associated with external lighting aren't included in Building Regulations calculations, BREEAM assessments and the Code, these CO_2 emissions could contribute significantly to the site's overall impact on the environment. It is recommended that external lighting is used sympathetically and efficiently to achieve the desired visual effect with minimal environmental impact. Renewable systems could be used at a 'street level' to contribute to offsetting these emissions (e.g. renewable street lighting systems as shown in the figure below).

Figure 73: 'Street level' renewables that are currently used in Woking, Surrey

The large scale of development on the Central Station site creates an ideal opportunity to develop a "renewable technology feature" located on the Promenade or even Blackpool's beach itself. Blackpool's steady wind resource presents an ideal opportunity to generate useful electrical energy at a medium scale and supply this (via private wire) to the Central Station development. The private wire connection to this technology would allow the CO_2 emissions offset by this technology to be counted towards Building Regulation calculations and consequently BREEAM and 'Code for Sustainable Homes' assessments. This creates an ideal opportunity to create a highly visual statement for the Central Station site while offsetting a useful quantity of CO_2 to contribute to improved BREEAM and CfSH scores.

Without this direct 'private wire' connection, the CO2 saved from the renewable technology would not be counted towards BREEAM and CfSH assessments.

The figure below shows an illustration of how a heat network may be routed based on an assumption of development at this site. This map serves as an illustrated example of a potential solution and is not intended to dictate the scale or location of development within the site boundary.

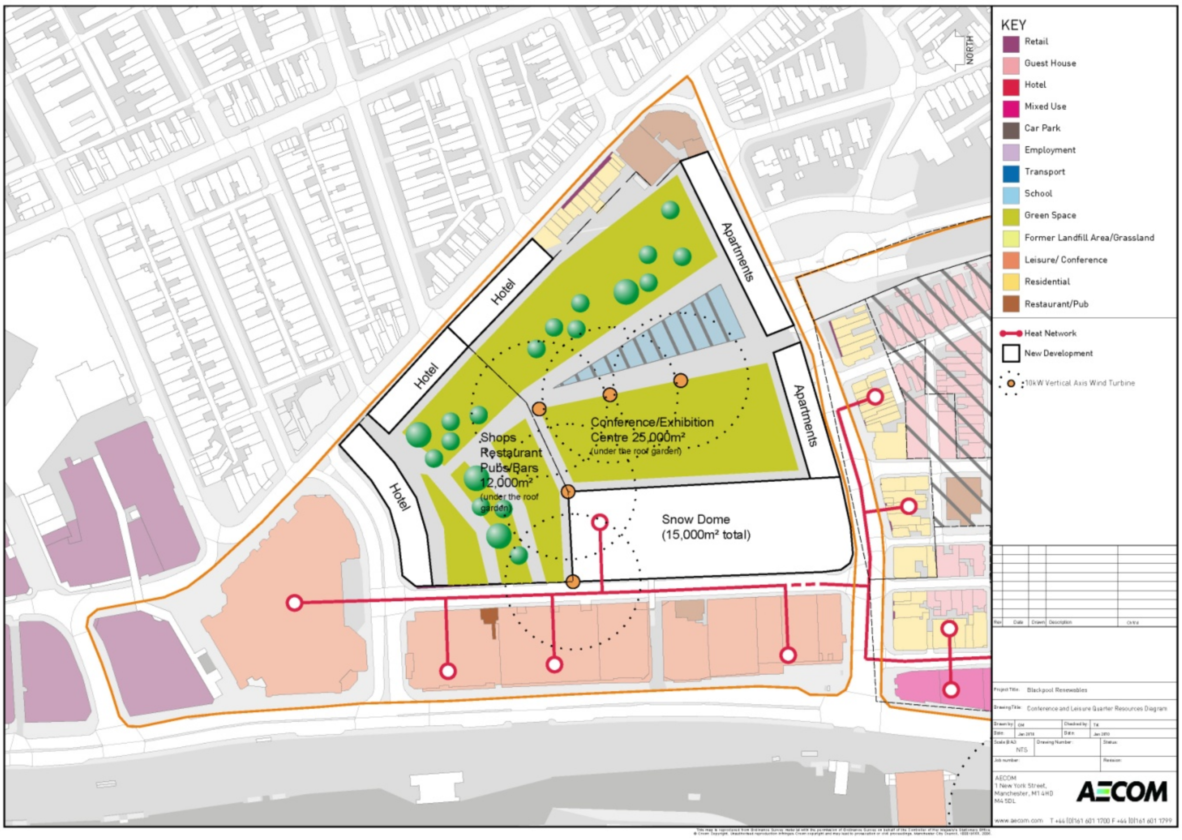


Figure 74: Indicative proposals for low carbon technologies at the Central Station site

The table below shows the potential CO2 reductions achievable for new development at the Central Station site. These indicative figures are based on the assumption of a gas-fired CHP heat network as shown in the figure above.

Building Name	Building Type	Floor Area (m2)	Technology Proposed	% Reduction in CO2		Indicative % Increase in Capital Cost over BCIS baseline cost
				Gross	Over 2006 Part L	
Snow Dome ($15,000m^2$ total)	Cold Zone ($7,500m^2$)	7,500	Network Gas CHP	10	10	17
	Retail ($7,500m^2$)	7,500	Network Gas CHP	26	35	18
Conference / Exhibition Centre	General Office	25,000	Network Gas CHP + Waste Heat from Snow Dome	22	46	7
Hotels	Hotel	5,000	Network Gas CHP + Waste Heat from Snow Dome	35	40	8
Shops	Retail	10,000	Network Gas CHP + Waste Heat from Snow Dome	32	43	12
Restaurant	Restaurant	1,000	Network Gas CHP + Waste Heat from Snow Dome	39	61	6
Pubs / Bars	Bar/Club	1,000	Network Gas CHP + Waste Heat from Snow Dome	33	50	7
Average for Central Station Site:				24	39	11

Table 51: Indicative CO_2 reductions and capital cost uplift for redevelopment at the Central Station site– NOTE: indicative capital cost uplift is expressed as a percentage over the BCIS base build cost. These figures are provided to allow a relative comparison between different technologies and cannot be used to assess viability due to the large number of varying factors affecting viability.

The average regulated CO2 emissions savings for new development at the Central Station site is 39% which is equivalent to Code level 3 for residential properties. A number of building types have the potential to exceed the 44% improvement requirement for Code level 4 based on the use of a gas CHP heating network with waste heat contributing from the cooling systems of the snow dome. With the use of PV panels throughout the site, it would be possible to achieve Code level 4 equivalent standards of CO2 reduction.

5.11 STRATEGIC SITE 7: RIGBY ROAD EDUCATION SITE

5.11.1 BACKGROUND AND PROPOSED DEVELOPMENT

The site identified on Rigby Road is a key investment site earmarked as a University-style Higher Education campus. The site was originally identified as being a secondary tourist attraction off the back of the prospective casino development at the Central Station site. Without the major Casino development, it is deemed unviable to develop a second major tourist attraction and so this site is now proposed for educational uses.

The site is predominantly occupied by the Illuminations Depot and Transport Depot, with substantial public car parking provision and other commercial and domestic uses. With the relocation of the Illuminations Depot expected in the near future and the large area of open car parking space, the site creates an ideal opportunity to deliver a new Higher

Education university style campus close to the town centre. This new campus will meet the needs of the expanding Blackpool & Fylde College as it is relocated from the current Bispham site, with the existing Bispham site then seeing the development of approximately 350 new dwellings.

Development in this area is hoped to transform the existing rundown appearance of this inner area neighbourhood. With further education funding currently being restricted by the Learning Skills Council (LSC), options are currently being considered for a mixture of education and residential uses. The future for the Rigby Road site is heavily dependent upon funding from the LSC and so assumptions have been made on the scale of development and surrounding supplementary development at this stage.

The figure below shows the current land uses on the Rigby Road site and the table below summarises the future development assumed for this site to illustrate the potential CO_2 emissions reductions that could be achieved.

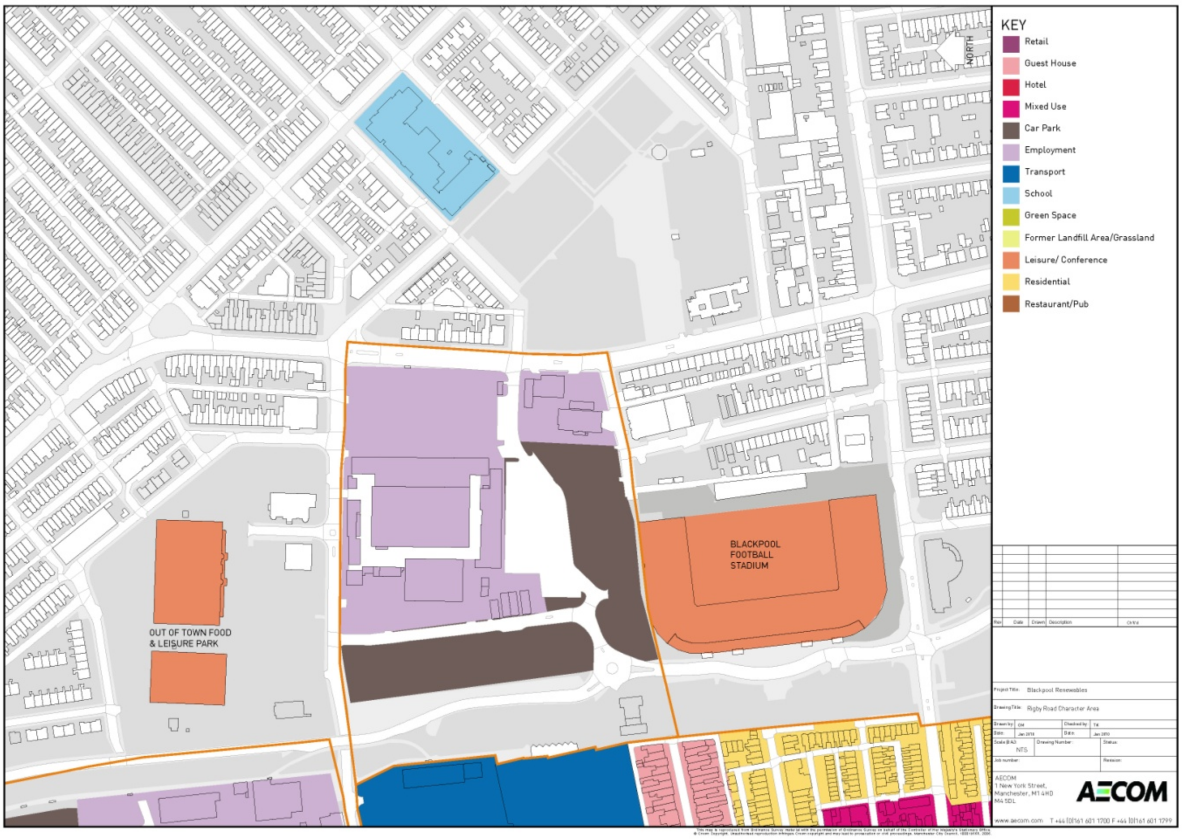


Figure 75: Existing land use at Rigby Road

Building Name	Floor Area (m2)
Further Education College	15,000
50 New Townhouses	4,000

Table 52: Assumed development types

5.11.2 OPPORTUNITIES, CONSTRAINTS & PROPOSAL

Enhanced energy efficiency - improved fabric and services specifications

Energy efficiency standards are particularly important for educational developments, where demand for heat is generally high. Surrounding residential properties that are also assumed to be developed on this site should also maximise on the potential benefits of high energy efficiency standards with space heating demand in domestic terraced housing accounting for around one third of the total annual energy demand. Since the Rigby Road site is assumed to contain primarily new development, minimum energy efficiency standards are already dictated by Building Regulations, ensuring that a reasonable standard of insulation and airtightness is achieved. It is recommended, however, that developments are specified beyond the minimum standards of insulation required under Building Regulation Part L as the first step of the 3 step approach to sustainable building design (be lean, be clean, be green). A well designed building should be able to achieve at least 25-30% beyond the minimum Building Regulation values for insulation and air tightness. Domestic properties should aim to go beyond this where possible to reach higher levels of the Code for Sustainable Homes.

There are a number of existing residential properties to the south and east of the Rigby Road site that could benefit from energy efficiency improvements driven by redevelopment in this area. The educational development could be used to stimulate home improvements such as cavity wall insulation, loft insulation and habitual changes in surrounding residential areas.

Gas fired Combined Heat and Power (CHP)

Gas CHP is expected to play a significant role in meeting energy demands at the Rigby Road site as a logical extension to the proposed network at the Foxhall site. The requirement for heat from further educational buildings creates a diversification of daily demand patterns when combined with the proposed networked buildings at Foxhall. There is also the potential to connect additional residential properties to the east and south of the Rigby Road education site as well as Revoe Primary School, lying to the east of the Rigby Road site, which acts as a catalyst for further domestic connections in this area. Leisure facilities at Rigby Road (Odeon Cinema) could also be considered for connection to the network to further balance daily demand patterns, subsequently improving the financial viability of a heat network. Existing domestic properties that could potentially be connected to an extended heat network should be considered for connection in the context of scheduled renovation of existing heating systems, i.e. where the current heating systems installed are due to be replaced, the capital cost associated with replacing this equipment with a heat exchanger and heat meter would be heavily reduced as it could be offset against the cost of boiler replacement that would otherwise have been incurred.

Solar Water Heating (SWH)

Because of the suitability for the Rigby Road site to use a low carbon district heating network, it is not recommended that solar thermal systems are installed for new development areas. Where it is deemed unfeasible to extend the low carbon heat network to existing residential properties, solar thermal systems can be an effective method of significant CO2 reductions when combined with high standards of energy efficiency. However, it would not be cost effective to install both solar thermal systems and a low carbon heat network as the solar thermal system would reduce the demand for domestic hot water and therefore diminish the benefits and the effectiveness of the gas CHP heat network. This would increase capital costs per tonne of CO2 saved and increase the payback periods for these technologies. Solar thermal systems should therefore only be installed in areas that are unlikely to develop a heat network connection within the next 10 years.

Wind Turbines

The residential areas surrounding the east and south of the Rigby Road site restrict the possibility of locating substantially-sized wind turbines in these areas because of the buffer zone required between large wind turbines and surrounding residential properties.

However areas to the north and centre of the Rigby Road site are located away from these predominantly residential areas and could potentially be viable for small/medium scale wind turbines. This could take the form of a roof-mounted wind turbine located on the proposed College building itself, or could be a larger turbine sited in the College grounds or even in the adjacent parkland area between the Rigby Road site and Revoe Primary School. The suitability for large scale turbines is limited because of the proximity to residential areas, particularly with the proposed residential properties at Foxhall.

Photovoltaics (PV)

PV panels are highly flexible in that they operate almost completely independently of other renewable technologies. While the savings achievable are relatively small in comparison to technologies such as gas CHP, the contribution made by PV cannot be ignored and this technology should be considered where building design permits suitable mounting positions. The educational development should seek to optimise the positioning of PV arrays to obtain a southerly orientation and in a location that minimises overshading from surrounding buildings.

The Government's proposed Feed in Tariff is likely to assist in the uptake of PV panels, ultimately increasing demand and driving down capital costs. PV panels are therefore expected to be retrofitted to surrounding residential properties to address the high CO2 emissions typically associated with existing residential properties.

Ground Source Heating (GSHP)

Ground source heating could be used at the Rigby Road site given the area of land that is currently available both on the Rigby Road site itself and on the adjacent playing fields to the east. However the take-up of ground source heating on this site would create a barrier between the development areas to the west and existing residential areas to the east, preventing a viable heat network from expanding towards the existing building stock further east. The existing building stock in Blackpool has been identified as difficult to target and therefore efforts should be made through new development to encourage improvements to existing properties. Improvements to surrounding properties are best made through encouraging technologies that can be connected to or contribute to existing properties. Ground source systems should therefore be avoided to prevent development and improvements from being restricted to within the site redline only.

Biomass heating and CHP

Biomass heating systems are typically popular with education developments because of the very low CO2 emissions associated with biomass heating and the relatively high demand for heating from education buildings. Despite the Rigby Road site being located away from the Promenade area, transport access is still restricted because of the built-up surroundings. Blackpool's limited biomass resource would therefore be better used in areas to the east with better transport access.

Hydro

There are no potential hydro schemes identified in the Rigby Road area. Blackpool's tidal resource could be considered but is better exploited as part of a solution linked to Promenade developments or as a completely standalone solution from energy generation in buildings.

Other

A large sewage pipe runs parallel to Seasiders Way which is identified as a potential resource for heat, with a constant elevated temperature over ambient air temperatures. There is potential to exploit this heat resource via heat exchangers to feed into a heat network and reduce the load on gas-fired boilers and CHP units.

Further investigation would be required to assess the scale of heat potential from this pipeline (this is likely to be assessed through taking physical measurements of the sewage pipe and through details of sewage volume from the local waste management operators). The scale of this heat resource is also likely to influence the method of heat extraction from the pipeline as well as the viability of the system. The heat from this resource is likely to be low grade heat and therefore may be unsuitable for use with a gas-fired CHP heat network.

Summary - Opportunities and constraints for low and zero carbon technologies

High standards of energy efficiency must be the starting point for the Rigby Road development, especially so given the high heat demands from education and residential buildings. Developments should aim to improve upon the minimum insulation and airtightness standards set out in Part L of the Building Regulations by at least 25%. On a cost per tonne of CO2 basis, energy efficiency should offer the greatest benefits for a small increase in capital cost of a Building Regulations compliant building. Residential properties to the east and south of the Rigby Road site should be encouraged to install (additional) loft insulation and cavity wall insulation to address the high demand for heat from Blackpool's existing residential stock.

The main potential feature identified for the Rigby Road education site is a gas CHP heat network which would ultimately connect the new higher education building with new residential properties and existing surrounding dwellings where appropriate. Retrofitting of heat exchangers and heat meters should be scheduled and encouraged at a suitable time when household boilers are due for replacement to offset some of the capital cost against equipment that would otherwise have been replaced. The connection of existing dwellings to the heat network could be encouraged further by connecting Revoe Primary School, which would create an additional anchor load for this network as well as providing additional security in the network connection for potential residential connections for dwellings in the surrounding area (e.g. Lune Grove, Wyre Grove and Levens Grove). Proximity to the proposed residential development at Foxhall creates an additional opportunity for load diversification through connecting these networks. This connection could potentially be routed along Rigby Road and under Seasiders Way. The potential extent of this heat network creates an ideal opportunity to address the CO2 emissions associated with a significant new development and crucially the CO2 emissions associated with existing residential properties.

Both new development and existing residential properties in the area should be encouraged to install PV panels and owners/occupiers should be made aware of the potential financial benefits through installing these systems under the Government's Feed in Tariff scheme which is expected to start in April 2010.

The figure below shows the potential heat network at the Rigby Road education site with identified connection linking the following:

- Proposed Blackpool College education building
- Proposed residential townhouses adjacent to Blackpool College education building
- Existing Odeon cinema
- Proposed residential properties on heat network at Foxhall
- Existing Revoe Primary School
- Existing residential properties on Lune Grove, Wyre Grove and Levens Grove
- Potential heat supply from sewage pipeline running down Seasiders Way

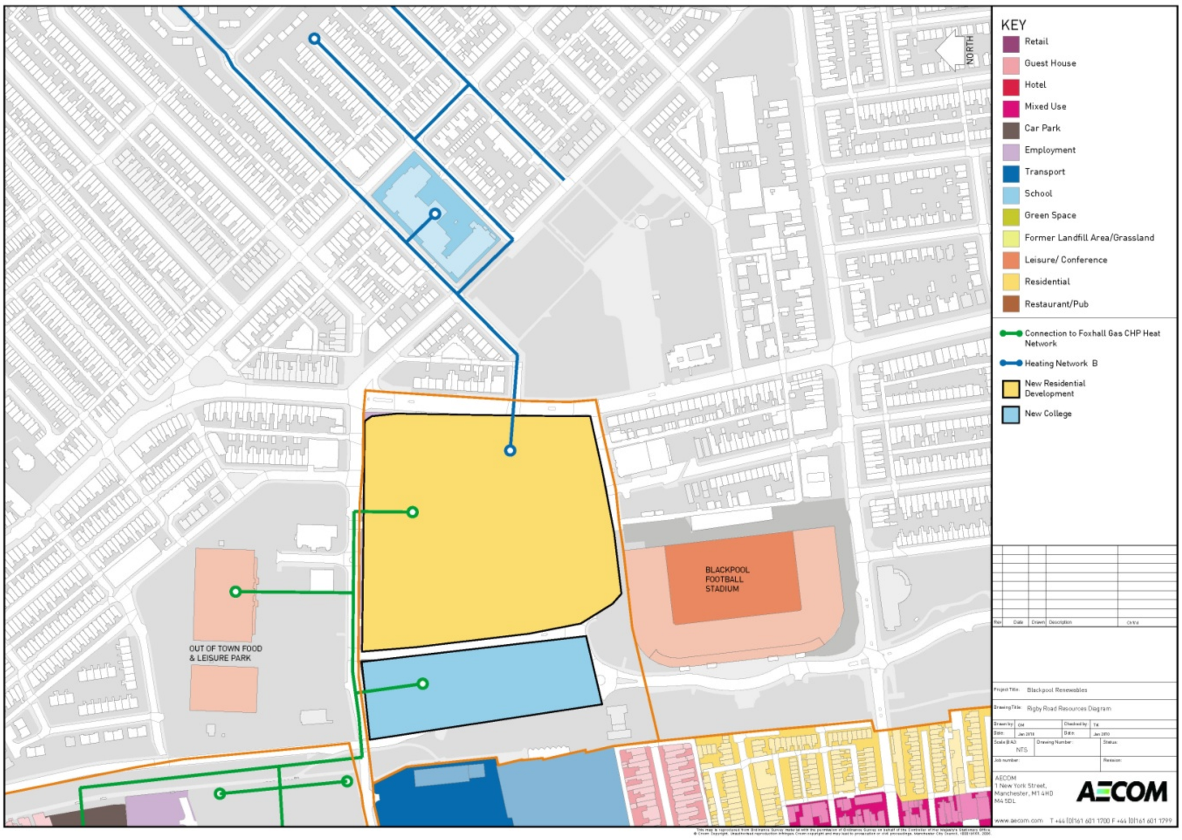


Figure 76: Indicative proposals for low carbon technologies in the Rigby Road area

The table below shows the potential CO2 reductions achievable at the Rigby Road site for the proposed new development based on assumptions made at this stage. The average regulated CO2 emissions savings for new development at the Rigby Road site is 54% which is equivalent to Code level 4 for residential properties. In fact, the residential townhouses assumed for this development potentially achieve Code level 5 based on the assumption of a gas CHP heat network and Photovoltaics. The further education building on its own is capable of meeting Code level 3 based on a heat network connection, although this would be capable of achieving Code level 4 if PV was included on this building.

Building Name	Building Type	Floor Area (m2)	Technology Proposed	% Reduction in CO2		Indicative % Increase in Capital Cost over BCIS baseline cost
				Gross	Over 2006 Part L	
Further Education College	University Campus	15,000	Community Gas CHP	28	40	10
50 New Townhouses	Terraced Housing	4,000	Community Gas CHP + PV	57	108	46
300 Existing Terraced Houses	Terraced Housing	24,000	Community Gas CHP	15	28	-
Average for new development at Rigby Road:				34%	54%	18%

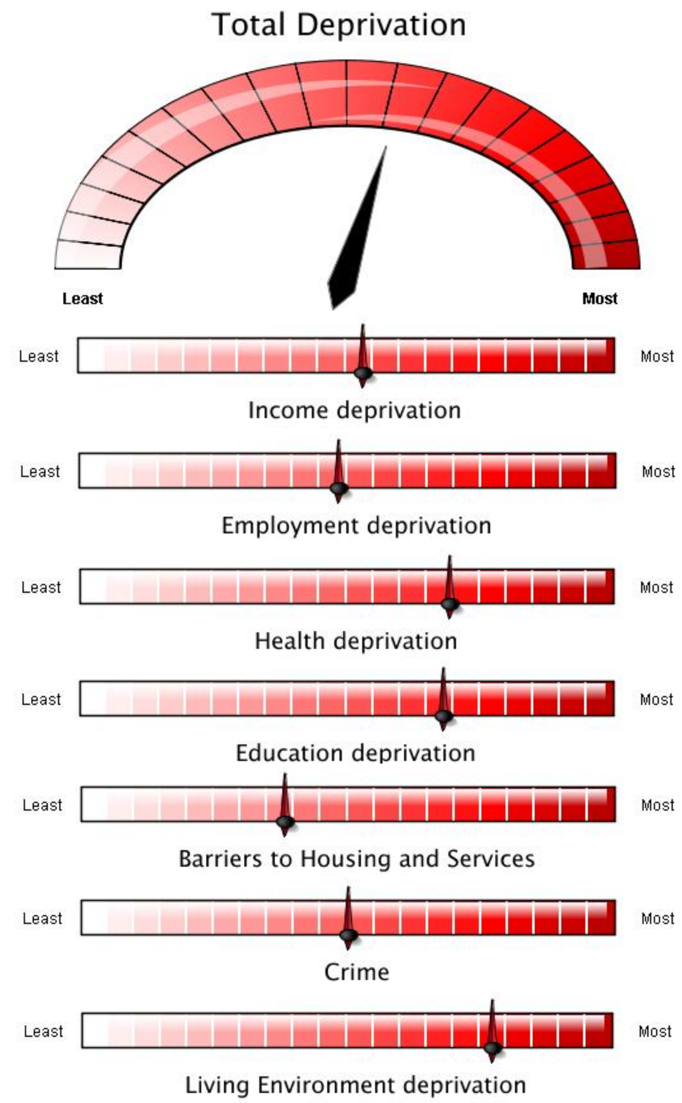
Table 53: Indicative CO_2 reductions and capital cost uplift for redevelopment in the Rigby Road Area– NOTE: indicative capital cost uplift is expressed as a percentage over the BCIS base build cost. These figures are provided to allow a relative comparison between different technologies and cannot be used to assess viability due to the large number of varying factors affecting viability.

5.12 TYPICAL SUBURBAN RESIDENTIAL AREAS

5.12.1 BACKGROUND TO THE AREA

There are a number of suburban residential areas within Blackpool that lie some distance away from proposed areas of new development. These areas are typically difficult to address in terms of implementing measures to reduce CO_2 emissions as they are generally in private ownership and cannot benefit from nearby development or regeneration which may provide opportunities for the implementation of a large-scale low carbon technology (e.g. a low carbon district heating network).

The suburban residential areas of Blackpool are typically made up of medium density semi detached housing as shown in the map above. These areas are generally indistinct in terms of deprivation and lack of access to services, having fairly average levels of income and employment as shown by the Office for National Statistics indicators below:



5.12.1 OPPORTUNITIES FOR IMPROVEMENTS

Improvements to energy efficiency standards are likely to be the cheapest, easiest and most effective measure that can be carried out in these suburban residential areas. Significant improvements could be made (up to 20% reduction in gas consumption) through initiatives to promote cavity wall insulation (the majority of properties in these suburban areas are likely to have cavity walls) and improved loft insulation to a thickness of 270mm (a recognised industry standard for optimum performance against cost). Additional guidance on energy saving tips around the home could also introduce more energy efficient habits to reduce electricity consumption. These energy efficiency improvements should form the minimum standard of improvements made to these properties.

The heat map produced for Blackpool shows that a substantial amount of residential suburban areas have a heat density of 6-9MW/km^2. This heat density shows the potential to implement a district heating network however retrofitting networks in these areas will involve significant capital cost and is likely to be unviable unless the network installation could be scheduled to coincide with other street works and heat exchangers and meters installed when boilers would otherwise have been replaced. This level of scheduled replacement would require significant coordination between various Council departments as well as residents/property owners.

There are also potential funding issues relating to the lead time between commencing the installation of a heat network and the connection of the first customers upon the installation of heat exchangers and heat meters. While this creates a logistical and financial challenge, large scale heat network retrofitting has been carried out in other areas in Europe, namely in Copenhagen, Denmark.

The most likely method of heat generation used to supply a suburban residential heat network would be gas CHP (to meet the base heat load for domestic hot water) topped up by conventional gas boilers to meet peak loads. A district heating network such as this would generate significant CO_2 emissions savings, particularly where connection to a heat network is carried out as a means of upgrading properties that are currently fitted with old inefficient gas boilers.

Retrofitting microgeneration technologies is something that could be promoted by Blackpool Council as a means of reducing the CO_2 emissions of the existing residential stock without the potentially large lead time of a low carbon district heat network. The two technologies that are most likely to be effective for existing residential properties are solar water heating and solar PV. Both of these technologies are expected to receive subsidies for energy generated, with the Feed in Tariff for generated electricity beginning in April 2010 and the Renewable Heat Incentive for generated heat expected to begin in April 2011. Blackpool Council should promote these schemes and encourage residents to install microgeneration technologies. Promotion and assistance could take the form of generating awareness of the schemes, how they are proposed to work, their benefits and details of approved installers.

Areas that are identified as having the potential for a heat network connection in the near future (if there are areas that are scheduled to have major infrastructure works carried out or known areas where a large number of boiler systems are due to be replaced) should be encouraged to take up PV installations rather than solar water heating. This will ensure that the viability of a low carbon district heating network isn’t diminished by reduced demands for domestic hot water as a result of a solar water heating system.

6. Delivery Context – Borough Wide Considerations

6.1 INTRODUCTION

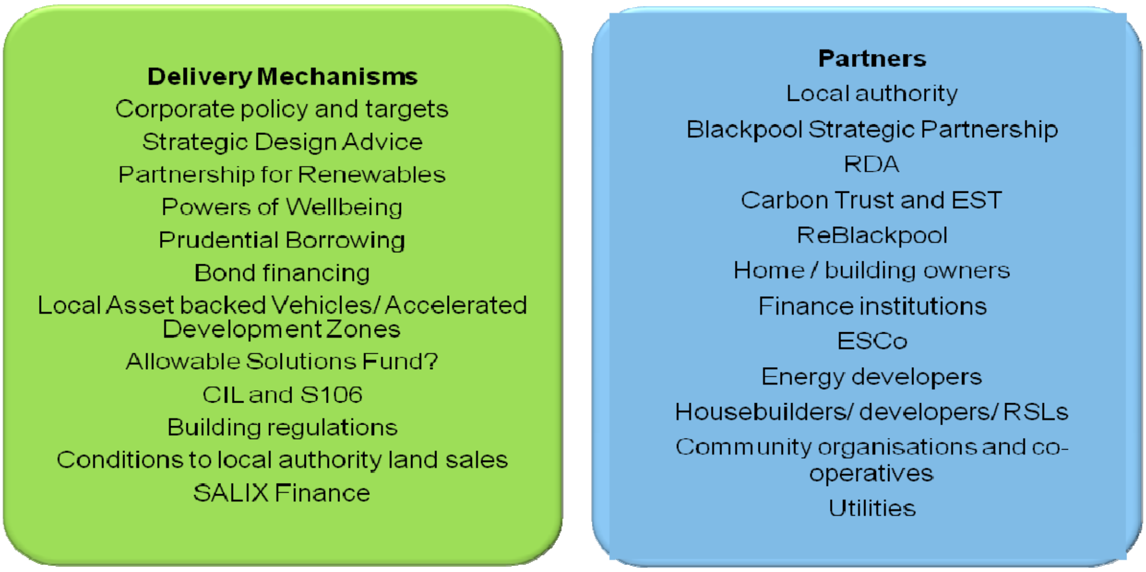
Along with planning policy, targets provide a useful mechanism for articulating to stakeholders the extent of the challenge around low carbon and renewable energy. However, to be effective, policies and targets need to have a strategy for delivery and a collaborative approach between the Council, Blackpool Strategic Partnership, ReBlackpool, utilities, private developers, other stakeholders and the community. This strategy should set out:

- What the objectives of the policy or targets are
- An appropriate mechanism for delivery
- Who is responsible for their delivery
- Recommended next steps

This chapter describes the mechanisms available to Blackpool to deliver the principal opportunities for decentralised renewable and low carbon energy opportunities identified on the energy opportunities map (EOM). These mechanisms should be considered in addition to the planning policy recommendations. It is not intended to be an exhaustive list, nor does it reach definitive conclusions about which mechanisms are most suited to Blackpool. Rather it seeks to clarify the importance of considering delivery at the same time as planning policy and provide guidance on what opportunities exist and where further work is required. Making clear recommendations on what approach will be suitable for Blackpool will require a more detailed study involving discussions across the Council and with partners.

The figure below sets out some of the mechanisms and partners required to deliver change in Blackpool. Both refer to three types of energy opportunity: existing development; new development; and strategic community-wide interventions. Each uses the EOM as the starting point for informing the development of appropriate delivery mechanisms and planning policies. Potentially the most immediate and helpful delivery opportunity is the Low Carbon Building Strategic Design Advice service offered by the Carbon Trust. Up to £50,000 of matched funding can be obtained for scoping works for CO_2 reductions. Although there is no defined product, money is available to large multi-site organisations, including but not limited to local authorities, which could enable Blackpool to act on the recommendations set out in this section and to roll out area based programmes. AECOM is an accredited consultant and able to explore this process further with you.

Figure 77: Overview of delivery mechanisms and partners for energy opportunities in Blackpool



6.2 EXISTING DEVELOPMENT

Delivering Energy Efficiency in Existing Buildings

Our estimations of the likely change in performance of existing buildings in chapter 3 show the differences between a ‘business as usual’ scenario, where energy efficiency measures continue to be encouraged on a national scale with existing local authority initiatives, and a ‘higher reduction’ situation where further steps are taken to maximise energy efficiency. The CO_2 savings that can be achieved through improvements to existing buildings are substantial and this should be a priority across Blackpool. However, a concentrated funding and improvement programme would have to be introduced to trigger the completion of higher cost elements of retrofit. The Councils have a role in working with partner organisations to distribute and focus funding and possible options are explored in this chapter.

This study shows certain areas as having higher heating demand per home than others, particularly in the older central area of Blackpool, and hence in spatial terms these areas can be prioritised for intervention (see Chapter 3). Since heat loss can be more easily and cost effectively addressed than other efficiency measures, leading to immediate CO_2 savings, it has been prioritised for intervention in this study. Home improvement measures such as loft, cavity and solid wall insulation, double glazing and boiler replacement should be heavily promoted across the Borough, as these are the least efficient areas on a per home basis.

Delivering On-Site Renewable and Low Carbon Energy Technologies

Delivery of low carbon and renewable technologies within existing buildings and communities cannot easily be required by planning, but can be encouraged by the Council. The Council should seek to engage communities and highlight the cost-saving benefits of the inclusion of micro-generation, especially with the introduction of the feed-in-tariff[20]. There are also other funding sources available to homeowners and businesses to assist with the capital cost of installation.

The Council has already set an example by installing example micro-generation technologies in Blackpool and supporting the Solaris Centre. Further initiatives could be taken through pro-active community education and leadership of the council by installing significant installations on their own buildings. Blackpool Council owns and manages a high proportion of buildings and facilities in Blackpool, and therefore there is good potential to lead by example.

[20] Due to come into action in April 2010 for micro-generation installations not exceeding 5 megawatts . The tariff will pay generators a guaranteed price for electricity generated and exported to the grid over a period of 20 years (25 for solar PV).

Available Delivery Mechanisms

In addition to central government grants and subsidised energy efficiency offered by energy companies. Local authorities have access to low interest loans and have the powers to deliver energy opportunities in the existing stock using the Wellbeing Power and Community Sustainable Energy Programme (CSEP).

There are funding sources already available to homeowners and businesses to assist with the capital cost of installing CO_2 reduction solutions. These include Warm Front, Carbon Emissions Reduction Target (CERT), the Big Lottery Fund, the Low Carbon Buildings Programme, the Energy Saving Trust and Low Carbon Communities Challenge. Further details are contained in Appendix B.

The three part approach suggested below offers a potentially effective way to co-ordinate the various funding streams and to prioritise areas for installation of micro-generation technologies and energy efficiency improvements. The initiative could be financed using a combination of SALIX and Community Energy Savings Programme (CESP) and could be co-ordinated through the Council and/or ReBlackpool, possibly in partnership with the private sector and energy companies for finance and with installation companies for delivery:

- *Discount provision* – available finance could be used to bulk buy technologies, enabling them be sold on at a discount to households and businesses.
- *Householder or business hire purchase* – appropriate technologies could be leased to householders and businesses. Rental costs could be charged as a proportion of the generation income received by the beneficiary. After a period of time, ownership would transfer to the householder or business.
- *Householder or business rental* – a third model could be for the Council or partnership to retain ownership of the technologies and to rent roof or other suitable space. Again, rental costs would be set as a proportion of generation income. As with the hire purchase option, this approach would give benefits of low carbon and renewable energy to communities without the up-front expense. The advantage of this option would be the retention of control over phasing and technology choice, and greater flexibility to respond to changes in technology and demand.

Table 54: Delivery options for existing development

Option	Potential Partners	Potential Delivery Mechanism
Increased energy efficiency Increased microgeneration	• Local authority • ReBlackpool • Energy companies • Community groups • Private installation companies	• Provision of discounted CO_2 reduction solutions • Hire purchase of CO_2 reduction solutions • Rental of space for CO_2 reduction solutions • Awareness and education campaign for householders and businesses. • Salix Finance • Community Sustainable Energy Programme • Warm Front • Carbon Emissions Reduction Target • Big Lottery Fund • Energy Saving Trust • Low Carbon Communities Challenge • Low Carbon Buildings Programme

6.3 NEW DEVELOPMENT

Delivering CO_2 Reductions in New Development

Building Regulations are the primary drivers for higher energy performance standards and low carbon and renewable energy generation in new developments. The role of Blackpool Council is therefore limited beyond specifying more stringent policy or targets to achieve this.

One option includes applying conditions to sales of the Council's own land requiring higher environmental standards or installation of energy technologies. Partnerships for Renewables is a further option, however we understand that work with PfR has previously not identified any sites.

Another opportunity is the Low Carbon Buildings Programme (LCBP) capital grant scheme. This could be used by the local housing authority, RSLs, schools and other charitable bodies to install micro-generation technologies on their own buildings. We recommend that the Council works with eligible partners to develop a delivery strategy based on the opportunities presented by the LCBP.

A third opportunity is both a planning and a delivery mechanism that is to prioritise delivery of energy opportunities through spending of money raised through a Community Infrastructure Levy (CIL). The CIL is expected to commence in April 2010 and unlike Section 106 contributions can be used 'to support the development of an area' rather than to support the specific development for which planning permission is being sought. Therefore, contributions collected through CIL from development in one part of the charging authority can be spent anywhere in that authority area. This flexibility will enable the Council, as the 'charging' authority, to fund energy infrastructure identified in the energy opportunities map.

It is our understanding that CIL money can be spent on infrastructure projects (the definition of infrastructure includes renewable and low carbon energy technologies) delivered by the public or private sectors or partnership between the two. Therefore, a local authority led delivery vehicle, partnership or joint venture could be established to manage and co-ordinate delivery of energy infrastructure to support new development and to help enable developers meet the requirements of planning and Building Regulations, including future allowable solutions. Although CIL is an optional charge for local authorities we would recommend adopting it in Blackpool in order to deliver energy infrastructure. Should CIL not come into force it may be possible to set up a local tariff, similar to that in Milton Keynes.

Delivering 'Allowable Solutions'

Development post 2016 (domestic) and 2019 (non-domestic) offers a fourth opportunity to deliver low and zero energy in new development by virtue of the requirement through Building Regulations for zero carbon buildings. This is likely to mean that new development will be required to reach a 70% reduction in CO_2 on-site, leaving the remainder to be delivered through 'allowable solutions'. A final list of allowable solutions is expected from Government by the end of 2009, but early indications are that developers will have two broad routes:

- Increased on-site energy efficiency or generation either within the site boundary or through connection of heat technologies directly to the site. Generally, district heating and wind energy will provide excellent and cost effective allowable solution opportunities, but often the integration of these technologies cannot be delivered solely within the boundary of the site since there may be restricted space or heat networks may be more viable when connecting into heat loads off site.
- Alternatively, developers can achieve the remaining CO_2 reductions through off-site reductions. For example, by contribution to the installation or expansion of district heating networks or wind energy elsewhere in the local area.

The latter is of most interest to Blackpool since it has some control, through planning and the delivery mechanisms identified above, over the nature and location of off-site allowable solutions.

The energy opportunities map can be used to identify possible locations. For example, Talbot Gateway could potentially be an anchor development for a district heating solution linking new development to existing high density residential and bed and breakfast and the town centre. Since all of the strategic sites and the larger SHLAA sites sit within a district heating opportunity area, each should be prioritised for action. This is discussed further below, however, further feasibility work will need to be undertaken to understand the extent of the opportunities and to draw up a priority list. This will need to consider practical issues such as development phasing, cost, market potential and delivery strategies. The EOM below shows the location of the strategic sites in relation to feasible district heating area and should be used assist the Council in identifying location and phasing of district heating.

Similarly, wind opportunities exist that can be related to new development. In locations not prioritised by the Council for district heating, developers could be required to pay for or contribute (through the proposed carbon buyout fund) towards a large or small wind turbine off-site in one of the wind opportunity areas. Further work will need to be undertaken to establish the extent of the opportunity, considering issues such as land ownership. Alternatively, if no tariff or buyout fund is in place a Merchant Wind arrangement could be entered into between the developer and energy company.

From our modelling of the likely selection of energy strategies by developers, we can expect the CO_2 reductions that will need to be met through allowable solutions to be equivalent to those discussed in Chapter 4 and shown in the table below. Potentially, allowable solutions or a local carbon buyout fund will be charged at £100/tonne[21], resulting in significant availability of funding. A recent speech by Rt Hon John Denham[22] suggests that an annual pot of £1bn will result from the zero carbon homes policy by 2020.

Table 55: Predicted cumulative demand for off-site CO_2 reduction through allowable solutions from new development (tonnes)

	2006	2011	2016	2021	2026
CO_2 reduction portion from allowable solutions (tonnes)	0	0	923	7,378	15,495
Equivalent annual funding arising from allowable solutions (£)	0	0	92,300	737,800	1,549,500

It should be noted that this scale of contribution will only offset CO_2 increases from new development. The Councils will need to consider these opportunities alongside those for the existing stock and strategic community-wide interventions. Blackpool Council should develop a plan to deliver allowable solutions in the Council areas, to ensure funding available from new development is directed towards the best solutions in a coordinated manner.

The Role of a Local Delivery Vehicle in Addressing Viability in New Development

A 'carbon buyout fund' (operated through CIL or other tariff mechanism) offers a useful way of providing continuity in delivery mechanisms between proposed planning policies requiring energy performance standards ahead of Building Regulations prior to 2016 and the likely allowable solutions post 2016. Linked to this is the important issue of viability. Specifically in relation to new development, a local delivery vehicle (company, partnership or joint venture) set up to deliver projects funded through the fund could provide a useful opportunity for reducing the financial burden on developers, thereby improving viability, while increasing the level of low and zero carbon energy delivered.

While this option will require further work beyond the scope of this study, one of the objectives of a delivery vehicle could be to ensure synergy between delivery of its energy projects and phasing of new private sector development.

[21] Impact Assessment of the Zero Carbon Homes Consultation, CLG, December 2008

[22] The Green Councils of the Future, 26th November 2009

Under such a scenario the vehicle could enter into an agreement with the developer whereby it commits to installing a district heating network. The responsibility and therefore financial burden for the developer would be limited to installing the secondary network, making space available for an energy centre and possibly payment of a connection fee, again operated through the carbon buyout fund. Where phasing synergy cannot be secured the secondary network could be powered by a containerised temporary energy centre.

The Council should carry out feasibility work to assess the potential for setting up a local delivery vehicle to deliver district heating networks across the town. This will need the involvement and buy-in from a wide range of stakeholders and potentially the Homes and Communities Agency.

Table 56: Delivery options for new development

Option	Potential Partners	Potential Delivery Mechanism
Higher energy and sustainability standards Wind energy District heating networks	• Local authority • ReBlackpool • Energy companies • Community groups • Private installation companies • Homes and Communities Agency	• Conditions attached to local authority owned land sales • Low Carbon Buildings Programme • Community Infrastructure Levy or local carbon buyout fund • 'Allowable solutions' or off-site opportunities • Local delivery vehicle (company, partnership or joint venture) • Salix Finance • Low Carbon Communities Challenge • Low Carbon Buildings Programme • Merchant wind

Market Context

Delivery of carbon reduction associated with new development should consider the local market context. The future of the market is difficult to predict, but local studies give us some insight on possible constraints to delivery and cost associated with carbon reductions.

The Strategic Housing Market Assessment (2008) (SHMA) covers the Fylde Coast strategic area, which encompasses Blackpool, Fylde and Wyre. The SHMA identifies the current position for the Blackpool housing market, which in short is skewed towards one bedroom flats and higher density housing and population along the coast and particularly in central Blackpool. Blackpool has a large number of flats but a small number of detached properties. In addition there is a high incidence of HMOs (Houses in multiple occupation due to the conversion of properties to hotels and guest houses, although the tourism sector has been suffering a decline. It is important to note that this high incidence (3,000) of HMOs in Blackpool presents a major challenge to delivering change in the housing stock due to economic viability of the properties to landlords.[23]

SHMA future demand looks at future household projections for the overall Fylde Coast area, including the three local authorities and for the North West of England suggest that there will be an overall increase in the number of households between 2006 and 2026.
The growth will be driven by one person households and a falling household size. Smaller households show the highest levels of under-occupation and therefore there can be no presumption that small households either want, or can only afford, to purchase single bedroom dwellings. It is important to note however, that for affordable housing provision the correlation between household and dwelling size can be assumed as allocation policies tend to dictate the size of property that households are entitled to although over time, and a new choice based letting scheme across the SHMA may result in different findings.[24]

[23] Fylde Coast Strategic Housing Market Assessment (April 2008)
[24] Fylde Coast Strategic Housing Market Assessment (April 2008)

SHMA future supply in the Fylde Coast area will be focused on a limited number of currently developable locations. It will be important to cater for strong growth in single person households, although Blackpool in particular may wish to skew supply against the trend, so as to facilitate a housing market that is more attractive to families and more aspirational in general. Lastly, future supply will need to respond to significant need for intermediate housing, which is in short supply across the housing market area.[25]

The Blackpool housing market viability assessment considers the validity of the current affordable housing targets in the Local Plan for Blackpool, which provides for a minimum of 30% affordable housing on new developments on sites greater than 0.5 hectares or 15 dwellings.

The viability assessment also assesses what tenure arrangements are capable of delivering strategic objectives and meeting needs for affordable housing within new developments. The affordable housing market viability assessment provides a clear understanding of the current affordable housing market. The assessment indicates that the clear targets for affordable housing should still be upheld, which indicates schemes are still capable of being delivered with these associated costs, it is important to bear in mind however, that there is not a lot of margin for error.

The viability assessment suggests that for the tenure mix of 30% affordable housing across the 3 tenure mixes would still be financially viable. However, in some instances developments may be marginal at these levels of affordable provision and individual viability appraisals will need to be considered on a case by case basis. The appraisals conducted necessarily ignore site abnormalities which will be specific to each site.[26]

Ultimately potential to reduce carbon on-site in response to policy requirements will have to be assessed on a site by site basis. If the Council chooses to deliver additional CO_2 reductions above Building Regulations, the developer should comply unless they are able to show (through an open book approach) that additional requirements would make the development unviable. The concept of a ‘carbon buyout fund’ would give developers in the areas certainty about the additional costs of any carbon reductions.

6.4 STRATEGIC COMMUNITY-WIDE INTERVENTIONS

The principle stand alone renewable and low carbon infrastructure opportunities in Blackpool Borough come from large and medium scale wind turbines, geothermal and district heating networks to provide community heat from biomass or gas (preferably with CHP to provide electricity as well). These types of technologies are likely to come forward in one of two ways: through private commercial interest or through local authority and/or community investment. Schemes are likely to be larger and may significantly contribute towards delivery of authority wide, regional or national energy generation targets rather than primarily off-setting increases in CO_2 emissions or energy demands resulting from new development.

Local authority-led delivery is likely to be crucial to increasing installed capacity and maximising delivery of energy opportunities, especially for district heating since the private sector is traditionally poor at delivering infrastructure. Opportunities are set out below and will need to be supported by planning policies.

Planning policy and decision-making should support the market development of renewable energy and low carbon, where it doesn’t conflict with other planning criteria. Broadly speaking, there are three areas where planning can influence strategic community-wide decentralised renewable and low carbon energy:

- Providing an overarching supporting policy, along with a set of criteria policies to guide development;
- Identification of suitable sites and opportunity areas; and

[25] Fylde Coast Strategic Housing Market Assessment (April 2008)

[26] Blackpool Affordable Housing Policy Viability Appraisal, Keppie Massie, (August 2009)

- Providing policies designed to support delivery mechanisms, such as a requirement for new development to connect to a district heating network.

Delivering Decentralised Renewable and Low Carbon Energy through Private Investment

Market opportunities will be delivered with little or no requirement for intervention by the public sector beyond supportive planning policies. However, the Council and its partners can maximise the likelihood of delivery by the market in a number of ways:

- Development of stand-alone wind power is a possibility in some areas of Blackpool. The Council should seek to positively support development of wind energy. However, as a broad rule of thumb commercial wind developers are interested in opportunities of above 5MW. Since most of Blackpool's opportunities will be for smaller scale or individual turbines, they are unlikely to be attractive to commercial developers. The Council or community groups will therefore have an important role to play in bringing sites forward, potentially through a Merchant Wind arrangement.
- As with new development, the zero carbon building policy's proposed allowable solutions will place emphasis on the Council to identify and support delivery of strategic and community scale solutions. There is potentially, therefore, an opportunity to use delivery of energy opportunities across Blackpool as a driver for housing delivery. In other words, where key large-scale opportunities driven by new development have been identified then the value of these energy opportunities to a developer, in terms of potential income from energy sales combined with Renewables Obligation Certificates (ROCs), feed-in-tariff or future renewable heat incentive could actually drive the delivery of more homes rather than acting as a break on development.

Table 57: Delivery options for strategic community-wide market interventions

Option	Potential Partners	Potential Delivery Mechanism
Wind energy Biomass supply chain	• Local authority • ReBlackpool • Regional and sub-regional bodies • Energy companies • Homes and Communities Agency	• Community Infrastructure Levy or local carbon buyout fund • 'Allowable solutions' or off-site opportunities • Local delivery vehicle (company, partnership or joint venture) • Merchant wind • Northwest-wide development and coordination of biomass supply chains • Renewable Obligation Certificates and feed-in-tariff • New housing or domestic development

Delivering Low Carbon and Renewable Energy through Local Partners

There are three principal reasons why reliance on delivery of energy opportunities through market mechanisms alone may be insufficient to achieve maximum delivery:

1. Where opportunities extend beyond the boundaries of an individual site or development. This is particularly an issue for CHP or district heating schemes where viability is determined by a combination of scale, mix of use and density. Individual sites, even Blackpool's larger strategic ones, may not be able to support a network without extending it into existing developments or connecting to an anchor load, such as a hospital or civic building. The additional cost and practical challenges of delivering a scheme that crosses new and existing development, areas of multiple land ownership and other infrastructure such as roads, rivers or railways is unlikely to attract commercial developers. It is therefore unlikely that an individual planning application will be forthcoming.

2. District heating is a well established type of infrastructure in many parts of Europe. In the UK, however, there are a relatively small number of examples meaning that schemes can be marginal.
3. Where schemes are of insufficient size to attract a commercial developer. Wind developers are generally less interested in smaller schemes (those below 5MW may be considered as a very crude rule of thumb) meaning that more constrained, but still windy, sites may go undeveloped. The link to allowable solutions for new development described earlier may offer one solution but this will still leave some opportunities unrealised.

Where market delivery isn't forthcoming Blackpool Council can lead delivery of energy infrastructure, potentially with support from the private sector, investors or communities. Communities may want to join together to deliver energy infrastructure, investing in capital cost and receiving income from selling energy, though further work will need to be undertaken to understand the nature of Blackpool's communities.

Medium and large scale wind

Few wind opportunity areas identified in the EOM are likely to be attractive to commercial developers. Project finance options include the issuing of bonds to residents and businesses. Returns on investments would be based on energy sales, ROCs and the feed-in-tariff. Further community incentives could include discounts on Council tax. These kind of delivery approaches will be challenging. Therefore, to ensure sufficient expertise and resource is devoted to making local authority-led delivery initiative a success it is recommended that a local authority-led delivery vehicle, such as an ESCo, partnership or joint venture, be considered. The types of ESCo are discussed in more detail below.

Some primary and secondary schools sit within or close to wind opportunity areas, which presents a further opportunity for linking up with the Building Schools for the Future programme. Where school focussed communities are identified, through further work, community-led delivery could provide an alternative to local authority-led delivery.

Cooperatives are a common delivery mechanism in parts of Continental Europe and a few examples exist across the UK, including Baywind, the first UK wind cooperative. The cooperatives are overseen by Energy for All. Shares are issued to fund development of turbines with investors receiving a stake in the project and annual financial returns. Importantly, community ownership can help to boost support for a wind proposal. The local authority can play a useful role as a partner and in raising awareness of the potential for community ownership. Community ownership or investment could bring particular benefits for delivering more controversial schemes; large wind being an obvious example in such a heavily constrained district.

For all potential wind sites the Council and its partners should identify delivery opportunities, considering available financial mechanisms, publically owned land, community involvement and ownership and the role of schools.

District heating with CHP

There are major opportunities across Blackpool for the introduction of heat networks. Some relate to strategic sites, but most of the existing urban area also has good heat densities. A strategic approach will be necessary to successfully manage and co-ordinate delivery. The local authority would be ideally placed to plan, deliver and operate part or all of a district heating network through establishment of a delivery vehicle.

The following will need to be considered:

- Financing – the different elements of a network can be treated differently. The operating costs of the insulated pipes that move heat between the energy centre and customers are relatively low. The main cost is installing the pipeline at the start. The pipe work, therefore, could be competitively tendered by a local authority-led vehicle and, since the Council may have access to low interest loans and repayments over a long time period using prudential borrowing, repayments can be kept to a minimum. Repayments could be serviced by energy sales and income from the renewable heat incentive, ROCs and/or the feed-in-tariff.

  It needs to be recognised however the ability of the public sector to raise finances is likely to be severely hampered for the foreseeable future by the current economic crisis. Alternative sources of funding may need to be considered, including: bond financing; local asset-backed vehicles; and accelerated development zones or tax increment financing. In the December 2009 Pre Budget Report the Government committed to examining tax increment financing and the scope for local authorities to borrow against future CIL revenues and the renewable heat incentive and feed-in-tariff revenue streams. This could provide crucial finances to support investment.

Energy centres tend to have lower upfront costs. The expense comes with ongoing operation and maintenance, a shorter life span (around 15 years) and exposure to fluctuations in energy prices. While ownership of the sites and buildings may be retained by the local authority, the plant itself could be operated by a private sector ESCo. To simplify things further for the Council, the billing and customer service elements could be contracted out to a third party.

- Delivery of networks as part of new development could also be undertaken by a local authority-led delivery vehicle or partnership, leaving the secondary network to be installed by the developer. The developer could then be charged a connection fee to the primary network. An initial district heating network could be installed to connect existing council facilities, where new and existing development later connects. This model has been used successfully by the Council in Woking. Council-owned properties are shown in relation to the predicted heat density in the figure below.

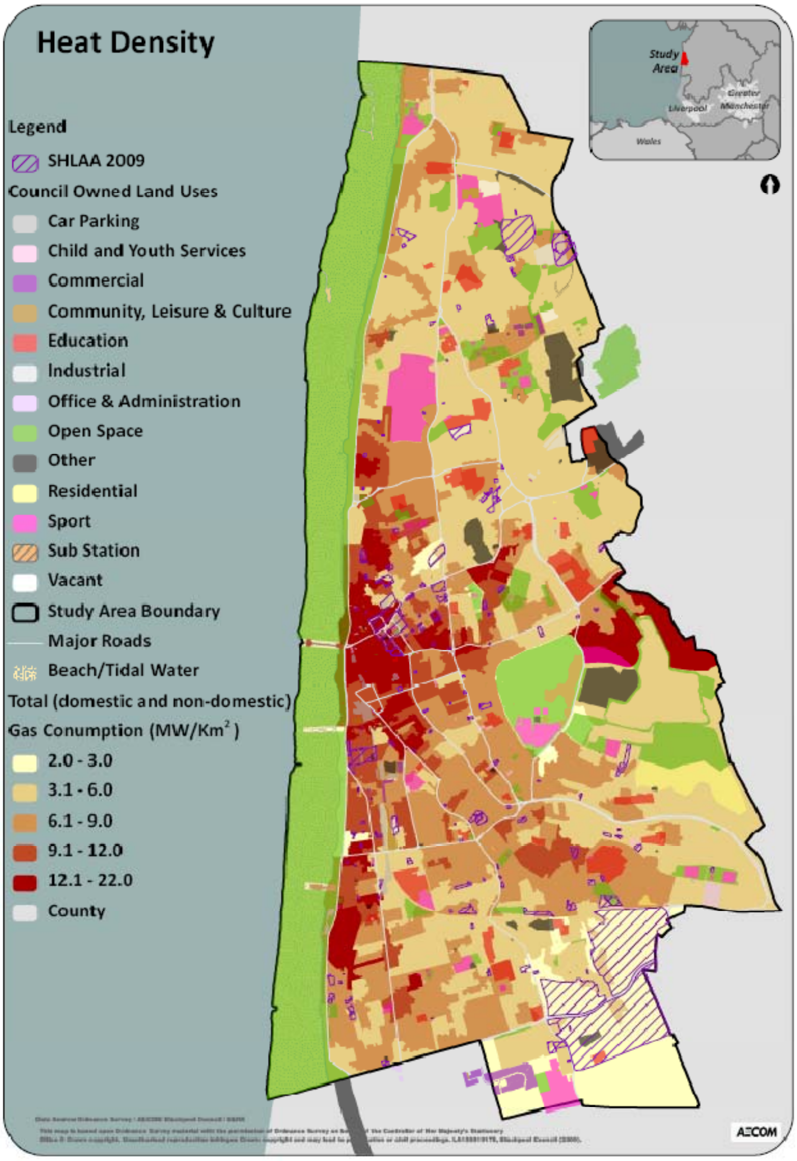


Figure 78: Council owned facilities in relation to heat density

- Planning - the PPS1 Supplement presents opportunities at the local level in the form of an LDO, which can be applied by local authorities to extend permitted development rights across whole local authority areas or to grant permission for certain types of development. Should the Council agree to lead installation of a district heating network then it is recommended that they explore the option of establishing an LDO in order to add certainty to the development process and potentially speed up delivery.
- Phasing – installing a district heating network is a major capital investment. The cost depends on the number of buildings to be connected, how close together they are and how much heat they require. In order to minimise risk, a general strategy for developing a scheme would be to secure the connection of a large anchor load within close proximity to the generating plant. Existing anchor loads are identified on the energy opportunities map. Further work will need to prioritise sites based on the following suggested considerations:
    - Opportunities for incremental delivery, such as by requiring pipes to installed when roads are being dug up. South Beach AAP is in the area with the highest heat density and a short delivery timescale (completion by 2011) and would make sense to designate as a district heating priority area. Concerns over financial viability means that alternative delivery mechanisms should be explored.
    - There are no major road redevelopment proposals, but the three wide corridors (Central Drive, Talbot Road and Church Street) which radiate out from central Blackpool would be key corridors for heat mains. These are likely to require strategic interventions to ensure opportunities are not lost.
    - The tramway is being re-laid along the promenade which offers the opportunity to lay a heat main. This options should be explored further with the relevant stakeholders and as part of the Foxhall, South Beach, North Beach and the conference and leisure quarter developments.
    - Phasing of and opportunities from strategic sites. Sites that include new anchor loads as part of the development will make ideal candidates, such as Talbot Gateway and the conference and leisure quarter.
    - Opportunities for connecting existing anchor loads. For example, the CHP at Victoria Hospital cannot be extended due to electricity capacity constraints in the surrounding infrastructure. The absence of a strategic development site means that the local authority is likely to need to work with the NHS, utilities and other partners to assess opportunities for extending the hospital CHP to surrounding communities.
    - Areas of hard to treat homes and buildings, such as those with solid walls (a significant proportion) or conservation areas.
- *Type of development* – the following criteria have been applied to draw up the energy opportunities map but can also be applied to detailed assessments:
    - Large scale mixed use development (at least 500 homes and 10,000m^2 non-domestic) to enable a good anchor load
    - Proximity to high heat density areas with gas grid to enable extension into existing development
    - Proximity to existing fuel sources (e.g. waste heat, managed woodland, waste treatment site) to enable easy access to renewable fuel sources
    - Proximity to good transport links to enable solid fuel delivery
    - Proximity to sources of waste heat (e.g. industrial processes) to enable zero carbon energy source.

Geothermal

Opportunities may exist to utilise geothermal energy beneath Blackpool. The resource is unproven and would need to be further explored by the Council and its partners. Ideally, the potential should be explored with a view to incorporating the technology as part of a wider district heating and CHP network, as Southampton has done (see Chapter 4).

Creating a biomass supply chain

There are opportunities to establish a biomass supply chain, coordinating both forestry and agricultural waste and growth of bio-crops locally. The limited supply of biomass within Blackpool means that the Council will need to explore sub-region or region-wide opportunities with partners in neighbouring rural authorities. Key issues are:

- Biomass supply chains
- Management of sewage – Blackpool sewage currently goes outside borough to Fleetwood
- Management of waste - Blackpool waste currently goes outside borough to Fleetwood

Table 58: Delivery options for strategic community-wide local authority and community interventions

Option	Potential Partners	Potential Delivery Mechanism
Wind energy District heating and CHP Biomass supply chain Geothermal	• Local authority • ReBlackpool • Regional and sub-regional bodies • Energy companies • Homes and Communities Agency • Partnerships for Renewables • NHS • Developers • Community groups	• Community Infrastructure Levy or local carbon buyout fund • 'Allowable solutions' or off-site opportunities • Local authority led delivery company, partnerships and joint ventures • Merchant wind • Northwest-wide development and coordination of biomass supply chains • ROCs and feed-in-tariff (April 2010) and possibly renewable heat incentive in 2011 • District heating priority areas • Wind priority areas • Cooperatives and community involvement • EDF Renewable Energy Fund • Carbon Emissions Reduction Target • Building Schools for the Future

6.5 DELIVERY PARTNERS

It is clear that a planned approach is necessary, with targets complemented by spatial and infrastructure planning. The implications of this for the Council are significant. We are no longer simply talking about a set of planning policies; rather success depends on coordination between planners, other local authority departments (including the corporate level) and local strategic partners.

Two central documents for setting out the requirements for coordinated delivery of low carbon and renewable energy projects at the local level are the Blackpool Sustainable Community Strategy, "Your Blackpool, Your Future", and Local Development Frameworks (LDF) prepared by the planners.

Dialogue between AECOM and the Council has indicated that there is enthusiasm for exploring options for setting up a local authority delivery vehicle. The skills needed to do this are likely to need to be developed. This does not need to be an insurmountable barrier and there are a growing number of local authorities engaging in similar activities both in energy and other areas. The key to success is likely to be leadership: from senior local authority management or, at least initially, from committed individuals in planning or other departments.

Delivery vehicle models range from fully public, through partnerships between public, private and community sectors to fully private. Broadly speaking, the greater the involvement of third parties the lower the risk to the authority but, importantly also, the less control the authority will have. Whichever route is chosen, the delivery vehicle should be put in place as early on in the development process as possible, so that its technical and financial requirements can be fed through into negotiations with potential customers.

Table 59: Advantages and disadvantages of ESCo/delivery vehicle models

	Private Sector Led ESCo	Public Sector Led ESCo
Advantages	▪ Private sector capital ▪ Transfer of risk ▪ Commercial and technical expertise	▪ Lower interest rates on available capital can be secured through Prudential Borrowing ▪ Transfer of risk on a District heating network through construction contracts ▪ More control over strategic direction ▪ No profit needed ▪ Incremental expansion more likely ▪ Low set-up costs (internal accounting only)
Disadvantages	▪ Loss of control ▪ Most profit retained by private sector ▪ Incremental expansion more difficult ▪ High set-up costs	▪ Greater risk ▪ Less access to private capital and expertise, though expertise can be obtained through outsourcing and specific recruitment

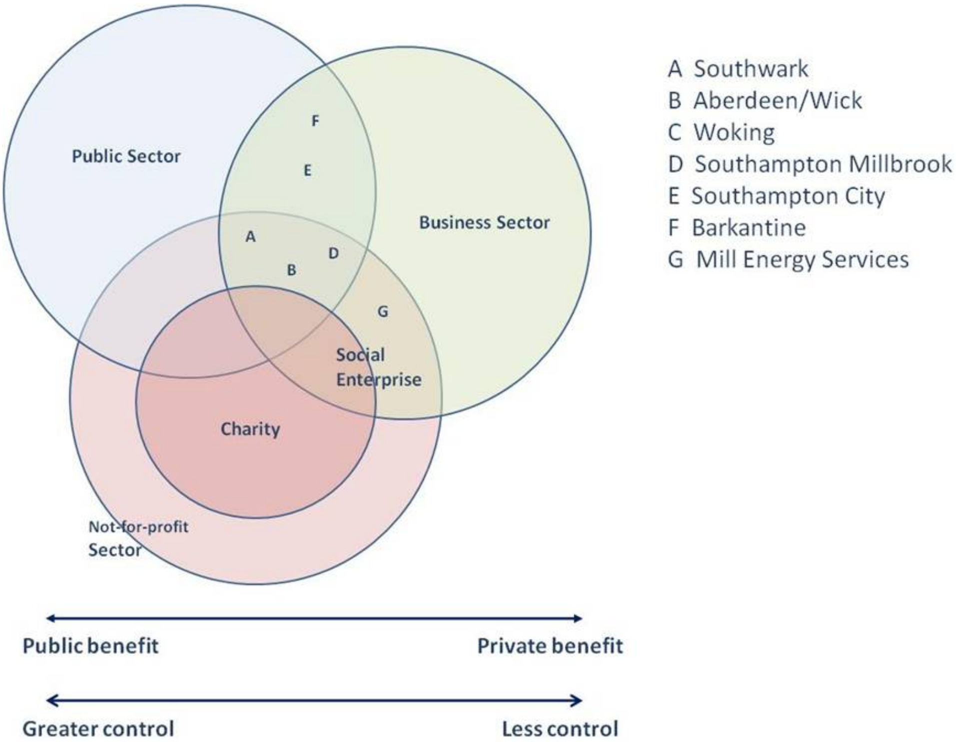


Figure 79: Spectrum of ESCo/delivery vehicle (Source: Making ESCos Work)

6.6 MONITORING AND REVIEW

Key to delivering an effective area-based low carbon and renewable energy strategy is successfully drawing on all of the available opportunities. This includes the Comprehensive Area Assessment (CAA) process, which recognises the fact that no single organisation can be responsible for meeting local needs. Alongside the opportunities for a local delivery vehicle are shorter-term Local Area Agreements (LAA) and National Indicators.

The Renewable Energy Strategy proposes introducing a renewable energy indicator, but until this time several can be used to deliver energy projects:

- NI 185 – Percentage CO_2 reduction from local authority operations.
- NI 186 – Per capita CO_2 emissions in the local authority area.
- NI 187 – Tackling fuel poverty – percentage of people receiving income based benefits living in homes with a low and high energy efficiency rating.

6.7 RECOMMENDATIONS AND NEXT STEPS

There are a wide range of delivery mechanisms that can be employed to support planning for energy. Not all will be suitable for Blackpool and mix is likely to be needed to encompass all of the energy opportunities. This report provides the context for making those decisions. Further work, discussions and advice will be needed to make them happen. As a first step we recommend that Blackpool Council explores further the potential for using Carbon Trust Low Carbon Building Strategic Design Advice money to undertake the following next steps:

Leadership and skills

- The Council must take strategic leadership role together with ReBlackpool and Blackpool Strategic Partnership to ensure the necessary political and stakeholder buy-in.
- It must develop skills across the Council and its partners.

Priority actions and projects

- The Council needs to set out a clear framework which gives relative certainty. Action should be prioritised on strategic sites, council and public sector property and assets, such as Victoria Hospital. Oversize energy generation should be considered on new development sites and in public sector and council owned schemes to supply excess heat/energy to surrounding developments.
- The Council should work with the other local authorities in the Fylde Coast sub-region to develop opportunities for energy from sewage, waste, hydropower, larger wind energy and biomass energy that would provide deliverable opportunities in the wider sub-region, in line with the Fylde Coast MAA which recognises key wider opportunities for renewable energy technologies.
- Initiatives in energy efficiency priority areas should focus on home improvement measures such as loft, cavity and solid wall insulation, double glazing and boiler replacement.
- The Council should work with eligible partners to develop a micro-generation retrofit strategy based on the opportunities presented by the LCBP.
- A set of priority district heating schemes should be drawn up by the Council and its partners and further feasibility work carried out. This should be based on factors such as financing options, planning, phasing and type of development. Options for designation as a district heating priority area include:
    - South Beach AAP. Concerns over financial viability means that alternative delivery mechanisms should be explored.
    - Central Drive, Talbot Road and Church Street along with the promenade would be key corridors for heat mains. These are likely to require strategic interventions to ensure opportunities are not lost.
    - The tramway along the promenade.
- Should the Council agree to lead installation of a district heating network then it is recommended that they explore the option of establishing an LDO in order to add certainty to the development process and potentially speed up delivery.
- For all potential wind sites the Council and its partners should identify delivery opportunities, considering available financial mechanisms, publically owned land, community involvement and ownership and the role of schools.
- Opportunities for biomass, biofuels and biogas should be explored with partners in neighbouring authorities.
- Geothermal potential should be explored with a view to incorporating the technology as part of a wider district heating and CHP network.
- The Council and its partners should undertake further work to explore the role for the local authority to link housing development to energy supply delivery.

Delivery vehicles and funding

- The Council and its partners need to establish an appropriate form of delivery vehicle or vehicles to pursue the key energy efficiency and supply opportunities. Further work will be needed to understand what is suitable for Blackpool but will need to consider ESCo, partnerships and joint ventures.
- Funding mechanisms should be identified and applied first to priority schemes, co-ordinated through the appropriate delivery vehicle. These could include:
    - Delivery of whole house and street-by-street energy efficiency improvements and retrofit of micro-generation technologies.
    - Setting up a carbon buyout fund, possibly using the CIL, to pay for large or small wind turbines off-site in the wind opportunity areas. Further work will need to be undertaken to establish the extent of the opportunity, considering issues such as land ownership.
    - Developing a plan to deliver allowable solutions to ensure funding from new development is directed towards the best solutions in a coordinated way.
- Communities are likely to play a crucial role in the delivery of energy infrastructure. However, to be successful further work will be needed to explore how communities function within Blackpool.

7. Policy Options

The previous chapters have developed an evidence base for policy development, based on the policy, energy use and environmental context, the resource potential and delivery considerations. The sections below outline the possible policy options open to Blackpool Council to implement carbon reductions in the Borough. These policy options are based on the analysis within this report and the best information available at the time of writing. These policies should be developed in conjunction with the other policies that make up the local development framework and consider the effect of policies on the local development context to ensure that they are fit for purpose, viable and achievable.

A full suite of policy options have been set out. These can be reviewed by the Council and combined and refined as necessary. The structure of the chapter follows that of the previous; considering policies applicable to existing buildings, new development and strategic community-wide interventions.

The diagram below outlines the relationship with the three tiers of opportunity for energy efficiency through existing, new and strategic community-wide interventions, providing a list of policy options that could be provided in relation to these opportunities.

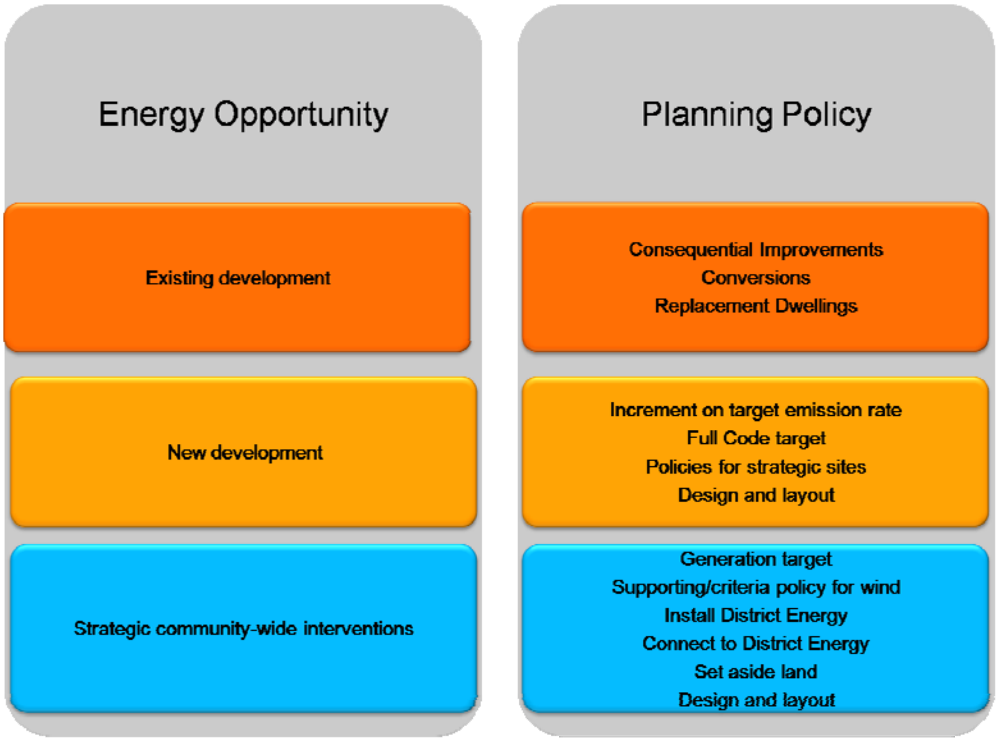


Figure 80: Policy options for the three energy opportunities

The Energy Opportunities Map (EOM) and delivery mechanisms set out in Chapter 6 have informed the policy proposals in this chapter. We propose that the three elements be treated together, as follows:

- The EOM is either adopted as policy and used to justify planning and other policies and actions, or included as part of a supplementary planning document (SPD); and
- The recommendations form the basis of council-wide discussions on delivery.

An Energy Efficiency SPD would give people making planning applications additional information on the measures that they can include in new development to reduce energy use.

The policy options proposed here will need to be reviewed if and when the approach to local authority delivery is agreed by the LPA and their partners. The review will need to consider:

- The nature of the local authority delivery mechanism and the role of planning policy in supporting this; and
- The extent to which existence of this mechanism influences the viability and feasibility of the policies set, and discussion around the need for more explicit criteria.

7.1 EXISTING DEVELOPMENT

Planning policy for directly influencing existing development are fairly limited. Therefore, it is important that the delivery opportunities identified in Chapter 6 are developed further in order to improve the energy performance of the existing building stock.

In the Blackpool context, the existing stock makes up a very significant portion of energy demand (and thus energy-related carbon emissions) over the core strategy period as the majority of buildings are in relatively poor condition and in need of regeneration and renewal. As the area is very built up, it is less about the building of new developments and more about working with the existing stock and improvements to this stock. Section 3 gives an overview of current stock and planned future changes to tenure and type.

Therefore, in policy terms, there is a need to give emphasis to measures that can be taken through planning to improve existing stock.

7.1.1 POLICY OPTIONS: CONSEQUENTIAL IMPROVEMENTS TO EXISTING HOMES

Policy Options Development Context

The purpose of the recommendations for policy options is to reduce CO_2 emissions from existing housing and off-set any increased heated volume of a dwelling caused by extensions. The approach aims to make the most of any straightforward opportunities for improvement that exist in existing buildings. These include loft and cavity wall insulation, draught-proofing, improved heating controls and replacement boilers.

The positive elements to implementing a policy like this is that significant numbers of homes in Blackpool will require upgrading in the near future and these measures will put in place targets that any building improvements will need to meet, as part of a planning application, in line with national energy targets,.

Precedent examples exist for these types of policies for existing development within the Uttlesford District Council Energy Efficiency and Renewable Energy SPD (2007). This SPD includes details of policies relating to extensions and replacement dwellings. These precedent polices are listed below;

Uttlesford Guidance 2 - In relation to extensions, where a property is proposed to be extended the Council will expect cost effective energy efficiency measures to be carried out on the existing house. Applicants are asked to complete and submit a home energy assessment form and are notified of energy savings measures that the Council will require as part of the conditions of granting planning permission for the extension

Uttlesford Guidance 3 - In the case of replacement dwellings if the replacement is bigger than the existing house then the Council will seek an "as built" dwelling emission rate 10% lower than the target emissions rate calculated to comply with Part L1A of the Building Regulations.

Uttlesford District Council has been successfully implementing these adopted policies for three years, and they have been well received by householders. Around 1,400 extensions have been affected by the policy so far, and the total projected savings from measures required as a result are £72,600 and 398,000kg of CO_2 per year.

A precedent example does not exist for conversions to existing development, however Blackpool has such unique circumstances for encouraging the implementation of an energy policy directly relating to the conversion of properties, that a policy option has been developed for conversions. The reasoning behind this is the large reservoir of low standard accommodation that exists in the Blackpool vicinity, which are currently in the form of HMOs (Homes in Multiple Occupation) such as Hotels and B&Bs, but may be converted back to residential homes.

Policy options have been outlined below to give a notion of the type of framework policies for energy efficiency in existing developments need to be set within.

Policy Options:

1. Extensions to Existing Homes

Any changes to existing domestic dwellings should include reasonable improvements to the energy performance of the existing dwelling. This is in addition to the requirements under Part L of the Building Regulations for the changes for which planning permission is sought. Improvements should include loft and cavity wall insulation, draught-proofing, improved heating controls and replacement boilers.

A checklist could be included as part of this process in order to identify which measures are appropriate to each home. In the case where the building already includes key energy efficiency measures, no improvements need to be made. The total cost should be no more than 10% of the total build cost.

2. Conversions

Any Conversions to existing buildings should include improvements such as loft and cavity wall insulation, draught-proofing, improved heating controls and replacement boilers. It should be encouraged that any requirements for new boilers should result in the property instead connecting to the existing or planned decentralised heat and/or power scheme. If the conversion is likely to take the form a substantial structural re-building of the property, then any changes will need to comply with Part L of the Building Regulations as a minimum.

Approach to Policy Implementation

The Uttlesford Council implementation of policy for existing buildings provides a proven example on how these policies can be applied and assessed. Uttlesford have devised a checklist of carbon reduction measures (with limited cost implications) that is used to assess existing homes. The checklist approach is simple – if any of the measures on the list are applicable, they are likely to pay for themselves in energy cost savings in less than seven years, and their combined cost does not exceed 10% of the cost of the building works, they are required. If none of the measures on the list fit the bill, none are required.

All proposed conversions that are deemed to need to comply with Part L of the Building Regulations will need to be rigorously checked against this criteria as part of the policy implementation. It is recommended that the policy option relating to conversions is included in the revision to the Supplementary Planning Guidance Note- SPG10: Change of use of holiday accommodation & conversion of properties to permanent residential use & holiday flats.

Renewable energy technologies can be introduced onto existing buildings but this is only advisable after all the basic measures have been introduced to make the existing building as efficient as possible.

The policy options above focus on existing homes in particular. Similar policies could also be set for non-residential buildings, as these are large contributors to carbon emissions for the Borough, however, a clear implementation system for different building types would have to be developed. In the absence of a checklist approach, developers could be asked to demonstrate how carbon emissions have been reduced at the Authority's discretion.

7.2 NEW DEVELOPMENT

A range of planning policy approaches can be directed at new development. The starting point has been to propose policies that meet the following criteria: readily understandable and implementable by development managers and applicants; do not have an adverse impact on scheme viability; and maximise CO_2 reduction and decentralised renewable and low carbon energy installations.

It is important that new buildings are designed for energy efficiency and where possible should include some form of renewable energy and combined heat and power generation. This should be on site where possible, however off site solutions could be considered if benefits can be evidenced, for example, where a critical mass can be established for the needs of more than one development to be met. Often the most cost-effective options for carbon reduction can be realised when a development is considered in its wider context, and hence it is in the interest of developers and the Council to delivery wider opportunities. These are discussed further in section 7.3.

Blackpool is predominantly developed land, and hence most new development is in-fill or regeneration of existing sites. Due to the central location, and often simultaneous development of neighbouring sites and areas over the core strategy period, new development will be a key driver for delivery in Blackpool. Due to the scale of strategic sites in Blackpool, these should be prioritised as key opportunities to achieve exemplar reductions in carbon emissions.

7.2.1 POLICY OPTIONS: ACHIEVING A REDUCTION IN CO2 EMISSIONS THROUGH NEW DEVELOPMENT

Policy Options Development Context

There is a framework through national and regional policy for inclusion in planning policy of CO_2 emissions targets and higher energy and carbon performance standards than Building Regulations. Changes to the Building Regulations for residential buildings, in 2010 and expected in 2013 and 2016, will bring in tighter standards for CO_2 emissions. After 2016 it will be necessary for all new residential buildings to be built to zero carbon standards, with the equivalent standard for non-residential buildings due to be introduced in 2019.

Policy can be used to accelerate the move towards zero carbon. All new buildings, both residential and non-residential, can be expected to achieve an additional increment reduction on the residual CO_2 emissions after Building Regulations compliance. This should be met through “carbon compliance;” a combination of energy efficiency measures, incorporation of on-site low carbon and renewable technologies and directly connected heat (not necessarily on-site). The function of these policy options is to drive delivery of carbon reductions in Blackpool, where buildings (both existing and new) are essential to carbon reduction potential due to constraints on wider renewable energy generation in such a built up area.

There are key opportunities for wind power and decentralised heating schemes which need to be delivered at a borough-wide scale. It is considered essential that immediate action is taken to begin to deliver renewable and low carbon energy in Blackpool to meet 2020 targets. Allowable solutions may provide funding post 2016, but key opportunities will be missed in the interim. The redevelopment of the town centre areas and strategic sites through new development will be a key opportunity to deliver infrastructure which is likely to start coming forward, at least in part, before 2016.

Precedent examples exist for these types of policies for new development within the draft Manchester City Council Core Strategy. The Core Strategy includes details of a policy relating to reducing CO_2 emissions through new development. This precedent policy is listed below;

Policy Approach En1 – Achieving a Reduction in CO_2 Emissions through New Development
The City Council will seek to decouple growth in the economy and growth in CO_2 emissions, through the following actions;

- *All development must follow the principle of the Energy Hierarchy*

- *Wherever possible new development must be located and designed in a manner that allows advantage to be taken of opportunities for decentralised, low and zero carbon energy.*
- *Where possible new development will be used as a mechanism to help improve energy efficiency and increase decentralised, low carbon energy supplies to existing buildings.*
- *Where appropriate new development will be required to connect to existing or planned/potential decentralised heat and/or power schemes.*

Policy Approach En3 – CO_2 Emissions Reduction Target Framework

The policy sets percentages of CO_2 reduction in relation to Building Regulations and proposed Allowable Solutions.

Policy Options:

3. Additional Increment on Building Regulations

In order to contribute to the delivery of the Energy Opportunities Plan, all new buildings in Blackpool should be subject to either a Community Infrastructure Levy, charged at £100 per tonne of CO_2 per building emitted over a 30 year period (or a one-off payment of £3,000 per tonne of CO_2 per building); or

Aim to achieve a 15% reduction in residual CO2 emissions in all buildings after Building Regulations Part L compliance has been demonstrated. This can be achieved through "carbon compliance", i.e. a combination of energy efficiency measures, incorporation of on-site low carbon and renewable technologies and directly connected heat (not necessarily on-site).

Planning approval should then be conditional on the provision at the design stage and on completion of design and as-built Building Control Compliance documentation clearly showing the Target Emission Rate (TER) and Dwelling Emission Rate (DER) / Building Emission Rate (BER).

A reduction in emissions should be provided either on site, as part of CIL or as part of a carbon buyout fund which would be used in the event of CIL not being established as a requirement.

4. Efficient Design and Integration of New Development

All new development should, where possible, be located and designed in a way in which advantage can be taken of opportunities for decentralised, low and zero carbon energy.

All new development should catalyse improvements for energy efficiency and increase supplies of decentralised, low-carbon energy in existing buildings.

All new development should, where appropriate, be required to connect to existing or planned decentralised heat and/or power schemes.

Further Analysis of Policy Option 4

The additional 15% of residual emissions is not expected to add significant cost to development (see Appendix C). The additional requirement doesn't exceed the 70% overall reduction in regulated emissions expected to be met on-site by 2016 under current government proposals, and is therefore considered feasible. In the case where additional carbon reductions are not feasible on-site or are considered to add significant cost, the 'Carbon Buyout Fund' can be utilised by developers.

The total CO_2 emission savings targets are shown in the right hand column of the table below. They are calculated by adding the building regulations targets to the additional local target for an additional 15% reduction on the residual regulated emissions. Taking the top row of table 36 as an example - where the building regulations target is for a 25% reduction on regulated emissions the residual regulated emissions are 75%. A 15% reduction of 75% is 11.25%. By adding 25% with 11.25% you get the 36.25% target.

Table 58: Comparing Blackpool Borough Council policy option 4 with Building Regulations standards

Carbon Compliance Required for Residential Buildings			
Period	**Building Regulations**	**Additional Reduction**	**Total**

	Part L (residential)	in Regulated Emissions	
2010-2013	25%	11.25%	36.25%
2013-2016	44%	8.4%	52.4%
Post 2016	70%	Allowable Solutions	Zero Carbon

In setting the minimum level of carbon compliance that all new homes are required to meet, we need to be confident that we are not setting technical standards or costs that are unacceptably high for development. Government has decided[27] that, based on the assumptions in its consultation document on the definition of zero carbon[28], a carbon compliance standard of 70% of regulated energy use is as ambitious as possible for on-site CO_2 mitigation, while being technically achievable on most sites. The additional reductions required by Blackpool LPA should therefore be technically feasible on the majority of developments.

Nonetheless, there may be circumstances when it is not possible or desirable to achieve the standards proposed. Applicants who feel that they are unable to meet the required standards can pay into a 'Carbon Buyout Fund'. The preferred fund mechanism will be the Community Infrastructure Levy that applies to every building constructed within Blackpool at a rate to be determined by Government. Since the CIL cannot apply until April 2010 and the regulations are still in draft form, this policy option may need to be reviewed post April 2010. Chapter 6 discusses how CIL money can be spent to deliver maximum CO_2 reductions and installed energy.

The aim is to provide a mechanism that helps deliver the EOP, but is also compatible with delivery of 'allowable solutions' post 2016. The proposed levy has therefore been capped at £100 per tonne of CO_2 up to a maximum of £3,000 and has been selected to balance incentives for innovation whilst maintaining confidence in the house building market. The £100 contribution level is based on the Impact Assessment that accompanied the definition of Zero Carbon Homes[29]. The contribution level should be reviewed in tandem with both national and local changes in this policy area.

The costs of meeting this policy option are therefore transparent and provide certainty to developers as to the extent of their planning obligations. Diverting these payments into a Carbon Buyout Fund via the CIL could provide the borough with an income for investment in low carbon and renewable energy projects, as identified by the EOP. The fund should allow Blackpool LPA to strategically coordinate and phase the infrastructure required to deliver community scale energy generation installations such as district heating networks.

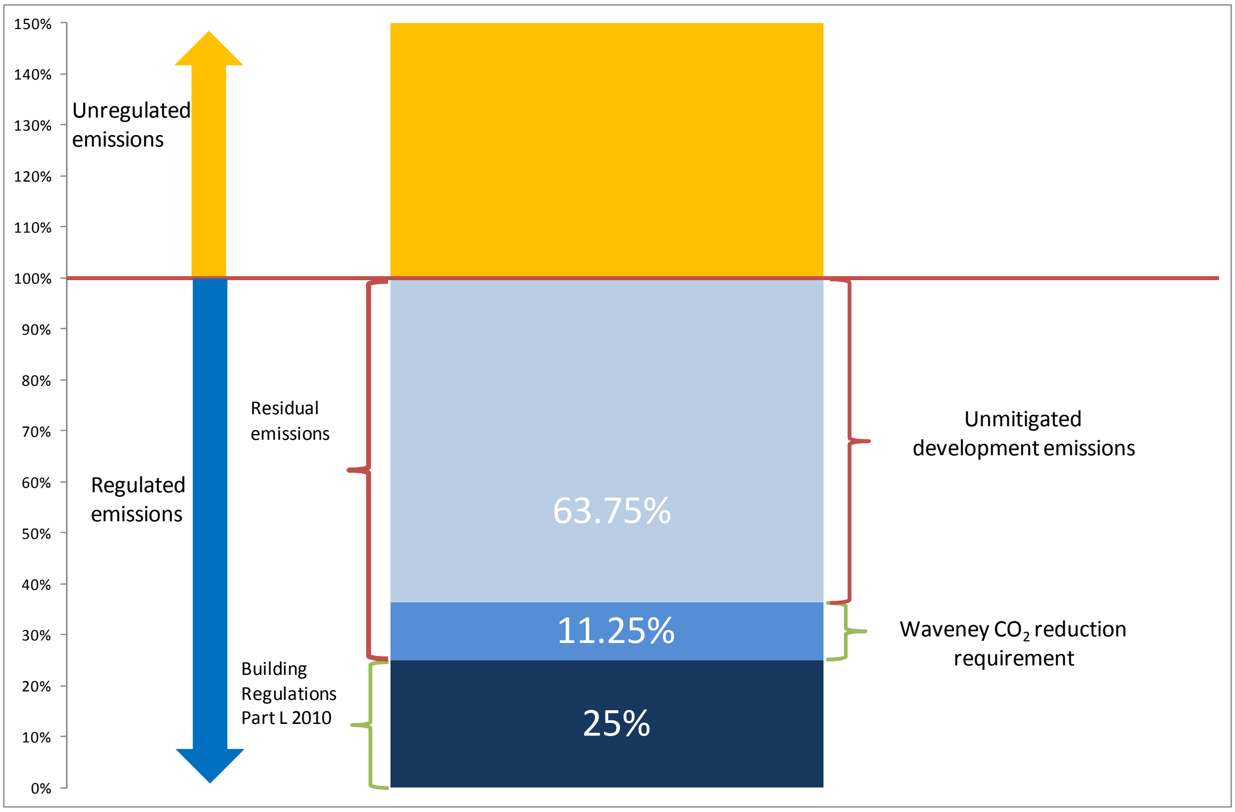
This proposed policy option does allow flexibility in the ways that applicants mitigate CO_2 emissions and it is expected that in the early years (e.g. the proposed revisions to Part L in April 2010) the most cost effective way to meet the target will be through increased energy efficiency. However, it is probable that as Building Regulations TER increase over time, many will choose to install on-site renewable technologies, which will assist the borough in meeting regional renewables targets.

Period from 2010 to 2013

From 2010, it is likely that the Building Regulations will require an improvement over 2006 levels of 25% in the regulated CO_2 emissions of residential buildings. The Building Regulations and proposed Blackpool policy requirements from 2010 are illustrated below in the figure below.

[27] Eco-towns and zero carbon homes statement (Minister for Housing & Planning, July 2009)
[28] Impact Assessment of the Zero Carbon Homes Consultation, CLG, December 2008
[29] Impact Assessment of the Zero Carbon Homes Consultation, CLG, December 2008

Figure 81: Building Regulations 2010 requirements plus Blackpool 2010 CO_2 reduction requirements



The table below gives an indication of the maximum levies that are likely to be incurred by standard dwelling types between 2010 and 2013, if built to minimum Building Regulations standards.

Table 59: Building Regulations 2006 Baseline TER, Building Regulations 2010 updated TER and Blackpool required TER, and the maximum levy chargeable for some standard dwelling types

Building Type	Building Regulations 2006 TER (annual tonnesCO2)	Building Regulations 2010 TER (annual tonnesCO2)	Blackpool required TER (annual tonnesCO2)	Emissions Subject to Levy (annual tonnesCO2)	Levy cost (£)
Detached	2.20	1.65	1.40	0.25	**£740.84**
Semi	1.61	1.21	1.03	0.18	**£544.01**
End	1.48	1.11	0.94	0.17	**£499.09**
1 bed flat	1.06	0.79	0.67	0.12	**£356.29**
2 bed flat	1.30	0.97	0.83	0.15	**£438.03**
General office	26.48	19.86	16.88	2.98	**£8,937.08**
General retail	6.27	4.70	4.00	0.71	**£2,115.01**

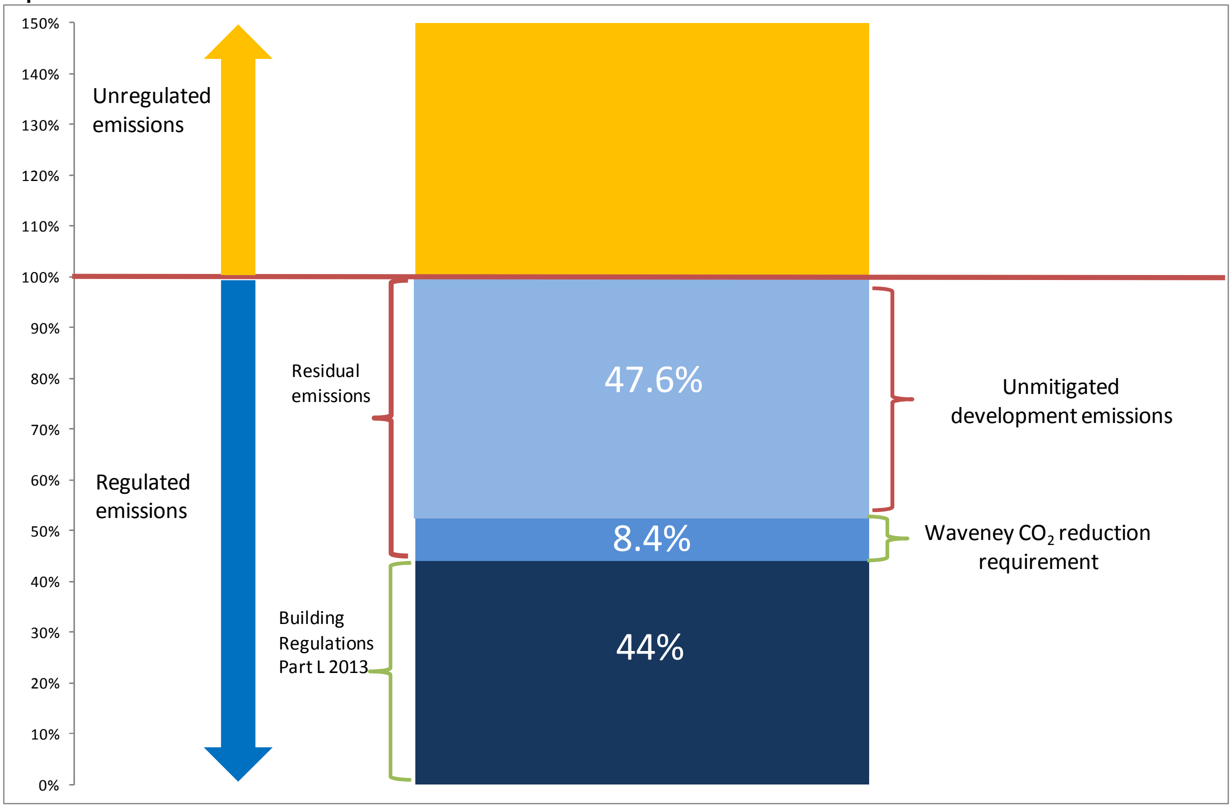
It should be noted that on certain sites, there may be other factors, beyond capital cost, affecting the decision of whether to invest in additional carbon compliance or make a payment into a Carbon Buyout Fund. For example, the applicant may also be the building occupant, or, in the case of an RSL, will have an interest in reducing the running costs for tenants as well as their own management costs for energy services, and energy for communal areas, etc. They may also be able to take advantage of feed-in-tariffs from installing micro-generation technologies. Where the developer is planning to provide commercial rents, they may also have an interest in reducing energy costs for communal areas. Building occupiers will also benefit from reduced risk and security of supply.

Applicants may also be able to market zero or low carbon developments at a premium. An example of this is seen in the mindset of developers responding to existing on-site renewable energy policies across England. Many have viewed this as an opportunity to lead the field in the designing, constructing and marketing of low carbon buildings – with the opportunity to sell them at above market rate. This "marketability" aspect may increase in the future as homeowners become more aware of the energy performance of new buildings through the energy labelling measures that came into force in the UK in 2008 following the EU Energy Performance in Buildings Directive.

Period from 2013 to 2016

From 2013, it is expected that the Building Regulations will require an improvement of 44% over 2006 levels in the regulated CO_2 emissions of residential buildings. There are currently no proposals for changes to the standards for non-residential buildings in this period. Building Regulations and proposed policy requirements from 2013 are illustrated in the figure below.

Figure 82: Building Regulations 2013 requirements (applicable to new residential buildings only) plus 2013 CO_2 reduction requirements.



Examples of the levies that are likely to be incurred by standard dwelling types from 2013 are presented in the table below.

Table 60: Building Regulations 2006 Baseline TER, Building Regulations 2013 updated TER and required TER, and the maximum levy chargeable for some standard dwelling types

Building Type	Part L 2006 TER (annual tonnesCO_2)	Part L 2010 TER (annual tonnesCO_2)	Blackpool required EER (annual tonnesCO_2)	Emissions subject to levy (annual tonnesCO_2)	Levy cost (£)
Detached	2.20	1.23	1.04	0.18	**£553.16**
Semi	1.61	0.90	0.77	0.14	**£406.19**
End	1.48	0.83	0.70	0.12	**£372.65**
1 bed flat	1.06	0.59	0.50	0.09	**£266.03**
2 bed flat	1.30	0.73	0.62	0.11	**£327.06**
General Office	26.48	19.86	16.88	2.98	**£8,937.08**
General Retail	6.27	4.70	4.00	0.71	**£2,115.01**

Post 2016

Current government policy suggests that all new residential buildings will be required to be zero carbon from 2016. Developers will have to reduce regulated CO_2 emissions by up to 70% "carbon compliance" i.e. through improved energy efficiency measures, on-site low carbon and renewable energy generation or connection to off-site heat. The remaining regulated as well as unregulated emissions will have to be offset through allowable solutions.

Government has announced that all new schools will be expected to be zero carbon by 2016. Guidance is likely to be introduced as to how new school buildings will meet this standard. Other non-residential buildings will incur the same costs as in the period 2010-2016, unless changes to the Building Regulations are introduced that alter the trajectory to zero carbon.

Post 2019

All new buildings are expected to be required to be zero carbon. Guidance is likely to be introduced by central government as to how non-residential buildings will meet this standard.

Approach to Policy Implementation

New developments can provide an important contribution to carbon reductions, with the additional benefit of contributing to a CIL or Carbon Buyout Fund which benefits the local community, by providing funding that could drive a district heating system. This is an approach that is only achievable at the broader spectrum, not on a plot by plot basis.

The proposed policy options should also be simple to operate. Developers will already have to understand TER, DER and/or BER in order to comply with Building Regulations. Similarly, development managers can assess compliance simply by checking whether design stage and as-built Building Control Compliance documentation has been supplied.

In order to comply with any policy that is established from these policy options, developers will need to demonstrate through the suite of information supporting a planning application the % energy saving on TER that the development delivers or, a detailed explanation as to why this is an unreasonable requirement. SAP is the Government's Standard Assessment Procedure for Energy Rating of Dwellings. SAP is adopted by government as part of the UK national methodology for calculation of the energy performance of buildings. It is used to demonstrate compliance with building regulations for dwellings. Compliance is achieved by comparing the modelled performance of the dwelling to be built, the Dwelling Emission Rate (DER), with a notional dwelling with the same dimensions built to a standard specification. A percentage reduction in the notional buildings emissions produces the Target Emission rate (TER). To comply with Part L the DER must be less than the TER.

If SAP calculations are carried out by an Accredited SAP Assessor the Building Control Officer and Planner can take documentation produced from approved assessor without having to carry out further checks (as checking is undertaken by the accreditation body). The Part L approval process is signed off by the Building Control Officer at two stages: the design stage before the developer starts on site and the 'As Built' stage after air pressure tests have been conducted and performance as built can be modelled.

For a developer to demonstrate compliance with the higher targets set out in planning policy they should provide a Part L1A Compliance Checklist completed by an accredited SAP assessor for each dwelling and a summary table listing all TER and DERs to demonstrate the required % emissions rate has been achieved. This evidence can be requested at design stage, prior to starting on site, and 'As Built' prior to handover.

At planning application a description of measures to be undertaken supported by indicative SAP modelling of a sample of dwelling confirming that the target will be met can be requested.

Compliance is measured consistent with Part L on a building level. Houses are required to have individual calculations. Flats can provide multiple compliance calculations on a building by building scale. Development wide aggregation of percentage improvement of DER over TER performance should not be accepted.

For larger developments, a more comprehensive 'Energy Strategy' may provide an effective and coherent way to both plan the energy requirements of a development and demonstrate to planners how energy savings have been made. This would set out, as above, the savings gained though passive design, energy efficiencies through building performance and fixtures and fittings as well as any energy requirements generated or offset through on-site renewable and low carbon technology.

7.2.2 POLICY OPTIONS: WIDER SUSTAINABLE CONSTRUCTION TARGETS FOR NEW DEVELOPMENT

Policy Options Development Context

The PPS1 Supplement allows local authorities to require levels of building sustainability in advance of those set nationally where local circumstances warrant them. The North West area will be affected by climate change, with frequent winter flooding, changes in the landscape as well as changes in habitats and species composition, habitat fragmentation and changes in soils, recreation and tourism and cultural heritage. This means that actions must not only be taken to reduce the impacts of climate change by reducing CO_2 emissions, but also to adapt proposed development to the effects of climate change and other environmental damage. The Code for Sustainable Homes is the voluntary Government-backed building assessment tool that covers a full range of sustainability issues including, but not restricted to, energy and CO_2 emissions.

This report includes an evidence base for the need for carbon reduction in Blackpool. The Code for Sustainable Homes requires mandatory credits for energy and water, and hence these are the most inflexible items that are directly tied to the Code Level specified. There is flexibility in the other aspects covered by the code, and each of these depend on site-specific conditions as to whether the credits can be achieved. Hence, a LPA-area wide evidence base has been deemed unnecessary for the other aspects. Overall viability and cost related to all aspects of the Code for Sustainable Homes and BREEAM is given in Section 2 of this report. Individual applications should assess the viability of meeting the standards proposed on a site-by-site basis.

Policy Options:

5. Sustainable Design and Construction

New residential developments in Blackpool are required to meet full 'Code for Sustainable Homes' standards or equivalent. These requirements will not come into effect until successive updates to Part L of the Building Regulations become mandatory:

Code level 3 or above, will be required for all new homes once updates to Part L come into effect (currently scheduled for April 2010).
Code level 4 or above, will be required for all new homes once updates to Part L come into effect (currently scheduled for 2013).

All new non-residential developments in Blackpool over 1000 square metres gross floor area should aim to achieve the BREEAM "Very Good" standard or equivalent, with immediate effect (relevant versions of BREEAM are available covering offices, retail, industrial, education and healthcare).

If this policy option is to be applied it should require submission of final Code certificates and post-construction BREEAM certificates, as appropriate.

6. Design, Layout and Location

All new developments should ensure buildings are designed to be warmed by the sun, orientating buildings to maximise sunlight and daylight and using natural lighting and ventilation to reduce carbon emissions.

The council should support the design or location of buildings to enable people to get access to amenities with fewer or shorter car journeys. In addition the council should support development which makes efficient use of land with good access to public transport to reduce travel and therefore carbon emissions.

Further Analysis of Policy Option 6

This study does not include an evidence base for all aspects of Sustainable Design and Construction aspects. However, the Council should consider the local context and potential need for wider targets (which also include energy standards). Under the Code for Sustainable Homes, energy and water have mandatory credits, while other aspects of sustainable design have flexible credits that can be mixed-and-matched to some degree.

The policy does not require residential building to meet standards beyond Code Level 4. At levels 5 and 6 the current mandatory criteria for water use create strong drivers for greywater recycling or rainwater collection systems. In our judgement it is not clear that the installation of rainwater and greywater systems in new homes is a cost-effective or appropriate to the water demand and supply balance in Blackpool as the evidence hasn't been scoped as part of this study. The proposed policy 3 Code targets could be reviewed in response to any future changes in Code water criteria for Code Levels 5/6.

The requirements for Code Levels 5/6 for meeting water targets are mandatory, and have not been agreed as part of this study. These water targets would require a further evidence base to be set out. If this was implemented this would provide the council with a raft of sustainable benefits meeting the highest code levels and TER requirements.

Approach to Policy Implementation

A Code for Sustainable Homes and/or BREEAM pre-assessment should accompany the planning application to provide assurance that the design will achieve the required rating. An interim design stage certificate is required before construction can start on site and, following completion, the post-construction review (PCR) and subsequent formal certification is required. Where cost associated with a pre-assessment is considered unreasonable due to the size and/or type of development, negotiations should be made with the planning authority to ascertain supply of details of how the policy can be met.

In encouraging energy efficient buildings that use the minimum amount of energy but still meet the needs of the people who are using them, wherever possible, the context of the site and its surroundings buildings should be positioned to make sure that the principal rooms face south to benefit from solar gain.

The way the buildings are laid out on the site should also take account of the wind direction. Tree and shrub planting schemes can act as windbreaks, which will ensure wind chill factor is reduced. These goals will help to ensure policy options can be met.

In addition, Blackpool should consider the orientation of new residential developments, to ensure energy efficiency is achieved. For example, the use of the cul-de-sac in building design is inefficient as the heating circuit is incomplete. Arranging the location of buildings in block form allows heat to flow constantly around the system. Mixed use buildings also offer good opportunities for energy efficiency as a range of uses provides a variety of heat loads.

Policy implementation can also be achieved by considering how areas that are currently under development can assist in meeting energy efficiency goals. The South Beach area of Blackpool is currently under development, which offers an opportunity to locate the necessary infrastructure for district heating in this location, as part of this construction, despite the lack of availability of other sources to join this system up at the present time, purely to save this process having to be done again, thereby ensuring cost efficiency and helping to move towards energy efficiency goals.
The policy does not require residential building to meet standards beyond Code Level 4. At levels 5 and 6 the current mandatory criteria for water use create strong drivers for greywater recycling or rainwater collection systems. In our judgement it is not clear that the installation of rainwater and greywater systems in new homes is a cost-effective or proportionate contribution to reducing water issues in Blackpool (though baseline water demand and supply is not assessed as part of this study). The proposed policy 3 Code targets could be reviewed in response to any future changes in Code water criteria for Code Levels 5/6.

The requirements for Code Levels 5/6 for meeting water targets are mandatory, and have not been agreed as part of this study. These water targets would require a further evidence base to be set out. If this was implemented this would provide the council with a raft of sustainable benefits meeting the highest code levels and TER requirements.

7.2.3 POLICY OPTIONS: STRATEGIC SITES

Policy Options Development Context

PPS1 Supplement encourages setting specific policy and targets for strategic sites where greater opportunities exist to reduce CO_2. Seven strategic sites in the study area have been considered in detail in Chapter 5. Blackpool should also seek opportunities to set higher targets on other sites that come forward where significant potential is present.

Policy Options:

7. Strategic Sites – Energy Strategies

Within Blackpool it is considers that the following strategic areas will have a major role to play in achieving an increase in decentralised, low carbon and renewable energy:

Marton Moss (as part of the M55 Hub)

Talbot Gateway

Foxhall

South Beach AAP area

North Beach AAP area

Central Station Site

Rigby Road

An energy strategy, including phasing requirements, should be developed for the entire site and surrounding area. This will guide the development of low carbon infrastructure in a coordinated way, and ensure that individual developments on the site can be taken forward in a carbon and cost-efficient manner. All energy strategies should include feasibility assessment for district heating and CHP.

8. Strategic Sites – Carbon Reduction Targets

The following strategic sites should be required to achieve additional on-site carbon reductions (relative to TER) according to the scale of potential, as follows:

- **Marton Moss (as part of the M55 Hub): 100%**
- **Talbot Gateway: 100% for domestic properties; 44% for commercial properties**
- **Foxhall: 100% for houses; 44% for apartments**
- **South Beach AAP area: 44%**
- **North Beach AAP area: 25%**
- **Central Station site: 44%**
- **Rigby Road Educational Facility: 100% for domestic properties; 44% for commercial properties**

Calculations showing the achievement of the required carbon reduction should be provided to the Council using the standard methods outlined in Building Regulations.

Approach to Policy Implementation

As explained in section 7.2.1, reductions in carbon emissions should be supplied using the standard measurements from Building Regulations. While on a Borough-wide level a baseline carbon reduction level can be set, strategic sites simply need to demonstrate a higher reduction to levels deemed feasible through initial modelling.

Modelling that has been undertaken to determine the recommended levels of carbon reduction is based on a number of assumptions regarding the likely mix of development. These assumptions may not reflect the eventual proposals on the sites, and hence the energy strategies submitted for each site should scope the particular potential of proposals and outline how the carbon reduction target can be met (or where it cannot, how carbon reduction can be increased as far as feasible).

7.3 STRATEGIC COMMUNITY-WIDE INTERVENTIONS

The third policy area addresses strategic, stand-alone energy opportunities and those that are not necessarily related to specific development proposals.

7.3.1 POLICY OPTIONS: RENEWABLE ENERGY

Policy Options Development Context

The binding national renewable energy target of 15% of total energy to be generated from renewable sources by 2020 can be delivered through a combination of renewable electricity, heat and transport fuel. The Government's July 2009 Renewable Energy Strategy indicates that this is likely to comprise: 30% of total electricity from renewables; 12% of total heat; and 10% of total transport fuel. Planning has a key role to play across all three but the focus of this study is on electricity and heat, therefore, the targets relate to these elements only.

The 30% target for electricity will be met in part through contributions on a national scale, through off-shore wind installations and other major projects, however a substantial proportion still needs to be delivered on land and across the country, following where opportunities exist.

The North West has set an overall target of 20% of electricity from renewables by 2020, where Blackpool is capable of delivering its portion of that target. The 12% heat target on a national scale will be delivered and supplied primarily in conjunction with the built environment, and therefore, Blackpool should contribute the portion of that target where significant opportunity exists to generate renewable heat. The Blackpool LPA demonstrates significant potential for inclusion of renewable heat in the form of a district heating system utilising biomass or geothermal energy, and therefore the national target is recommended for policy. Chapter 4 has demonstrated the range of options available to meet both electricity and heat targets.

The targets included in the proposed policy are calculated from the expected energy demand baseline derived in Chapter 3. The energy and heat modelling indicates that the proposed targets are challenging but deliverable. The nature of the renewable energy resource in Blackpool means that much of this is likely to be delivered through decentralised heat and/or power schemes and larger wind turbines, however, small and medium scale wind, solar photovoltaics and other technologies will also play an important role. The role of the local authority and communities as delivery agents will be important and is explored in more detail in Chapter 6.

Policy Option:

9. Renewable Energy

Blackpool demonstrates significant potential for inclusion of district heating and micro-generation and should aim to meet at least the national heat target of 12% or above.

Blackpool should assist in the delivery of its portion of the 20% electricity from renewables by 2020 using its potential for combined heat and power, wind energy and micro-renewables.

Applications for low carbon and renewable energy installations should generally be supported in the area. The area is seeking new renewable energy generation capacity to deliver an appropriate contribution towards the UK Government's binding renewable energy target. Therefore:

At least 142GWh of renewable electricity by 2020 (approximately 20% of total electricity demand in Blackpool).

At least 189GWh of renewable heat by 2020 (approximately 12% of total heat demand in Blackpool).

Approach to Policy Implementation

The Councils may wish to support the policy option and targets by setting criteria by which decisions will be taken. In the context of national policy in PPS22 and the PPS1 Supplement and the Regional Spatial Strategy, these would need to cover all or some of the following: local amenity; ecology; landscape and visual impact; cultural heritage; the technologies; weighing up impacts and benefits; and community involvement and ownership.

7.3.2 POLICY OPTION: DELIVERING THE ENERGY OPPORTUNITIES MAP

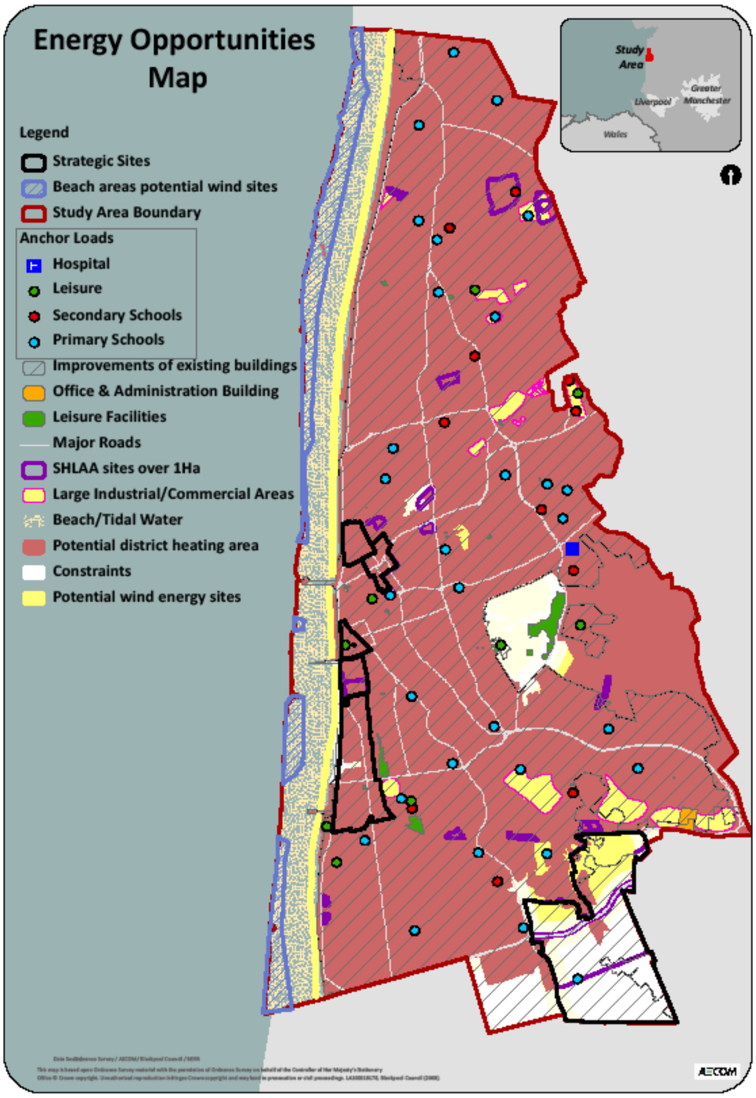


Figure 83: The Energy Opportunities Map

Policy Option Development Context

The various key decentralised renewable and low carbon energy opportunities across the borough have been used to create an Energy Opportunities Map (EOM).The EOM acts as the key spatial map for energy projects in Blackpool. It underpins the policies, targets and delivery mechanisms described here and can set out where money raised through the Carbon Buyout Fund/CIL will be spent. The map should also be used to inform policy making in the Sustainable Community Strategy and other corporate strategies, and investment decisions taken by the local authority and Local Strategic Partnerships in Blackpool.

The main opportunities for energy generation identified through the energy opportunities plan include the opportunity to establish a blanket approach to district heating, due to the unique nature of Blackpool for this type of system to be installed here, as evidenced on the EOM. District heating priority areas and opportunities should be identified and these should be phased with development, based on a co-ordinated approach to delivery.

In addition small – medium scale wind turbines could be located along the promenade and large wind turbines could be located within the industrial parks, as these areas have been identified on the EOM as good potential locations.

Policy Option

10. Delivering the Energy Opportunities Map

Decentralised, low carbon and renewable energy is a priority for the Council. Planning applications for new development in Blackpool will need to demonstrate how they contribute to delivery of the 'Energy Opportunities Map'.

Approach to Policy Implementation

The EOM should be incorporated into SPD or development plan documents and corporate strategies and should regularly be updated to reflect new opportunities and changes in feasibility and viability. The EOM should be used as a tool to inform applications and assessment, though it should not be used to restrict scope or locations of proposals, where they are shown to be viable.

All new buildings should be encouraged to connect to a district heating system. This should be a co-ordinated approach established by the council, which should also influence the Sustainable Community Strategy. The council should lead in this approach by ensuring that any new council buildings or large scale upgrades to council buildings take forward this approach.

7.3.3 POLICY OPTION: PRIORITY AREAS

Policy Option Development Context

The planning policy approach represents the application of national policy to the specific Blackpool context. The PPS1 Supplement on Planning and Climate Change and PPS22 (Renewable Energy) are both supportive of wind power. Specifically in relation to borough solutions, the Supplement requires the following:

Along with criteria based policies, identify suitable sites for decentralised and renewable or low carbon (DRLC) energy and supporting infrastructure.

Expect a proportion of energy supply for new development to be secured from DRLC energy. This can involve utilising existing and fostering new opportunities to supply development. For example, co-locating potential heat customers and suppliers, requiring development to connect to an identified system or to be able to in the future, setting out how proposed development should contribute to securing the DRLC energy system from which it would benefit, and facilitate connection.

Precedent policy exists for these types of strategic areas within the draft Manchester City Council Core Strategy. The Core Strategy includes details of a policy relating to areas for low carbon, decentralised and renewable energy development. This precedent policy is listed below;

Policy Approach En 2 – Within Manchester it is considered that the following strategic areas will have a major role to play in achieving an increase in the level of decentralised, low carbon and renewable energy available:

- *Regional Centre, which also includes the Oxford Corridor and Sport city*
- *District Centres*
- *Inner Areas*
- *Strategic Housing sites*
- *Strategic employment sites*

The City council will work with all relevant stakeholders, which may include residents, private sector partners, utilities companies, neighbouring authorities and other public sector bodies, as appropriate, to bring forward more detailed proposals for decentralised low and zero carbon energy infrastructure in these areas.

Where investment or development is being undertaken into or adjacent to a public building, full consideration shall be given to the potential role that the public building can have in providing an anchor load with a decentralised energy network.

The priority areas listed in the policy option below have been identified based on the analysis carried out in Chapter 4 and 5. The purpose of the policy is to prioritise district heating and community wind in areas where opportunities are the greatest.

Policy Options

11. Priority areas

The Council will favourably consider applications for development which will support the following energy priority areas:

DISTRICT HEATING PRIORITY AREA

The Energy Opportunities Map (EOM) highlights the favourable areas for district heating networks. These areas should be considered by the delivery body as priority areas for installing district heating systems.

The Council will support the delivery of district heating in these areas and will work with all relevant stakeholders, which may include residents, private sector partners, utilities companies, neighbouring authorities and other public sector bodies, as appropriate, to bring forward more detailed proposals for district heating in these areas.

Development within the priority area should install the secondary elements of a district heating network (i.e. from the wider network to properties), unless it can be shown not to be viable or feasible, and work closely with the ESCo to ensure compatibility of systems. Should development come forward prior to a district heating network being in place, developers should provide a containerised energy centre to provide temporary supply. Where appropriate, applicants may be required to provide land, buildings and/or equipment for an energy centre to serve proposed or multiple developments.

New residential and commercial development should be designed to maximise the opportunities to accommodate a district heating solution, considering: density; mix of use; layout; and phasing.

Where applicants demonstrate that connection to a district heating network is not feasible or viable they should contribute financially to the Carbon Buyout Fund/CIL.

WIND POWER PRIORITY AREAS

The Energy Opportunities Map (EOM) highlights potential favourable locations for wind turbines.

The council will look favourably on the addition of new wind turbines at the medium or large scale as part of any redevelopment of industrial parks, commercial areas or public realm located a suitable distance from residential areas. The location of wind turbines in these areas should not be to the detriment of local wildlife. Applications would be encouraged from community groups and individuals in priority areas.

Approach to Policy Implementation

Developments within or near the district heating priority areas should investigate the feasibility of the opportunity within the site (and surrounding the site as far as possible). The planning application should provide details of how the opportunities will be implemented to allow the LPA to coordinate delivery of potential across the priority areas. Where installation of infrastructure is not possible, details of the viability assessment should be given with the application.

In order to provide additional certainty to the installation of district heating networks it is recommended that a Local Development Order (LDO) is designated, either for district heating networks across the council areas or specifically in priority areas. Introduced in the 2004 Planning and Compulsory Purchase Act and amended by the 2008 Planning Act, LDOs grant permission for types of development specified in the Order and by so doing, removes the need for a planning application to be made by the developer.

The PPS1 Supplement supports their use in bringing energy projects forward. A pilot is underway for the Barking Power Station strategic heat main promoted by the London Development Agency. Barking and Dagenham have recently received funding for a pilot project using a LDO for implementing a district heating system.

Applications should be encouraged for wind energy developments directly related to new domestic and non-domestic developments, particularly in areas identified in the Energy Opportunities Map.

Due to the nature and size of the strategic sites identified, they should complete an energy strategy to ensure that the best options are identified, taking into account the whole site and its surroundings. The energy strategy should outline the proposed options and how these will be delivered in coordination with Borough-wide initiatives.

Appendix A: Existing Energy Networks

ELECTRICITY AND GAS SUPPLIES

Approximately 93% of North West regions electricity is generated by a small number of large generating plant. Their fuel mix reflects the national electricity generation mix, being split three ways between natural gas, coal and nuclear generation:

- Natural gas: Rocksavage power station at Runcorn has a capacity of 784 MW. It was commissioned in 1998 and has a projected lifespan of at least 30 years;
- Coal: Fiddlers Ferry power station on Merseyside has a capacity of 1,989 MW and sources its fuel from Yorkshire and across the world, including Australia and South America. It was commissioned in 1971 and will remain operational until at least 2015;
- Nuclear: Heysham 1 and 2 power station near Lancaster has a capacity of 2,400 MW and sources its fuel from across the world, including Canada, Africa, Australia and Russia. It was commissioned between 1970 and 1988 and with likely operation until 2014 (Heysham 1) and 2023 (Heysham 2);

A small but growing proportion of the region and the sub-region's electricity is generated by renewable sources (7% in 2008) the majority of which is from on and offshore wind power. This is due to increase with a further 1,400 MW of offshore wind farm capacity consented or underconstruction.

Based on the North West generating mix, Blackpool's electricity supply can currently be seen to be diversified in its sources. However, there a number of factors that may influence future energy planning and the ability to meet sub-regional and local CO2 reduction targets:

- Coal and nuclear generating capacity are both reliant on imported international fuel sources;
- Fiddlers Ferry and Heysham 1 and 2 stations are scheduled to be decommissioned by 2023;
- The Morecambe Bay gas field has a finite lifespan of between 10-20 years, based on current estimates;
- The position with regard to replacement capacity, including the recent announcement of 10 sites for new nuclear power stations including replacement of the Heysham 1 and 2 power stations in Lancashire.

A new 860 MWe Combined Cycle Gas Turbine (CCGT) power station has been granted permission at Carrington in Greater Manchester, creating an additional regional drawdown of the Liverpool Bay gas resource.

ELECTRICITY DISTRIBUTION NETWORK

The electricity transmission and distribution network in the UK consists of the National Grid which takes electricity from large power stations and transmits it though a high voltage network (400kV and 275kV) to grid supply points where it is transformed down to 132kV for distribution to customers through networks which are owned by 14 regulated distribution network operators (DNOs).

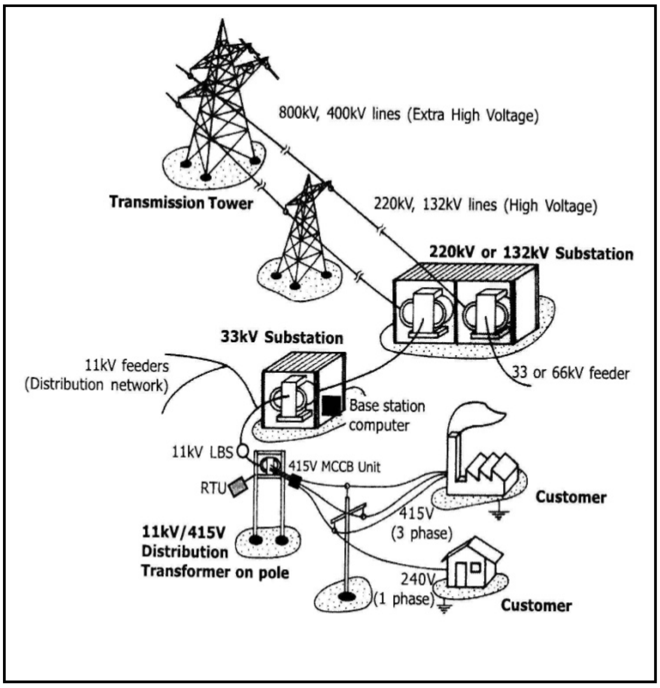


Figure 1. Distribution Network

REGIONAL ELECTRICITY DISTRIBUTION

Electricity North West Limited (ENW) owns the electricity distribution network in North West England, distributing electricity to customers as the licensed network operator on behalf of the electricity supply companies. ENW currently has 13,127 km of overhead lines, 43,136 km of underground cables, and 33,822 transformers serving 2.3 million customers in the North West of England. United Utilities operate, maintain, construct and repair these assets on behalf of ENW.

The price that ENW can charge for distributing electricity is regulated by the Gas and Electricity Markets Authority ('GEMA'), operating through the Office of Gas and Electricity Markets ('OFGEM') under a price regime which is reviewed every five years. The result of the most recent Distribution Price Control Review was announced in November 2004 and took effect on 1 April 2005. The next price control review is scheduled to take effect from 1 April 2010.

BLACKPOOL'S NETWORK

The network in the region is fed through the main 132kV supply which is transformed down to 33kV at bulk supply points named Blackpool, Bispham and Thornton – see Figure . It is then served through primary sub-stations which transform the voltage from 33kV to 11 and 6.6kV for distribution to local areas where smaller sub-stations step down the voltage to 230v or 400v for use by customers in factories, offices and homes.

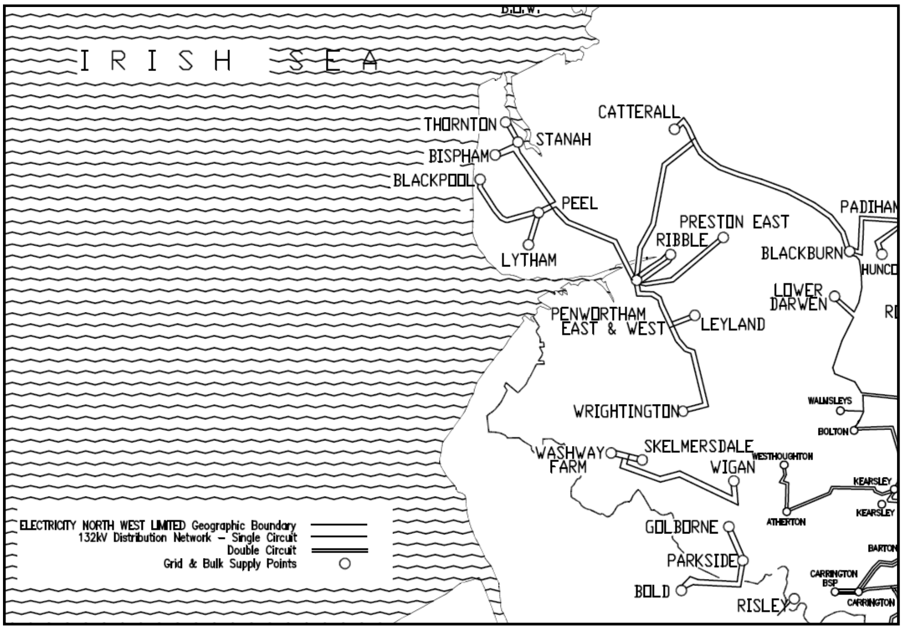


Figure 2: Map of the 132kV Network in the Northwest (source: Electricity Northwest LTDS 132kV geographic diagram)

An illustrative section of the 33kV network, covering the three bulk supply points in Blackpool is shown in the figure below. The Blackpool Bulk Supply Point transforms the 132kV supply down to 33kV which then feeds the primary sub-stations in the area (e.g. at Shannon Street, Preston Old Road, Marton and Cecil St). The Bispham BSP feeds primary sub-stations such as Warbreck and Poulton. It should be noted that the 33kV networks are interlinked to provide network reliability and security e.g. the substation at Cecil Street is linked into the Bispham and Blackpool grids.

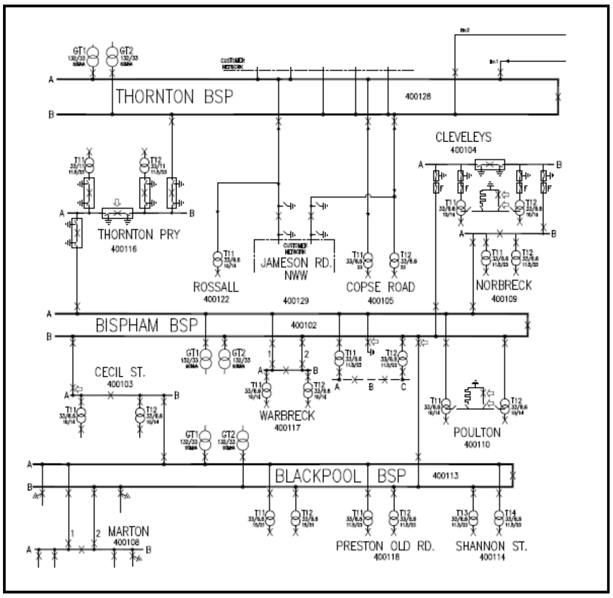


Figure 3: Representation of the 33kV Network in Blackpool (source: Electricity Northwest, West Lanc LTDS)

CONNECTION OF NEW DEMAND

The connection of new demand to the network, especially large loads, can cause problems in terms of the available capacity at the sub-station to which the load will be connected.

The network is designed with a degree of redundancy to ensure security of supply under fault conditions. The capacity or utilisation of a substation is specified as the capacity of the network after a most severe single fault.

An overview of utilisation of the primary 33kV sub-stations in Blackpool is provided in the figure below. The plan highlights where the utilisation of each primary sub-station is high in terms of maximum load compared to sub-station capacity.

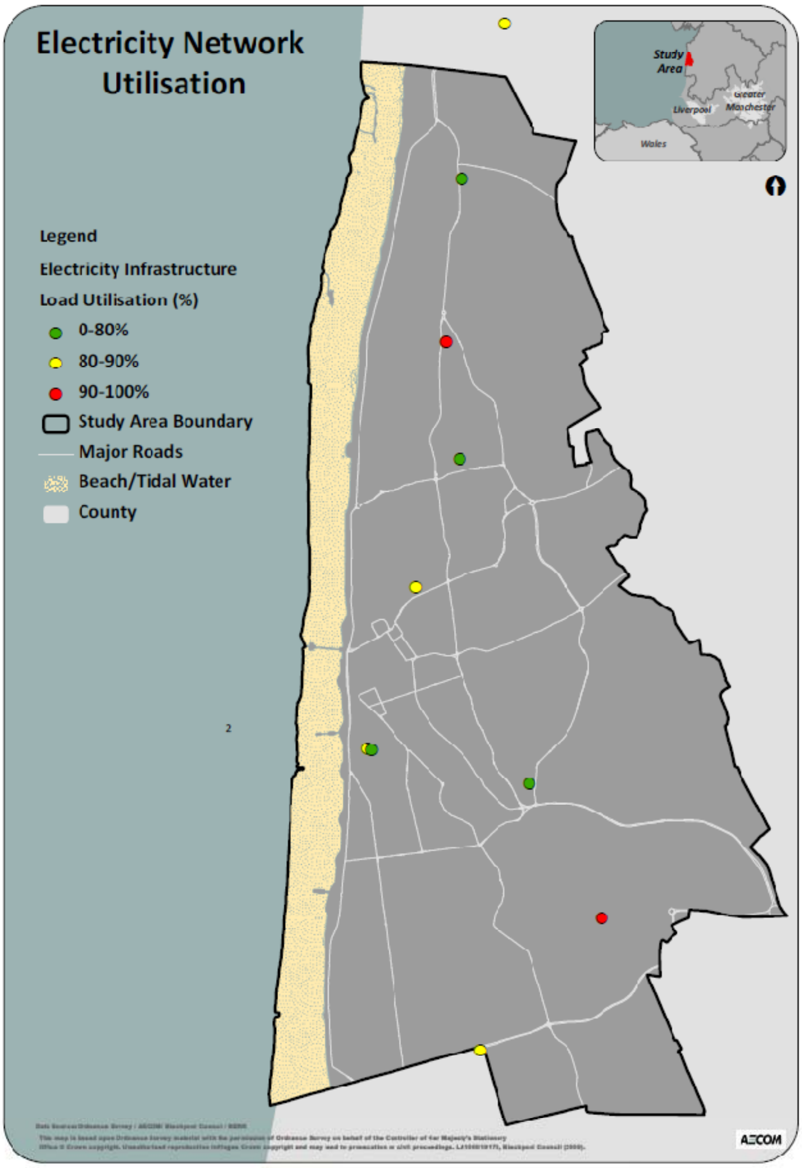


Figure 4. Blackpool electricity network utilisation map

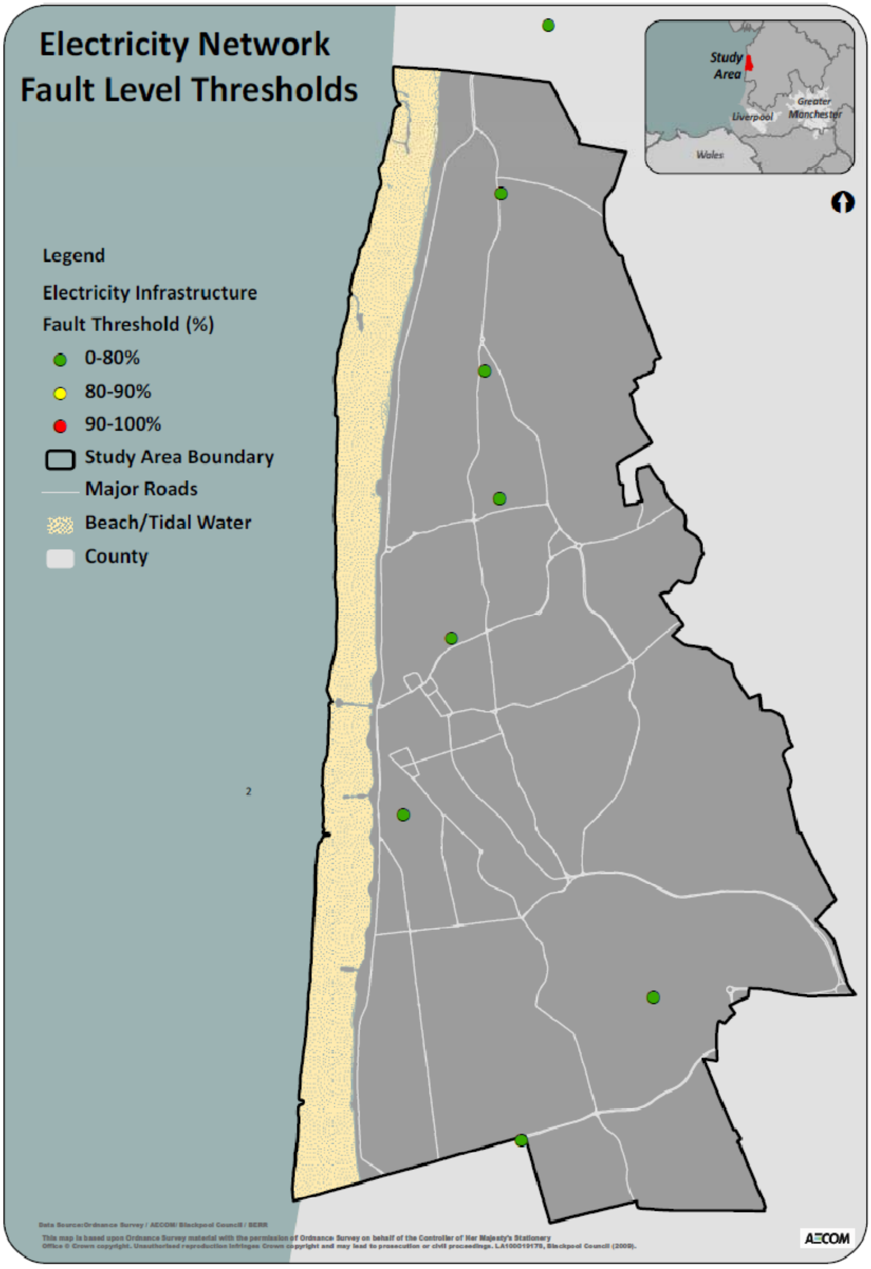


Figure 5. Blackpool electricity network fault level thresholds

This illustrates that the majority of the Blackpool network is operating at utilisation levels below 90% but some sub stations (notably Bispham, Marton and Copse Road) have utilisation levels above this level. It should be noted that loads can be switched from one sub-station to another to maintain supply at periods of high load which usually coincides with the maximum domestic peak in the early evening. Hence the overall system reliability is maintained.

However, the map does indicate areas where reinforcement of the network is more likely when significant new loads need to be connected. Conversely, the areas where the utilisation is below 90% should be able to accommodate the connection of new loads without reinforcement unless the loads are very high (e.g. 5 to 10MW maximum demand).

It should be noted in this context that a number of the larger developments covered by the case studies do exceed these levels of demand especially in their later phases, hence some reinforcement of the network may be required even in areas which are not highlighted in the plan. It should also be stressed that this map provides only a general indication of areas where there could be problems with the connection of new loads since there are a number of complex factors involved and a system study is needed to assess the situation for a specific development.

CONNECTION OF DISTRIBUTED GENERATION

Connection of new generation plant to the distribution network, adopting existing standard connection solutions, can often be expensive and inefficient. The distribution network has not been designed to incorporate significant levels of generation, i.e. generation substantially in excess of local demand. Connection of generation can therefore lead to non-compliance with network design standards in respect of thermal rating, voltage and fault levels; the solution to which is reinforcement of the network.

An important factor in the connection of distributed generation is the fault level rating of the switchgear at the primary sub-stations especially for CHP. An overview of the fault levels of the primary sub-stations in the Blackpool area is provided in p

. This indicates that the majority of Blackpool is currently operating at fault levels below the 80% and hence there should not be any problems with accommodation of DG capacity unless it is a very large plant.

It should also be noted that the map does not indicate the fault level rating of switchgear at distribution sub-stations fed from the primary sub-stations. Therefore, although the primary substation may be operating well within its capability it may be that there is some switchgear embedded in the network that is highly stressed and this would not be reflected in the map.

PLANNED NETWORK INVESTMENT

In its Long Term Distribution Statement (LTDS), ENW identifies a number of areas within Blackpool where it is undertaking investment to improve the network through replacement of ageing assets and/or reinforcement to accommodate load growth (see table below).

Table 1. Network Investment Plans (current price control review period 2005 to 2010)

Location	Improvements	Completion
Fleetwood	Connection to new gas storage site at Fleetwood. 2x132kV circuit breakers to be fitted.	June 2012

Further network developments are proposed in the Greater Manchester area but these are subject to the Regulatory settlement at the next Distribution Price Control Review (2010 to 2015) and they will be influenced by recent changes in demand patterns in the city region.

OPPORTUNITIES AND CONSTRAINTS

There are a number of key constraints in seeking to connect low and zero carbon distributed energy generation to the electricity distribution network. Opportunities can also be identified as workarounds to overcome these constraints and minimise connection costs.

Constraints

There are constraints with the connection of large developments and the integration of distributed generation which could lead to significant costs in reinforcing the electricity network.Specific problems include:

- Fault levels:
  Distributed generation involves the connection of smaller generators (e.g. wind turbines, gas/biomass CHP etc) to the local distribution network. This can cause problems with fault levels depending on the size and type of generator involved. For example, a medium-sized CHP plant (3 to 5 MWe) would be connected to a local sub-station and there may be fault level issues if the switch gear ratings are inadequate. A larger CHP plant (say 10 MWe) would probably have its own transformer and switchgear and hence there would not be such a problem.

- Guaranteed supply:
  ENW has to guarantee supply when the distributed plant is not operating (e.g. due to maintenance, breakdown or intermittent operation), hence it needs to provide sufficient network capacity to back-up the supply even though this may only be needed occasionally. This can result in additional costs associated with reinforcing the network.

- Speculative investment:
  OFGEM's price controls have placed constraints on the network operators which mean they are not able to invest speculatively in capacity for which there is uncertain demand. This can cause problems in a phased project since the network development is undertaken in stages and those involved in the later stages of the project may have to bear the full costs for any reinforcements rather than the costs being spread over the whole project.

- Timing of investment:
  ENW is sometimes involved at a relatively late stage in the project cycle and this can lead to problems if there is insufficient capacity or a fault level issue with any DG plant in the development. In the past, this has resulted in projects being cancelled due to the additional costs which have not been included in the budgets. Involvement of ENW at an early stage in a new development would help to address this problem and ENW might also be able to offer guidance on the network implications and how to avoid or minimise any reinforcement costs.

- Substation locations:
  It is getting more difficult to site new electricity substations because of demands on visual appearance, and in-fill development pushing up values. Substations are having to be placed more remotely from development areas and designed to be more aesthetic (especially in city and town centres), all of which pushing up contributions from developers.

Opportunities

To address the possible constraints, a more strategic approach to the provision of electricity is required which addresses demand, generation and distribution issues. Key elements in this approach could include:

- Distributed generation
  DG needs to be local to the demand but also local to the prime source of energy (e.g. wind, biomass). It also needs to be generating at a time when there is demand, otherwise reinforcement of the network may be required to enable the excess energy to be transported to other areas of demand. Matching local generation to demand will also reduce the amount of electrical losses incurred. There may be scope in this context to address opportunities for energy storage particularly

in CHP/district heating schemes where there is scope for heat storage to assist in matching supply and demand (also known as load following – see below).

- Energy supply
  Electricity suppliers will play key roles in changing customer behaviour through the introduction of feed-in tariffs for small scale generation and installation of smart metering coupled with appropriate tariff incentive arrangements. There could also be scope for 'time of use' tariffs as seen in the USA.

- Load following
  Distributed generation plant could be used to contribute to security of supply and to avoid network reinforcement costs if it is appropriately sized and reliable. The network operator could contract with the generator to call on the plant (load following) when demand in a specific area and time of day is close to the maximum capacity of the network. OFGEM is encouraging the network operators to consider this as an option in the next price control review period.

- Demand-side management
  OFGEM is also encouraging the network operators to consider demand side management (DSM) options to avoid network reinforcement. DSM facilitates the reduction in the network maximum demand by consumers contracting with the DNO to reduce the demand requirements at the time of normal peak demand. This could be considered as one of the options for particular areas of Blackpool e.g. where there are some large industrial and/or commercial loads.

- Distribution losses
  Distribution network losses account for approximately 5% of the total generated electricity. New network infrastructure can be designed to minimise these losses; this includes low loss assets and the intelligent application of distributed generation. Existing network loss performance can be improved by distributed generation but also by the application of new technologies currently being trialled.

- 'Smart grids'
  The above techniques are just some of those available that can contribute to the delivery of a smarter decentralised network. A more ambitious vision is to bring together some or all of these techniques in a real time control environment facilitated by smart metering and standardised communications protocols i.e. a 'smart grid'.

- The definition of a 'smart grid' is still the subject of much debate in the DNO community but a clearer definition should emerge as innovative ideas are transformed into real network solutions. This will require active participation of all parties: consumers, manufacturers of domestic appliances, developers, DNOs and energy suppliers.

GAS DISTRIBUTION NETWORK

The gas transmission and distribution system in the UK is owned and operated by National Grid. Gas travels from the National Transmission System (NTS) to the Local Transmission System (LTS) and reaches most consumers via the distribution system which operates at three pressure levels.

REGIONAL GAS DISTRIBUTION

National Grid Gas Distribution (NGGD) is responsible for the operation of the region's distribution system and it operates under a similar OFGEM regulatory regime as for ENW. The price control period is 2008 to 2012/13.

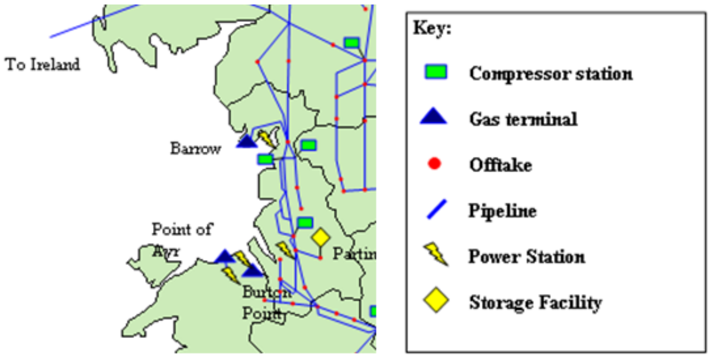


Figure 6. The National Gas Transmission System in the Northwest

The NTS transports gas, at pressures up to 85 bar, from terminals at Barrow and Burton Point to NTS off takes. At the NTS offtakes, gas travels into the High Pressure Distribution System (HP). This tier transports gas to the lower pressure tiers and has gas storage facilities. The HP system operates at pressures mainly in the range 32 to 14 bar. Some very large users, including big CHP plants, will receive their gas directly from this tier.

The distribution system has three pressure tiers: Intermediate (2 to 7bar), Medium (75mbar to 2 bar) and Low (less than 75mbar). The majority of customers are supplied from the low pressure system. There are a variety of pressures within the low, medium and intermediate tiers for different purposes. The lowest pressure will supply small domestic size loads and the higher pressures are required for transporting gas between areas.

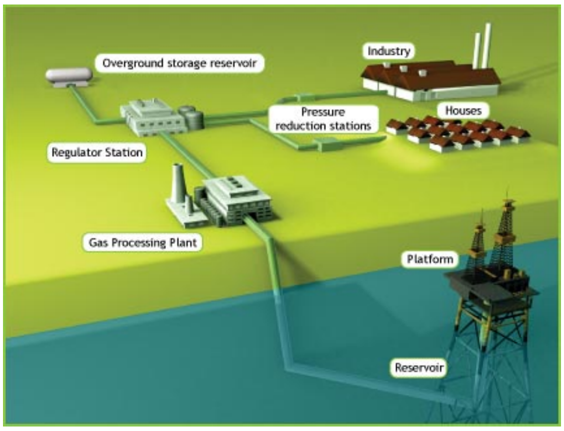


Figure 7. Schematic of gas distribution network

The High Pressure (LTS) system does not enter city centre areas. Most developments will
receive gas from the low pressure mains, if this causes constraints it may be possible to connect to medium pressure mains nearby dependent on location, cost and complexity (e.g. railways or other obstacles). Although the mains pressure can cause constraints for developments and CHP, the system is more flexible than the electricity network because it is possible to store gas to cope with the demand peaks.

INVESTMENT PLANS

NGGD's Long Term Development Plan (LTDP) for the North West, which was published in October 2007, states that NGGD will continue to develop the below 7bar distribution system to meet the needs of providing capacity to customers wishing to connect to the network. NGGD will also invest in the replacement of existing network assets, primarily the renewal of mains and services within the distribution system.

This includes replacement of cast iron and steel pipes with plastic pipes especially those which are within 30 metres of buildings. This is a long term (20/30 year) programme agreed with the Health & Safety Executive (HSE). The priorities are determined by a risk assessment of the gas mains based on leakages and related issues such as change of use e.g. single occupancy building changing to multiple occupancy.

There are a number of key opportunities and constraints posed by the gas distribution network in seeking to increase investment in low and zero carbon distributed energy generation:

Constraints

- Location and proximity:
  There are connection issues related to the size of the load and the proximity to higher pressure systems. For example, a demand of over about 1,000 standard cubic metres (scm) would probably exceed the capacity of the LP system and hence it would be necessary to work back to find a larger main and the costs will be related to the distances involved. A typical house requirement is 1 to 2 scm (10 to 20 kWth) so this equates to a development of 500 to 1,000 homes.

- Shock waves:
  Gas fired CHP can present a particular problem because of the demand requirements, particularly on start-up and shut down which can cause shock waves. It may be possible to connect small CHP units (below 1MW) to the LP network but bigger plants need to be connected to the MP or IP system and very large CHP plants may have to connect to the high pressure transmission system. Hence the reinforcement costs can be significant and, in the past, many CHP schemes have not gone ahead because of the gas infrastructure costs.

- Phased development:
  There are issues if a number of developers are involved in the different phases of the project. For example, it may be feasible to connect the first phase of a development to the LP system but then it may be necessary to use the MP system for subsequent phases which would be more expensive. There is a procedure to work out who pays what under these circumstances but it suggests that there would be benefits from a more strategic approach as discussed in the section on the electricity network.

- Lead-times
  The lead times associated with reinforcing the gas network can be lengthy, especially if the connection needs to be made to the high pressure part of the network. Hence it is important that early notice is provided to NGGD of any large scale development plans.

Opportunities

- Gas fired generation:
  Despite a shift in focus towards biomass fuelled solutions gas-fired CHP is the most appropriate low carbon solution where biomass may be constrained e.g. due to location in Air Quality Management Areas.

- Biogas injection:
  Biogas injection into the gas network e.g. based on the generation of biogas from sewage treatment and anaerobic digestion of organic waste. This raises important issues in terms of safety and quality standards which are currently under review by NGGD.

- Thermal storage:
  The integration of thermal storage into gas-fired CHP and district heating networks allows for smoother generating profiles This is because engines or turbines can then be run between 17 and 24 hours/day without the need for load following which can cause problems for the gas network such as shockwaves.

- Fuel cells:
  The use of solid state fuel cells creates the potential to use natural gas in a cleaner way. By using a steam reformer to strip out hydrogen from methane, which would then be fed to a fuel cell stack, electricity can be generated from gas with a carbon emissions rate approximately half that of the most efficient gas turbine generators. Fuel cells are also modular, creating a readily scaleable solution.

WHAT ARE THE STRATEGIC IMPLICATIONS?

Whilst Blackpool is embedded within and is reliant on national and regional gas and electricity networks, it is still possible to identify where the sub-region's energy is supplied from, and to determine the extent to which it is energy secure, now and based on future projections.

The need for new forms of infrastructure is timely because the region as a whole is approaching key milestones in the planned replacement of ageing generating capacity and the rundown of fossil fuel resources. The North West's energy infrastructure mirrors the national picture – the gas fields in Morecombe Bay are projected to be depleted by 2020, and major coal and nuclear generating plant at Fiddlers Ferry and Heysham respectively are projected to close by 2015- 2020.

This creates the impetus to develop new sources of renewable energy ensure and to ensure new generating capacity – including large new gas-fired plant such as at Carrington in Greater Manchester and smaller decentralised plant – operate as CHP plant supplying district heating networks.

Engagement with the current gas and electricity distribution network operators has shown that the availability of gas and electricity supplies to meet Blackpool's requirements is not a current constraint. It is, however, their ability within market and regulatory constraints to:

- Match the needs of new development with timely and appropriately sized new connections;
- React to development projections which have varying degrees of certainty attached to them;
- Plan for localised upgrades to networks against which costs will need to be apportioned and underwritten;
- Accommodate decentralised generation within network tolerances and based on an acceptable apportionment of cost.

Moving towards new forms of decentralised infrastructure is likely to require an even greater level of certainty in order to underwrite investment, and will require the direct engagement of the existing network operators.

Investment may be required to re-enforce and re-configure existing networks. Decentralised energy generation could bring mutual benefits to both developers and network operators, but only if this was to form part of a co-ordinated approach to design and management.

Appendix B: Funding mechanisms for Renewable and Low Carbon technologies

RENEWABLE ENERGY CERTIFICATES (ROCS)

The Renewables Obligation requires licensed electricity suppliers to source a specific and annually increasing percentage of the electricity they supply from renewable sources. The current level is 9.1% for 2008/09 rising to 15.4% by 2015/161. The types of technology and the number of ROCs achieved per MWh are outlined in the table below. The value of a ROC fluctuates as it is traded on the open market.

Technology	ROCs/MWh	Technology	ROCs/MWh
Hydro	1	Energy from Waste with CHP	1
Onshore wind	1	Gasification/Pyrolysis	2
Offshore wind	1.5	Anaerobic Digestion	2
Wave	2	Co-firing of Biomass	0.5
Tidal Stream	2	Co-firing of Energy crops	1
Tidal Barrage	2	Co-firing of Biomass with CHP	1
Tidal Lagoon	2	Co-firing of Energy crop with CHP	1.5
Solar PV	2	Dedicated Biomass	1.5
Geothermal	2	Dedicated energy crops	2
Geopressure	1	Dedicated Biomass with CHP	2
Landfill Gas	0.25	Dedicated Energy Crops with CHP	2 [2]
Sewage Gas	0.5		

FEED-IN-TARIFFS

These are due to come into action in April 2010 for installations not exceeding 5 MW . The following low-carbon technologies are expected to be eligible:

- Biomass and biofuels
- Fuel cells
- Solar power, including photovoltaics
- Water (including waves and tides)
- Wind
- Geothermal
- CHP with an electrical capacity of 50 kW or less

The electricity produced by these technologies will be bought by the utilities at above market prices. These prices will decrease over time to reflect the impact of increasing installation rates on end prices charged to consumers, the goal being to enable industries to "stand alone" at the end of the tariff period.

SALIX FINANCE

This is a publicly funded company designed to accelerate public sector investment in energy efficiency technologies through invest to save schemes. Funded by the Carbon Trust, Salix Finance works across the public sector including Central and Local Government, NHS Trusts and higher and further education institutions. It will provide £51.5 million in

[1] What is the Renewables Obligation? (department for Business, Innovation and Skills website http://www.berr.gov.uk/energy/sources/renewables/policy/renewables-obligation/what-is-renewables-obligation/page15633.html, accessed August 2009)
[2] Renewable Obligation Certificate (ROC) Banding (DECC websites http://chp.defra.gov.uk/cms/roc-banding/, accessed August 2009)

interest free loans, to be repaid over four years, to help public sector organisations take advantage of energy efficiency technology .

Salix launched its Local Authority Energy Financing (LAEF) pilot scheme in 2004. The success of this programme has allowed the pilot to be rolled out into a fully fledged local authorities programme.

THE COMMUNITY INFRASTRUCTURE LEVY

The CIL is expected to commence in April 2010 and unlike Section 106 contributions can be sought 'to support the development of an area' rather than to support the specific development for which planning permission is being sought. Therefore, contributions collected through CIL from development in one part of the charging authority can be spent anywhere in that authority area. This makes CIL potentially an ideal mechanism for operating the Carbon Buyout Fund proposed in the policy recommendations.

CARBON EMISSION REDUCTION TARGET

The Carbon Emissions Reduction Target (CERT) is a legal obligation on the six largest energy suppliers to achieve carbon dioxide emissions reductions from domestic buildings in Great Britain. Local authorities and Registered Social Landlords (RSL) can utilise the funding that will be available from the energy suppliers to fund carbon reduction measures in their own housing stock and also to set up schemes to improve private sector housing in their area.

The main different types of measures that can receive funded under CERT are:

- Improvements in energy efficiency
- Increasing the amount of electricity generated or heat produced by microgeneration
- Promoting community heating schemes powered wholly or mainly by biomass (up to a size of three megawatts thermal)
- Reducing the consumption of supplied energy, such as behavioural measures.
- Section 106 Agreements
- Section 106 agreements are planning obligations in the form of funds collected by the local authority to offset the costs of the external effects of development, and to fund public goods which benefit all residents in the area

THE COMMUNITY ENERGY SAVING PROGRAMME

This is a £350million programme for delivering "whole house" refurbishments to existing dwellings through community based projects in defined geographical areas. This will be delivered through the major energy companies and aims to deliver substantial carbon reductions in dwellings by delivering a holistic set of measures including solid wall insulation, microgeneration, fuel switching and connection to a district heating scheme. Local authorities are likely to be key delivery partners for the energy companies in delivering these schemes.
CESP has two grant initiatives, both are available to not-for-profit community based organisations in England.

PRUDENTIAL BORROWING AND BOND FINANCING

The Local Government Act 2003 empowered Local Authorities to use unsupported prudential borrowing for capital investment. It simplified the former Capital Finance Regulations and allows councils flexibility in deciding their own levels of borrowing based upon its own assessment of affordability. The framework requires each authority to decide on the levels of borrowing based upon three main principles as to whether borrowing at particular levels is prudent, sustainable and affordable. The key issue is that prudential borrowing will need to be repaid from a revenue stream created by the proceeds of the development scheme, if there is an equity stake, or indeed from other local authority funds (e.g. other asset sales).

Currently the majority of a council's borrowing, will typically access funds via the 'Public Works Loan Board'. The Board's interest rates are determined by HM Treasury in accordance with section 5 of the National Loans Act 1968. In practice, rates are set by Debt Management Office on HM Treasury's behalf in accordance with agreed procedures and methodologies. Councils can usually easily and quickly access borrowing at less than 5%.

The most likely issue for local authorities will be whether or not to utilise Prudential Borrowing, which can be arranged at highly competitive rates, but remains ‘on-balance sheet’ or more expensive bond financing which is off-balance sheet and does not have recourse to the local authority in the event of default.

BEST VALUE

Local authorities have the right to apply conditions to sales of their own land, whereby a lower than market value sale price is agreed with the developer in return for a commitment to meet higher specified sustainability standards. Rules governing this are contained within the Treasury Green Book which governs disposal of assets and in within the Best Value - General Disposal Consent 2003 'for less than best consideration' without consent. It is our understanding that undervalues currently have a cap of £2 million without requiring consent from Secretary of State.

LOCAL ASSET-BACKED VEHICLES

LABVs are special purpose vehicles owned 50/50 by the public and private sector partners with the specific purpose of carrying out comprehensive, area-based regeneration and/or renewal of operational assets. In essence, the public sector invests property assets into the vehicles which are matched in case by the private sector partner.

The partnership may then use these assets as collateral to raise debt financing to develop and regenerate the portfolio. Assets will revert back to the public sector if the partnership does not progress in accordance with pre-agreed timescales through the use of options.

Control is shared 50/ 50 and the partnership typically runs for a period of ten years. The purpose and long term vision of the vehicle is enshrined in the legal documents which protect the wide economic and social aims of the public sector along with pre-agreed business plans based on the public sector’s requirements.

Many local authorities are now investigating this approach, with the London Borough of Croydon being the first LA to establish a LABV in November 2008. LABVs are still feasible if adapted to suit the current macro economy. The first generation of LABVs were largely predicated on a transfer of assets from the public sector to a 50/50 owned partnership vehicle in which a private sector developer/investor partner invested the equivalent equity usually in cash. The benefits were in some instances compelling.

This transfer of assets suited the public sector given yields and prices had never been stronger. There is now a need for a second generation of LABVs that deliver many of the recognised benefits of LABVs as set out above but protect the public sector from selling ‘the family silver’ at the bottom of the market.

The answer may lie in LABV Mark 2 – a new model that is emerging based on the use of property options that will act as incentives. A better acronym would be LIBVs (Local Incentive Backed Vehicle) in which the public sector offers options on a package of development and investment sites in close ‘place-making’ proximity. The private sector partner is procured, a relationship built, initial low cost ‘soft’ regeneration is commenced such as; understanding the context, local consultation, masterplanning, site specific planning consents etc. Thereafter, as and when the market returns, the sites and delivery process will be ready to respond, options will be exercised, ownership transferred and a price paid that reflects the market at the time.

JESSICA

The Joint European Support for Sustainable Investment in City Areas (JESSICA) is a policy initiative of the European Commission and European Investment Bank that aims to support Member States to exploit financial engineering mechanisms to bring forward investment in sustainable urban development in the context of cohesion policy.

Under proposed new procedures, Managing Authorities in the Member States, which in the case of the UK is the RDAs, will be allowed to use some of their Structural Fund allocations, principally those supported by ERDF, to make repayable investments in projects forming part of an 'integrated plan for sustainable urban development' to accelerate investment in urban areas. The investments may take the form of equity, loads and/ or guarantees and will be delivered to projects via Urban Development Funds (UDFs) and, if required, Holding Funds (HF). The fund will recycle monies over time and series of projects.

LOW CARBON BUILDINGS PROGRAMME

Phase 2 of the Low Carbon Buildings Programme is a capital grant scheme from the Department of Energy and Climate Change (DECC) totalling £50m for the installation of micro-generation technologies by organisations including local housing authorities, housing associations, schools and other public sector buildings and charitable bodies. The programme is open to all products and installer companies registered on the Micro-generation Certification Scheme (MCS). Applications can be made for up to 50% (up to a maximum of £200,000) of the cost of installing approved technologies, although the maximum grant levels can depend on the nature of the organisation. The local authorities should seek to install appropriate technologies on their own stock and should work to ensure that those who are eligible are aware of the Programme and what it can offer.

GREEN RENEWABLE ENERGY FUND

A example of this is operated by EDF. Customers on the Green Tariff pay a small premium on their electricity bills which is matched by EDF and used to help support renewable energy projects across the UK. This money is placed in the Green Fund and used to award grants to community, non-profit, charitable and educational organisations across the UK.

The Green Fund awards grants to organisations who apply for funds to help cover the cost of renewable energy technology that can be used to produce green energy from the sun, wind, water, wood and other renewable sources. Funding will be provided to cover the costs associated with the installation of small-scale renewable energy technology and a proportion of the funding requested may be used for educational purposes (up to 20%). Funding may also be requested for feasibility studies into the installation of small-scale renewable energy technology.

There is no minimum value for grants, with a maximum of £5,000 for feasibility studies, and £30,000 for installations. All kinds of small-scale renewable technologies are considered. The closing dates for the applications usually fall on the 28th February and the 31st August.

INTELLIGENT ENERGY EUROPE

The objective of the Intelligent Energy - Europe Programme aims to contribute to secure, sustainable and competitively priced energy for Europe. It covers action in the following fields:

- Energy efficiency and rational use of resources (SAVE)
- New and renewable energy resources (ALTENER)
- Energy in transport (STEER) to promote energy efficiency and the use of new and renewable energies sources in transport

The amount granted will be: up to 75% of the total eligible costs for projects and the project duration must not exceed 3 years.

MERCHANT WIND POWER

A scheme of this type is operated by Ecotricity who build and operate wind turbines on partner sites. Ecotricity take on all the capital costs of the project, including the turbine itself, and also conducts the feasibility, planning, installation, operation and maintenance of the wind turbines. MWP partners agree to purchase the electricity from the turbine and in return receive a dedicated supply of green energy at significantly reduced rates.

Partnerships for Renewables is a company that has been set up to deliver turbines on public sector land. In return for a turbine the recipient receives an annual return on its investment. Importantly, installation would be limited to local authority owned land. Ecotricity operate a scheme whereby they build and operate wind turbines on partner sites. Ecotricity take on all the capital costs of the project, including the turbine itself, and also conducts the feasibility, planning, installation, operation and maintenance of the wind turbines. Partners agree to purchase the electricity from the turbine and in return receive a dedicated supply of green energy at significantly reduced rates.

LOW CARBON COMMUNITIES CHALLENGE

Local authorities can apply for up to £500,000 for energy efficiency and renewable energy measures across their locality. This could help deliver carbon-saving projects such as area-based insulation schemes or community renewables, The two year programme will provide financial and advisory support to 20 'test-bed' communities in England, Wales and Northern Ireland, support inward investment and foster community leadership. The programme is open to local authorities and community groups and the Challenge is focused on communities already taking action, or facing change in the area as a result of climate change and those looking to achieve deep cuts in carbon over the long term.

The programme will provide around £500,000 capital funding (up to 10% can be spent on project management). The timescale on the scheme is short with the capital money needing to be spent very soon. The challenge will be run in two phases with applicants able to apply for either of them. Phase 1 will be for green 'exemplar' communities that have already integrated community plans to tackle climate change and Phase 2 is for communities already taking some action or facing change in their area.

BIOMASS GRANTS

If grown on non-set-aside land then energy crops are eligible for £29 per hectare under the Single Farm Payment rules (set-aside payments can continue to be claimed if eligible). The Rural Development Programme for England's Energy Crops Scheme also provides support for the establishment of SRC and miscanthus. Payments are available at 40% of actual establishment costs, and are subject to an environmental appraisal to help safeguard against energy crops being grown on land with high biodiversity, landscape or archaeological value.

LOCAL AUTHORITIES CARBON MANAGEMENT PROGRAMME

Through the Local Authority Carbon Management Programme, the Carbon Trust provides councils with technical and change management guidance and mentoring that helps to identify practical carbon and cost savings. The primary focus of the work is to reduce emissions under the control of the local authority such as buildings, vehicle fleets, street lighting and waste.

Participating organisations are guided through a structured process that builds a team, measures the cost and carbon baseline (carbon footprint), identifies projects and pulls together a compelling case for action to senior decision makers. Carbon Trust consultants are on hand throughout the ten months. Direct support is provided through a mixture of regional workshops, teleconferences, webinars and national events.

The Programme could provide a useful mechanism for the Council to address its carbon emissions of which energy planning and delivery will be an important part.

Appendix C: Testing of Recommended Policy on Carbon Compliance for New Development in Blackpool

Development viability is a function of both technical feasibility and financial viability. A key issue for testing policy is whether or not a policy requirement for CO2 emissions places an “undue burden” on developers, primarily in terms of additional build cost – the financial implications of the recommended targets and policies are presented in this section.

What constitutes an undue burden will vary from site to site, and development to development. In the short term, in situations where the developer has bought the land before the policy existed and so was unable to take account of any additional build cost, there are aspects of a development which may affect the overall viability of a development.

TESTING COST VIABILITY OF THE ACCELERATED CARBON COMPLIANCE POLICY

The following scenarios were modelled using our AECOM Stock Energy Model to compare the financial implications of a range of policy options. The highlighted policy below represents our proposed policy for the LPA area. ‘Business as usual’ refers to the scenario when construction progresses according to minimum Building Regulations Compliance.

1. 15% reduction in total CO_2 emissions beyond Building Regulations (any method allowed);
2. **15% reduction in residual CO_2 emissions beyond Building Regulations (any method allowed);**
3. 15% reduction in total CO_2 emissions, must be met through renewables;
4. 20% reduction in total CO_2 emissions beyond Building Regulations (any method allowed);
5. 20% reduction in residual CO_2 emissions beyond Building Regulations (any method allowed);
6. 20% reduction in total CO_2 emissions, must be met through renewables;
7. 25% reduction in total CO_2 emissions beyond Building Regulations (any method allowed);
8. 25% reduction in residual CO_2 emissions beyond Building Regulations (any method allowed);
9. 25% reduction in total CO_2 emissions, must be met through renewables;

The capital costs and associated CO_2 savings with each policy type over time are presented the figures below. It should be noted that capital cost is not the only factor affecting the viability of a low carbon solution. On certain sites for example, the developer may also be the building occupant, or, in the case of a housing association, will have an interest in reducing the running costs for tenants as well as their own management costs for energy services, and energy for communal areas, etc. They may also be able to take advantage of feed-in tariffs from microgeneration technologies. For rented commercial property, developers may also have an interest in reducing energy costs for communal areas.
Developments with lower energy demands and shared infrastructure such as community heating can potentially offer savings in running costs in relation to alternatives such as individual boilers, and may offer attractive whole life costs. Building occupiers will also benefit from reduced risk and security of supply.

Note that in the following graphs, it shows the total cost and carbon saving associated with the technologies that are likely to be selected. In some cases the policy prediction and the baseline case have the same results as the same technology is selected to meet either target (in this case the baseline requirement is exceeds building regulations due to the performance of the technology). For example a common method to meet building regulation requirements in 2010 will be the use of ground source heat pumps, however the installation of this technology will result in carbon savings in excess of the requirements.

Period from 2010 to 2013

From 2010, the Building Regulations will require an improvement of 25% in the regulated CO_2 emissions of residential buildings on 2006 levels. Figures A1-A4 shows the capital costs and associated CO2 savings of meeting each type of policy, based on a representative selection of building types.

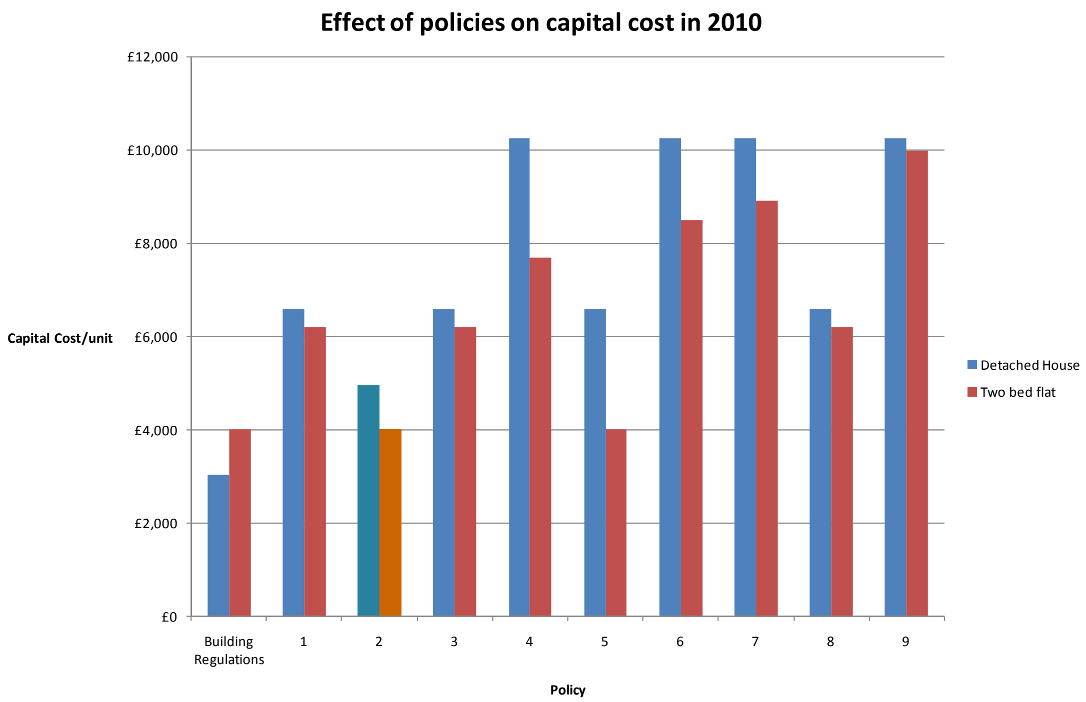


Figure A1: Cost per dwelling of meeting 2010 targets, for a detached house and a two bed flat under different policy scenarios (Source: AECOM Stock Energy Model)

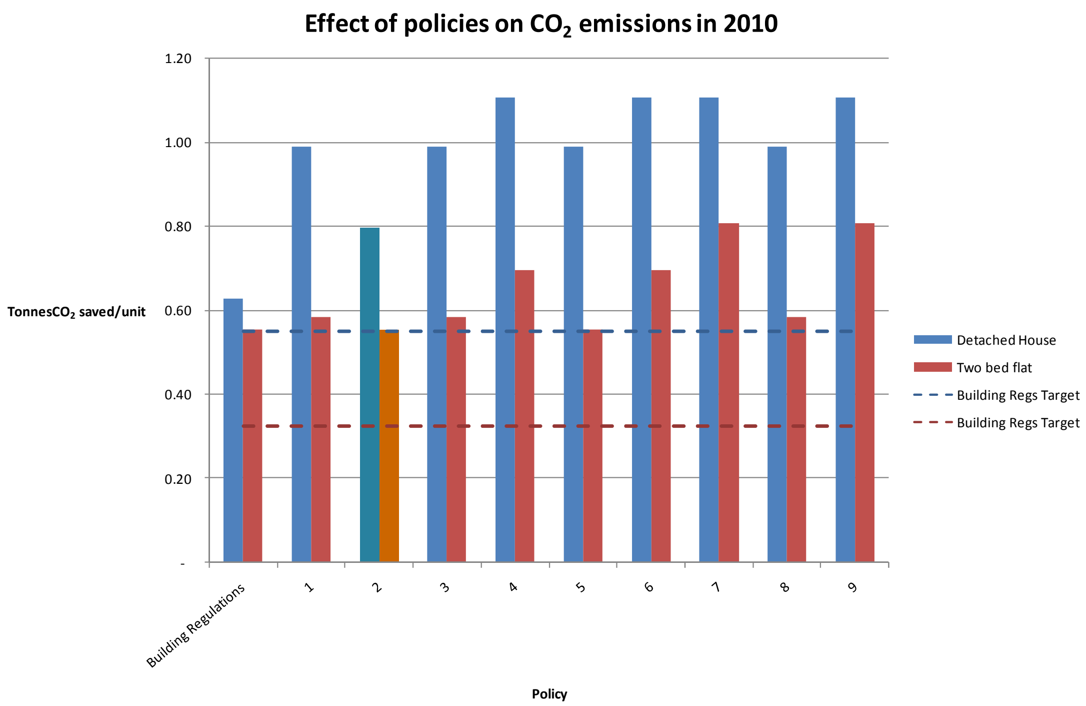


Figure A2: CO_2 savings per unit per year of meeting 2010 targets for a detached house and a two bed flat under different policy scenarios. (Source: AECOM Stock Energy Model)

Policy option 2 (the proposed policy) results in comparable CO_2 savings to the other policies, but it is relatively cheap for a new retail unit or office to comply, compared with the other policies.

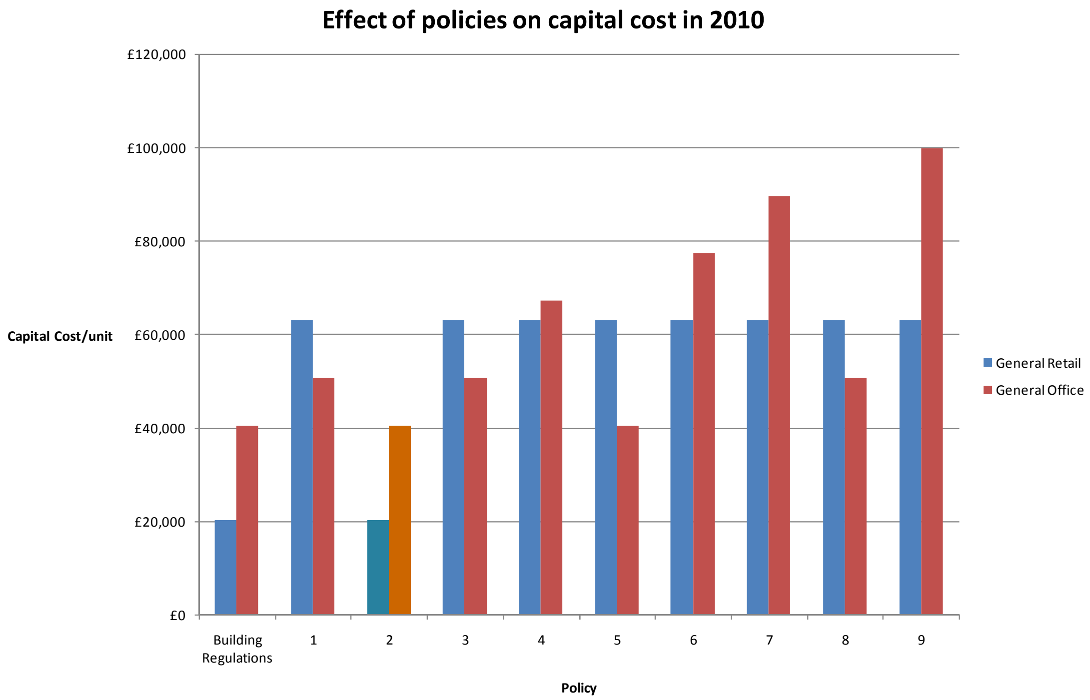


Figure A3: Cost per building type of meeting 2010 targets for an office and a retail unit under different policy scenarios (Source: AECOM Stock Energy Model)

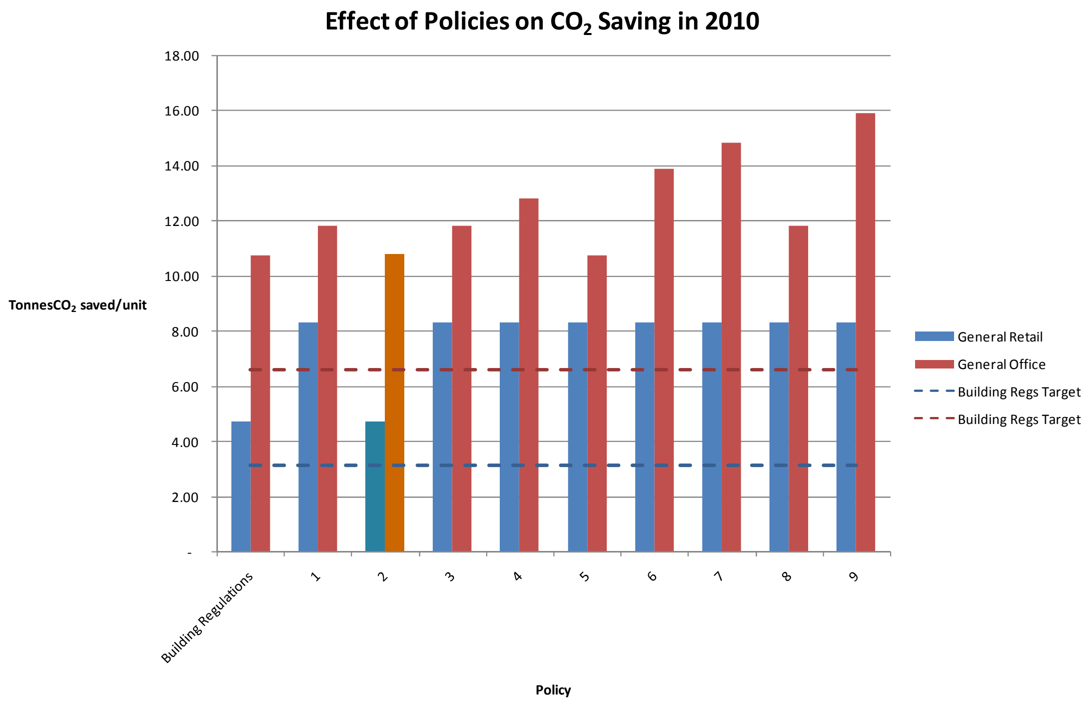


Figure A4: CO_2 savings per unit per year from meeting 2010 targets for an office and a retail unit under different policy scenarios (Source: AECOM Stock Energy Model)

Period from 2013 to 2016

From 2013, the Building Regulations are expected to require an improvement of 44% in the regulated CO2 emissions of residential buildings compared to 2006 levels. There are currently no proposals for changes to the standards for non-residential buildings in the period 2013 to 2016. The costs and CO_2 savings associated with a range of policy types are shown below in Figures A5-6. Whilst there is not much difference in capital cost between the policy options for a detached house, the policy option 2 is significantly cheaper to achieve for a two bed flat. This is because energy efficiency measures supplemented with PV would be sufficient to achieve policy option 2 for a two bed flat in 2013.

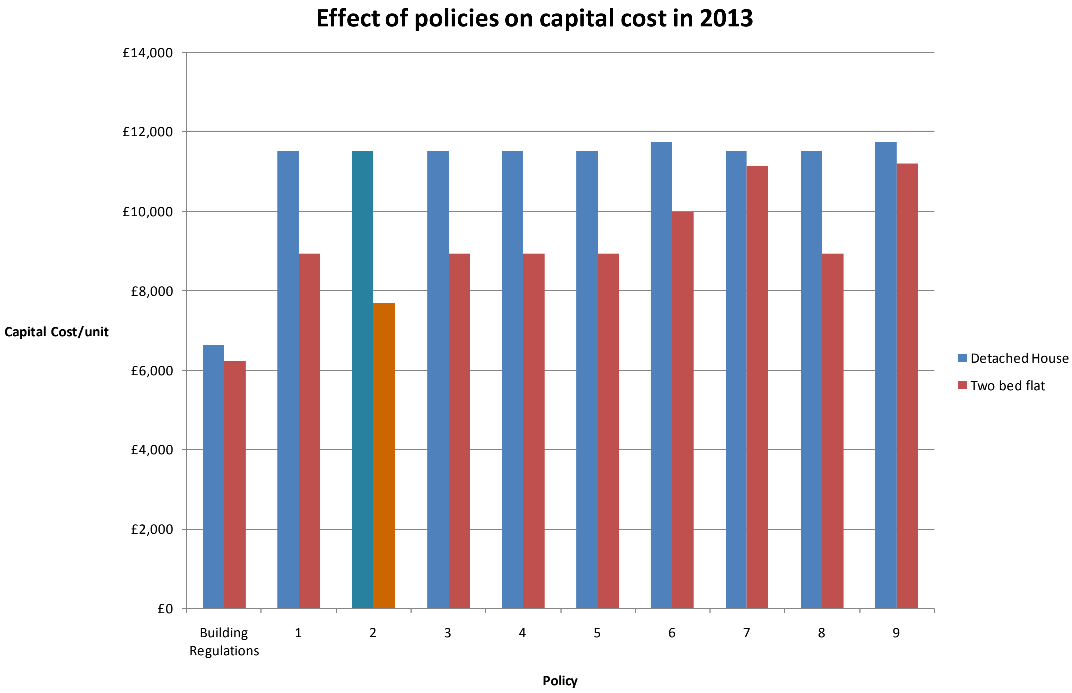


Figure A5: Cost per building of meeting 2013 targets for a detached house and a two bed flat under different policy scenarios. (Source: AECOM Stock Energy Model)

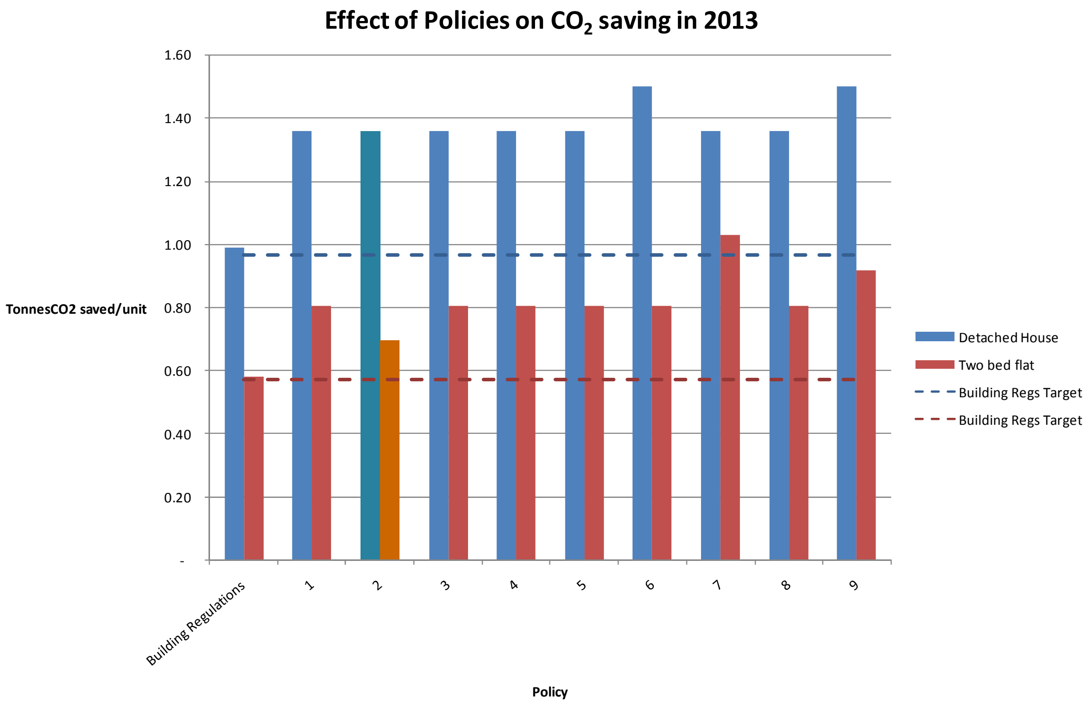


Figure A6: CO_2 savings per unit per year of meeting 2013 targets for a detached house and a two bed flat under different policy scenarios. (Source: AECOM Stock Energy Model)

Post 2016

All new residential buildings will be zero carbon. Developers will have to reduce both regulated and unregulated CO_2 emissions by up to 70% "carbon compliance" i.e. improved energy efficiency measures or onsite low carbon and renewable energy generation. The remaining 30% will have to be offset through allowable solutions. This is proposed as national legislation and therefore the costs of meeting this policy have not been assessed.

EFFECT OF CARBON BUYOUT FUND

We have tested the effect of setting the amount to be paid to the Carbon Buyout Fund at a rate of £100 per tonne of CO2 per square metre over the building lifetime of 30 years; this equates to a lump sum of £3,000 per tonne of CO2 per square metre and is in accordance with the central option costs for allowable solutions in the Zero Carbon consultation, reflecting the cost of off-site renewable electricity. Table A1 gives an indication of the maximum payments that are likely to be incurred in 2010 by a selection of building types if built to minimum Building Regulations standards. Examples of the payments that are likely to be incurred by standard dwelling types from 2013 are presented in Table A2.

Building Type	Building Regulations 2006 TER (annual tonnesCO_2)	Building Regulations 2010 TER (annual tonnesCO_2)	Policy Required 2010 TER (annual tonnesCO_2)	Emissions covered by Levy (annual tonnesCO_2)	Payment Required per square metre
Detached	2.20	1.65	1.40	0.25	£740.84
Semi	1.61	1.21	1.03	0.18	£544.01
End terrace	1.48	1.11	0.94	0.17	£499.09
1 bed flat	1.06	0.79	0.67	0.12	£356.29
2 bed flat	1.30	0.97	0.83	0.15	£438.03
General office	26.48	19.86	16.88	2.98	£8,937.08
General retail	6.27	4.70	4.00	0.71	£2,115.01

Table A1: Building Regulations 2006 Baseline TER, Building Regulations 2010 updated TER and required TER, and the maximum payment chargeable for a selection standard dwelling types.

Building Type	Building Regulations 2006 TER (annual tonnesCO_2)	Building Regulations 2013 TER (annual tonnesCO_2)	Policy Required 2013 TER (annual tonnesCO_2)	Emissions covered by Levy (annual tonnesCO_2)	Payment Required (£)
Detached	2.20	1.23	1.04	0.18	£553.16
Semi	1.61	0.90	0.77	0.14	£406.19
End	1.48	0.83	0.70	0.12	£372.65
1 bed flat	1.06	0.59	0.50	0.09	£266.03
2 bed flat	1.30	0.73	0.62	0.11	£327.06
General Office	26.48	19.86	16.88	2.98	£8,937.08
General Retail	6.27	4.70	4.00	0.71	£2,115.01

Table A2: Building Regulations 2006 Baseline TER, Building Regulations 2013 updated TER and required TER, and the maximum levy chargeable for some standard dwelling types.