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# Liverpool City Region Sustainable Energy Action Plan

1<sup>st</sup> Edition

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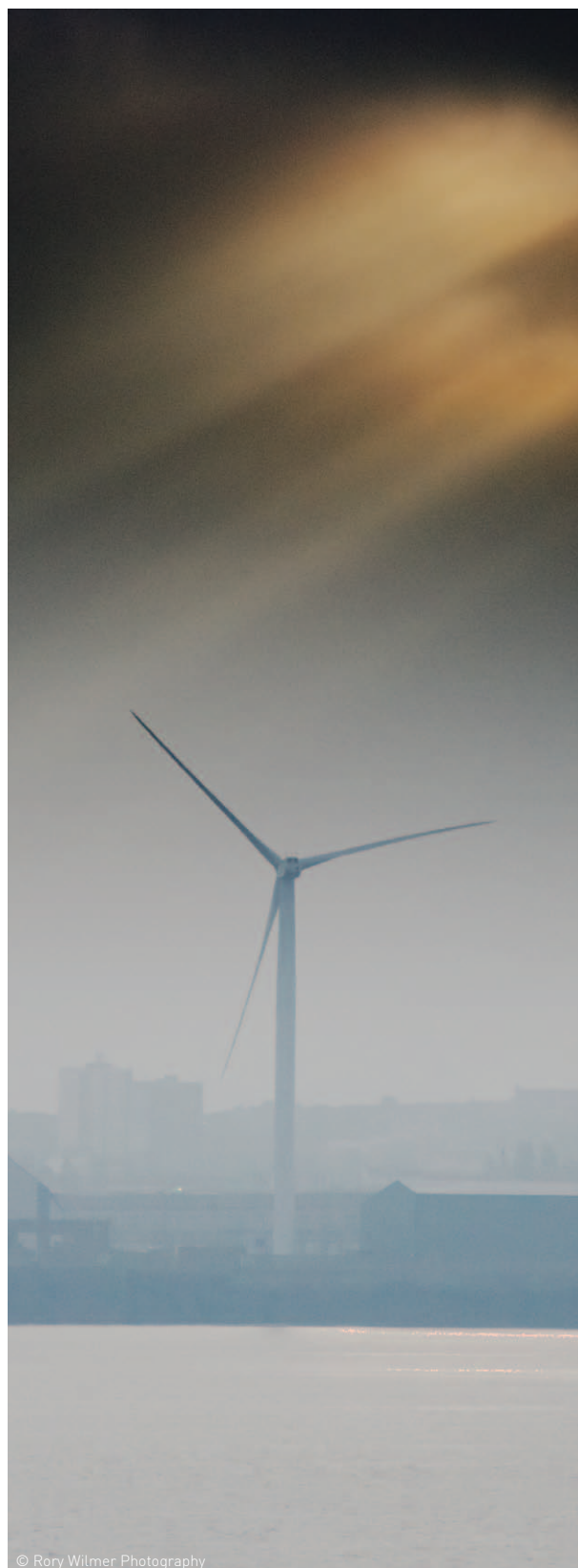
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# Foreword

The Liverpool City Region Sustainable Energy Action Plan (SEAP) has been prepared with assistance from the Government's Climate Change Skills Fund (administered by the Climate Change Local authority Support Programme, CLASP). Work has been co-ordinated by Merseyside Environmental Advisory Service with the support of Arup and the participation of the Local Enterprise Partnership and six City Region Councils, Halton, Knowsley, Liverpool, Sefton, St Helens and Wirral.

On 12 July 2012 the launch of the SEAP was presided over by the Chair of the Liverpool City Region Local Enterprise Partnership, Robert Hough. Around 100 senior representatives of business, local authorities and the third sector, discussed how the SEAP can help advance the City Region's ambition to transform itself into a resilient low carbon economy with a sustainable and productive energy sector.

The SEAP provides a vision and programme for the City Region to co-ordinate its energy sector ambitions, advance projects and bring greater resilience to its energy networks. Implementation has the potential to generate significant investment, economic growth and create new jobs, as well as delivering substantial social and environmental benefits. Significant momentum has been built up during preparation of the SEAP and the launch must now lead to commitment and implementation.



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# Executive Summary

## AN ENERGY VISION

The Liverpool City Region has set out its ambition to transform itself into a low carbon economy in which future economic growth, the delivery of which remains of vital importance, is decoupled from the consumption of fossil fuels and their inevitable carbon CO<sub>2</sub> emissions. The energy sector is critical to this goal and the Sustainable Energy Action Plan (SEAP) programme will provide a mechanism whereby the City Region can transform its energy system and infrastructure into a form that is increasingly managed and controlled locally.

The SEAP will drive growth in decentralised energy generation and supply using renewable and low carbon fuels, delivering employment, investment and exemplary reductions in carbon emissions required to achieve recognition under the European Covenant of Mayors mechanisms and to attract funding to support its aims. The SEAP aims to deliver its goals utilising locally-based supply chains, knowledge and skills to deliver an increasingly resilient and sustainable energy economy for the Liverpool City Region.

## OVERVIEW

The SEAP sets out a single co-ordinated programme to ensure the Liverpool City Region is at the forefront of the transition to a low carbon economy, with all of the economic, environmental and social benefits arising from the progressive decoupling of future economic growth from the CO<sub>2</sub> emissions, price and supply volatility increasingly associated with the fossil fuel reliant economy. The SEAP is presented in two parts:

- Part 1: sets out the purpose of the SEAP and the economic and environmental benefits that can be delivered through a single strategic City Region programme.
- Part 2: sets out the energy and CO<sub>2</sub> baseline and priority actions for the City Region to enable the delivery of the SEAP programme.

The SEAP provides the strategic direction across the domestic, transport, industrial and commercial sectors to bring investment, jobs, environmental and social benefits to the City Region. In order to achieve this, it is important to understand the benefits of working together in a co-ordinated way, to provide the economies of scale and value available to organisations working jointly across the whole City Region to identify, develop and exploit opportunities most effectively. The SEAP therefore sets out to align the priorities of local Government, business, the Local Enterprise Partnership, community groups and other public and private sector organisations.

There has been substantial progress across the City Region, with a range of energy and low carbon projects already identified and at different stages of delivery. This SEAP sets out to ensure that progress continues and that the substantial opportunities presented by the sustainable energy assets of the City Region are realised. Through the implementation of these projects, the SEAP will enable business growth and job creation throughout the supply chain, and will drive a progressive reduction in energy costs by improvements in energy efficiency standards and increased diversity of supply. In turn, this will help to improve energy security and reductions in fuel poverty which will also contribute to improved health and equality outcomes.

The SEAP will work alongside the City Region's Low Carbon Economy Action Plan, which aims to create 12,000 new jobs in the low carbon sector by 2015. This represents a significant increase on the existing 8,500 already estimated to be employed across hundreds of businesses in low carbon sub sectors. Jobs identified in the action plan that could be created include 3,000 in offshore wind, 1,500 in micro-generation and 1,500 in retrofitting business opportunities emanating from developing the infrastructure needed to move towards a low carbon economy.

## THE LIVERPOOL CITY REGION SEAP: A CO-ORDINATED RESPONSE

The SEAP aims to bring together, in one place, a programme of City Region scale with the potential to add value by enabling, among other things:

- Joint EU funding and investment applications.
- Efficiencies in the procurement of goods and services to deliver energy projects.
- Increased scale of energy projects to improve rates of return to investors and de-risk investment decisions.
- Development of a Liverpool City Region heat network.
- Support for integrated programmes of action such as the development of a domestic, industrial and commercial retrofitting programme and an alternative fuel strategy for transport and energy infrastructure.
- Development of a Special Purpose Vehicle (SPV) to reduce risk, attract subsidies, create revenues and bring economies of scale in the delivery of the programme.

## UNDERSTANDING LIVERPOOL CITY REGION'S ENERGY SYSTEM

The SEAP creates a baseline to inform decision-making. The baseline contains some compelling messages:

- In 2005 the City Region consumed over 37,000 GWh of energy.
- From this energy consumption a total of 11,500kt CO<sub>2</sub> equivalent (CO<sub>2</sub>e) was emitted.
- In 2009, 23% of households in the City Region were in fuel poverty.
- Between 2005 and 2009 Liverpool City Region energy consumption has reduced by 19% and CO<sub>2</sub>e by 16%.

Whilst the significant reductions in energy demand and CO<sub>2</sub> emissions are likely to reflect current economic conditions, they may also hint at a welcome de-coupling of economic activity from carbon emissions. A key challenge for the SEAP programme will be to promote an economic recovery in which regeneration and growth can be accommodated in the context of significant CO<sub>2</sub> reduction and increasing renewable energy generation targets.

## KEY LIVERPOOL CITY REGION FACTS

Over 4.4 GW of resource capacity for renewable and low carbon energy generation.

8 priority areas identified for district heating with a capital investment value of £200 million.

The Liverpool City Region is a nationally significant opportunity to support large-scale renewable energy generation through offshore, tidal and biomass projects.

21 community groups identified who will actively look to get involved in energy projects.

An established and growing supply chain including first and second tier suppliers and over 90 nationally accredited microgeneration installers.

A mature and growing local carbon academic and vocational training asset including National Skills Academy, Environmental Technologies Training Hub and Stephenson Institute for Renewable Energy.

Whilst local authorities are identified as key players for the SEAP programme, and can do much to provide the policy framework, place making, regeneration focus and community leadership, the public sector cannot drive this programme forward alone. The Liverpool City Region SEAP therefore targets the private sector to bring the necessary skills, investment and drivers to 'make things happen' and this is embedded throughout the programme.

The Liverpool City Region SEAP requires network and utility companies, universities, developers, banks and investment funds as delivery partners. Education, health, emergency and statutory agencies such as Merseytravel and Merseyside Recycling Waste Authority (MRWA) are also significant players in developing the City Region's energy sector and will have important roles in SEAP project delivery.



## A LOW RISK INVESTMENT DESTINATION

The City Region is pressing for co-ordinated action on energy infrastructure and is developing governance and administrative structures and working to secure funding for its programmes. The Liverpool City Region has an enviable combination of resources, assets, skills and experience on which it will build to decisively drive the agenda forward.

Energy projects need investment and that investment needs to be financed and repaid. Recognising that the market is competitive, the City Region will compete to attract investment in order to realise opportunities. The SEAP is a key component in the City Region signalling that it is a low risk destination for that investment.

## MORE INFORMATION

For further information on the Liverpool City Region SEAP programme please contact:

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## EU FUNDING OPPORTUNITIES

Green Investment Bank.

European Regional Development Fund (ERDF).

European Local ENergy Assistance (ELENA).

New European Commission Energy Efficiency Fund (EEEF).

LIFE+ Environmental Policy and Governance.

7th Framework Programme and  
8th Horizon Programme.

Intelligent Energy – Europe (IEE).

European Investment Bank.









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# PART 1: Realising the Opportunity

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# 1 Introduction

## 1.1 PURPOSE OF A LIVERPOOL CITY REGION SUSTAINABLE ENERGY ACTION PLAN

A Sustainable Energy Action Plan (SEAP) provides a single co-ordinated programme of action across the City Region to support the transformation to a low carbon economy through the identification and delivery of a variety of interventions in the energy sector. The SEAP mechanism is increasingly recognised as an effective vehicle for driving change, is a requirement for the Covenant of Mayors Programme and acts as an enabler to unlock access to many European and other funding schemes.

It is intended that preparation of the first Liverpool City Region SEAP signals that the City Region is ready and open to major investment in energy infrastructure projects to create jobs, strengthen the economy and in doing so, bring significant environmental benefits to the City Region. The Liverpool City Region SEAP shows the ambition of the City Region to act together and with partners to deliver a coherent programme of priority projects and actions. It is an invitation to both the private and public sectors to work in partnership to drive projects forward.

This report is an evolution of initial work undertaken by Arup on behalf of the City Region, and has been overseen by a City Region wide steering group with progress provided to both the City Region Chief Executives and the Low Carbon Economy Committee (LCEC).

## 1.2 THE ENERGY CHALLENGE FOR THE LIVERPOOL CITY REGION

There is an urgent need to transform the UK's energy system in order for it to sustainably provide energy to domestic, transport, industrial and commercial sectors. A secure, affordable supply of energy is critical to the smooth functioning and competitiveness of the economy, and is closely correlated with economic output. A reliance on fossil fuels, together with supply side conditions in energy markets, leads to fluctuations in energy prices that can be damaging to the economic performance of an area. Energy price volatility and issues in supply are forecast to worsen in future years. It will therefore be essential that the City Region takes greater control of its energy system and looks to generate more of its own energy in a competitive, secure and clean way.

This SEAP has been developed to increase understanding of the issues associated between economic growth, energy consumption and CO<sub>2</sub> emissions in the Liverpool City Region. The issues identified and discussed should also be used to inform the development of individual projects, including those led by the private sector as well as any individual local SEAPs prepared by local authorities for their own purposes.

“The era of cheap oil is behind us and we must plan for a world in which oil prices are likely to be both higher and more volatile”

UK Industry Taskforce on Peak Oil and Energy Security, February 2010<sup>1</sup>

## 1.3 DEALING WITH GROWTH

### A decade of progress and future growth

Over the last decade the City Region's economy (in GVA terms) has grown by around 50%<sup>2</sup>. Despite the global and national economic uncertainty, action plans developed by the City Region show the potential to create more than 100,000 new jobs across four sectors.

However the reality is that the City Region's GVA per capita remains well below the UK average, as does the average number of businesses per 1,000 population. There is a need for significant growth in the City Region's business base (from 47,471 to 62,164) in order for it to catch up to the rest of the country. To achieve the necessary growth, the City Region is set to bring forward some of the most significant developments in the country. This brings about major challenges but also significant opportunities to decouple the links between economic growth and increased energy consumption and CO<sub>2</sub> emissions.

The Government should establish a Task Force comprising representatives from relevant Departments, experts and private companies to establish how a multi-purpose Mersey Tidal Project can be funded and how the River Mersey can become the world's cleanest river in an urban setting. This is not solely about producing sustainable energy and an enhanced environment but also creating other wealth-creating infrastructure and business opportunities for British business.

Recommendation from The Rt Hon the Lord Heseltine CH and Sir Terry Leahy, October 2011

### Managing growth

The greatest challenge facing the City Region is to achieve economic growth whilst reducing CO<sub>2</sub> emissions. To do this Liverpool City Region will need to achieve an absolute decoupling of CO<sub>2</sub> emissions from economic growth, whereby emissions reduce at a greater rate than growth. This is the long term goal of the Liverpool City Region SEAP and will require the successful implementation of significant interventions, particularly if the Covenant of Mayors target of 20% carbon reduction by 2020 is to be achieved alongside significant City Region economic growth. It also means that over time, the City Region will need to understand and manage all forms of GHG emissions, from all sources. This will require the City Region to include emissions from aviation and shipping and consider the supply chains across the domestic, transport, industrial and commercial sectors.

To achieve this, the Liverpool City Region must ensure that it makes the transition to a knowledge economy by developing a greater balance between industrial, commercial and service sector economic growth and / or through increased productivity by improvements and efficiency of processes and labour skills. A sustainable knowledge economy will need efficient manufacturing at its heart. The City Region should maximise opportunities to service the energy sector through the manufacture, construction, installation, operation and maintenance services for all scales and types of energy generation. Liverpool City Region is already showing positive signs it can do this, most recently with the offshore wind and nuclear industry, however much more can be done across a wide range of energy sectors and projects.



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### How the City Region will grow

The City Region has a number of priority strategic developments planned that will grow the housing, employment and transport infrastructure. These include projects of national significance such as SuperPort, the Atlantic Gateway and Second Mersey Crossing that will result in major changes in the movement of goods and people around the City Region and beyond. The City Region is home to significant development and regeneration. For example, Liverpool Waters and Wirral Waters represent Europe's largest regeneration developments, with projects such as the Multi Modal Interchange 3MG, SuperPort, Daresbury Science and Innovation Campus (DSIC), Second Mersey Crossing, Kirkby Town Centre, Knowsley Industrial Park and Parkside Strategic Rail Freight Interchange demonstrating the range of major development opportunities emerging across the City Region. Such schemes present major challenges in reducing local carbon emissions, but are essential in the City Region becoming a low carbon economy and bringing wider environmental, social and economic benefits.

The City Region has nationally significant projects in place that will have impacts on CO<sub>2</sub> reductions, stemming from the four transformational actions (SuperPort, Low Carbon Economy, Tourism and Knowledge Economy) that shape the City Region. Each action is intended to drive significant job creation and growth. For example the knowledge economy<sup>3</sup> stands to create 60,000 jobs, whilst Tourism<sup>4</sup> will bring 14,000 new jobs. The Ports, Logistics and Maritime sector already has over 1,700 firms and employs approximately 28,000 people, with the Port of Liverpool trebling its volume of freight since 1985, now handling 5.3% of the total freight of UK ports. This growth is set to increase through the SuperPort<sup>5</sup>, which is projected to create a further 21,000 jobs by 2020, including many associated with onward distribution through the Manchester Ship Canal. The Atlantic Gateway is a collaborative framework between the Liverpool and Manchester City Regions that captures many of the City Region's existing and planned schemes and assets – a range of high-growth economic sectors, well-located development sites, key sustainable infrastructure and skilled workforces to unlock sustainable economic growth potential.

Projected residential and employment development up to 2025 stands to increase the City Region's energy consumption by 685 GWh a year. A significant proportion of this growth is anticipated to come from two key developments, Liverpool Water and Wirral Waters. Liverpool Waters alone is predicated to result in 213,333 MWh of energy consumption and total emissions of approximately 70.7kt CO<sub>2</sub> a year.

The Liverpool City Region must actively manage its energy consumption so that net increases in energy use do not result in increased emissions. It can do this by increasing energy efficiency and ensuring that a greater proportion of energy consumed in the City Region is from renewable and low carbon sources. This presents opportunities for a step change in energy projects being delivered by the City Region, in a way that creates jobs and growth whilst reducing emissions. To do this the City Region will need to increase access to investments in order to finance the delivery of energy projects.

### THE POTENTIAL FOR JOBS

The manufacture, installation, operation and maintenance of energy interventions require a broad range of skills. Based on national forecasts, the Liverpool City Region Mini-Stern first reported that the City Region could see 6,000 to 7,000 new jobs in the energy and environmental technology and service sector in the next 2 to 4 years.

The City Region's Low Carbon Economy Action Plan built on this with a target to create 12,000 new jobs in the low carbon sector by 2015. This represents a significant increase on the existing 8,500 already estimated to be employed across hundreds of businesses in low carbon sub sectors.

The action plan identifies the potential for 3,000 jobs in micro-generation and retrofitting business opportunities emanating from the interventions needed to become a low carbon economy.

### Direction of travel

In order to build on the significant progress already made in the City Region there will be a need to ensure it delivers the right actions, at the right times and in the right places. To do this the Liverpool City Region SEAP will use the Energy Hierarchy to guide the development and targeting of actions across the City Region.

The Energy Hierarchy is a framework to guide energy policy and decision making, that in turn will shape the energy projects developed and delivered in Liverpool City Region. The hierarchy is designed to reduce wastage and improve efficiency, is integrated with the principles of sustainable development and assists the management of energy demand and supply. Put simply, a common-sense, cost-effective, sustainable energy policy should aim to reduce energy use before seeking to meet remaining demand by the cleanest means possible<sup>6</sup>.

### Realising the potential

A recent report 'Rebalancing Britain: Policy or Slogan'<sup>7</sup> identified the City Region as needing to "set out how it will become one of the best places to start a business in the UK, building on its strengths such as availability of high-quality land, relatively low start-up costs, availability of skilled labour, its plans for growth, and its excellent internal and improving external connectivity". Growth presents a number of challenges for the City Region when developing a sustainable energy system. Growth can manifest and be measured in a wide number of ways and affects the energy demand from domestic, industrial and commercial and transport sectors significantly.

With over 4.4 GW of potential resource capacity identified for renewable and low carbon energy generation, the City Region has enormous potential to deliver a diverse range of commercial, community and micro-generation projects. The Liverpool City Region also provides a significant domestic market for energy projects and a real opportunity to cut carbon emissions in homes and workplaces, whilst also accommodating a mix of large, medium and small scale energy generation schemes. In doing so, these projects have the potential to save money and create employment.

### ENERGY HIERARCHY



#### SUSTAINABLE

**Priority 1:** Energy conservation.  
Changing wasteful behaviour to reduce demand.

**Priority 2:** Energy efficiency.  
Using technology to reduce demand and eliminate waste.

**Priority 3:** Exploitation of renewable, sustainable resources.

**Priority 4:** Exploitation of non-sustainable resources using low-carbon technologies.

**Priority 5:** Exploitation of conventional resources as we do now.

#### UNSUSTAINABLE

### CITY REGION POTENTIAL RESOURCES ENERGY CAPACITY

Energy from Biomass - 24 MW.

Energy from Waste - 77 MW.

Microgeneration - 2,990 MW.

Wind - 632 MW.

Tidal project - 700 MW.

Whilst challenging, this is achievable and the City Region already has the foundations for growing a supply chain and delivering the vocational and academic training and skills development needed for long term growth. To achieve this, the City Region must go beyond looking at energy in terms of energy generation and CO<sub>2</sub>, and focus on job creation, Gross Value Added, skills and investment in equal measure. To do this, there needs to be a focus in project and market creation. This should initially start with developing opportunities within Liverpool City Region, whilst exporting products, skills and services.

### CITY REGION LOW CARBON SKILLS ASSETS

Daresbury Science & Innovation Campus.

The Green Energy Training Centre, Wirral International Business Park.

Heath Business Park.

Liverpool Community College National Skills Academy Environmental Technologies Training Hub.

The Department of Electrical Engineering and Electronics at Liverpool University.

Stephenson Institute for Renewable Energy at Liverpool University.

Wavertree Technology Park.

Research Centre for Electrical Energy Efficiency at Liverpool John Moores University.

The Mini-Stern first identified significant assets that should be used to develop a renewable energy sector in the City Region. These include the use of suitable natural assets to respond to opportunities, for example tidal energy, commercial onshore and offshore wind energy generation and solar. Building on the Mini-Stern is the Low Carbon Economy Action Plan which sets out a programme of action across the four key growth areas of energy, networks, transport and buildings. The City Region's transition to a low carbon economy will provide significant opportunities for the Energy and Environmental Technologies and Services (ETTS) sector to develop with benefits for the consulting, engineering, construction, manufacturing, financial and legal sectors. This will build on the City Region's existing and growing supply chain to reduce demand, increase efficiency and deliver energy generation schemes across the domestic, transport, industrial and commercial sectors.

For businesses there are a number of organisations and programmes such as Carbon Trust, Enworks, Envirolink and ecoSMARTER in place that have been actively working with industry to reduce CO<sub>2</sub> and meet the regulatory requirement of Carbon Reduction Commitment (CRC), EU Emission Trading Scheme (EUETS) and Climate Change Agreement (CCA).

In the domestic sector, local authorities in the City Region have used national initiatives such as the Carbon Emissions Reduction Target (CERT), Warm Front and Community Energy Savings Programme (CESP) to good effect, working with housing providers and utilities companies to deliver energy and CO<sub>2</sub> saving measures to more than 120,000 homes in the last three years alone. This work will continue and be enhanced as the City Region prepares for the transition to the Green Deal and ECO (Energy Company Obligation).

For transport, the City Region also now has its third Local Transport Plan (LTP3) prepared and ready for implementation. LTP3 will have a major impact on the way goods, people and services will be moved in and out the City Region and the new fuels and technologies needed to do this.

### CASE STUDY: EXPORTING ENERGY PRODUCTS AND SERVICES

Wirral manufacturer ANH Refractories Europe provides service industries which utilise heat for production processes or power generation. The company supplies refractory materials for boilers, cyclone boilers and energy from waste plants. Their products extend the service life and reduce life cycle costs of energy generation units.

In January 2012, the Bromborough based company reported a record increase in turnover from £4m to around £7m through increased exports to the Middle East and European markets, as well as strong UK growth. The company has already increased staff numbers with further growth of 15% expected in 2012.



In terms of energy generation, the City Region is already making significant progress, with large scale projects at varying stages of delivery for heat and power generation, including CHP, heat networks, wind and tidal power resulting in over 2 GW of energy generating capacity.

The economic benefits of servicing the energy sector more generally have been recently witnessed by the City Region securing contracts to construct, assemble and support the installation of major energy infrastructure for the offshore wind and nuclear industry. There is a real opportunity to ensure that the transformation to a low carbon economy results in increased investment and a wide range of jobs requiring high, intermediate and low level skills.

There is a pressing need to develop the core skills into higher level low carbon / energy competencies and services through an integrated programme of training, development and crucially clustering and sector support.

For example, for micro generation and energy efficiency projects this is about clustering the core skills that are common to plumbing and heating engineers, electricians, roofers and general building contractors into an integrated low carbon installation business service through Micro-generation Certification Scheme (MCS) accredited training. This would be developed to enhance the City Region's existing capacity of around 100 MCS accredited companies.

Liverpool City Region's significant assets, growing supply chain, project activity and existing and emerging policies provide the City Region with a clear opportunity to harness its significant potential for renewable and low carbon energy generation and in doing so create jobs and grow the economy.

### LOCAL SKILLS

16 companies capable of installing more than one technology type.

66 for solar photovoltaics.

20 for solar hot water.

16 for heat pumps.

5 for wind.

### CITY REGION PROJECT ACTIVITY

The City Region is already becoming an attractive location for forms of renewable and low carbon generation investment. For combined heat and power generation alone there is almost 500 MW of energy generation capacity identified. This includes up to 273 MW generating capacity for energy from waste schemes, 54 MW from 8 priority areas for district heating and up to 150 MW capacity from a single biomass generation scheme.

Further potential is identified for commercial scale wind, with 19 MW of potential identified already and over 700 MW of capacity from tidal projects, which have already been subject to detailed feasibility assessments. There is also potential for up to 2,000 homes to be fitted with micro-generation technologies as part of a wider retrofitting programme across the City Region.

### Energy and poverty

Fuel poverty is defined as; "a household is said to be in fuel poverty if it needs to spend more than 10% of its income on fuel to maintain a satisfactory heating regime (usually 21 degrees for the main living area, and 18 degrees for other occupied rooms)<sup>8</sup>". Fuel poverty is often a combination of issues, including low household income, inefficient and costly forms of heating and poor insulation standards. In 2009, 23% of households (of a total of 639,379 households) in the City Region were in fuel poverty.

The development of a sustainable energy system can help reduce fuel poverty by increasing energy efficiency, reducing energy demand and improving a mix of energy sources that are less reliant on fossil fuels which are vulnerable to volatile prices. Typically, this will mean a shift towards renewable and low carbon energy sources; however with this is a risk of increased price rises due to the capital costs associated with deploying the associated infrastructure.

The City Region will therefore need to target and coordinate measures so that opportunities for economies of scale can be maximised, and capital and operating costs can be progressively eliminated as a barrier to implementation. The City Region may also need to look at ways of introducing mechanisms to subsidise the City Region's deprived areas and hard to reach groups.

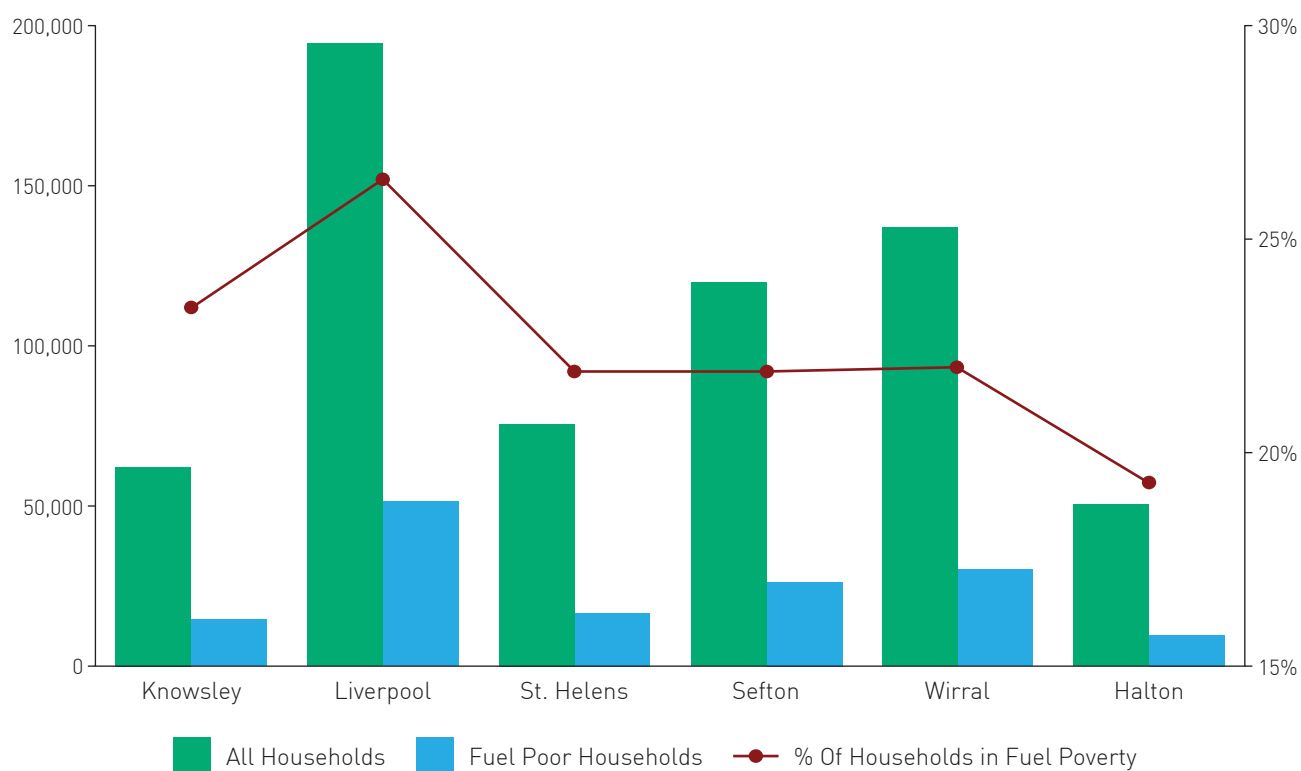


Figure 1: Fuel Poverty in the City Region, 2009

## 1.4 BUILDING ON PROGRESS

The Liverpool City Region SEAP has been prepared at a time when substantial progress is being made with a range of energy and low carbon projects identified across the City Region. However, much greater progress can be made through co-ordinated action that connects individual projects, resources and skills into a city regional scale programme. The SEAP programme signals that the City Region is serious about energy resilience and that it has the potential to improve the competitiveness of its economy and ability to attract major investment through the delivery of energy projects and development of its own supply chain. It does this by identifying the potential capacity to deliver renewable and low carbon energy, presenting the key strategic projects and programmes being planned and delivered, and outlining the assets and supply chains that exist across the City Region.

Key plans and documents that influence this SEAP include the Liverpool City Region's four transformational actions set out in the Low Carbon Economy Action Plan, SuperPort Action Plan, Knowledge Economy Action Plan, and Visitor Economy Action Plan. Other key documents include the third Local Transport Plan for Merseyside and the Joint Recycling and Waste Management Strategy for Merseyside, as well as Local Plans produced by each local authority. The SEAP also captures a wide range of local level plans and strategies aimed at providing affordable warmth, energy efficiency and reducing CO<sub>2</sub> emissions.

The SEAP has been produced at an important time. Whilst there is clear evidence of established and potential assets that already or could service the energy sector in and outside of the City Region, there are concerns that programmes and projects are either stalling or ceasing altogether due to changes in EU and UK policy, financial uncertainty, resource availability and risk. The preparation of the Liverpool City Region SEAP is timely in that it provides an opportunity to state the City Region's ambition for this key sector.

### 1.5 BENEFITS OF THE LIVERPOOL CITY REGION SEAP

The Liverpool City Region SEAP programme positions the City Region as an “investment ready” location for the energy sector and a place where the local authorities are working in partnership through a single programme of priority projects and actions.

Securing investment in resilient energy infrastructure and a more sustainable energy system offers multiple benefits across all sectors of business and our communities by:

- Creating opportunities for business growth and job creation by matching technological solutions that are currently available with project opportunities.
- Increasing employment and inward investment including further development of the low carbon economy supply chain.
- Reducing energy costs through improvements in energy efficiency and cheaper energy for public-owned assets.
- Increasing the resilience and potentially the capacity of energy infrastructure, thus providing new economic opportunities.
- Making a substantial contribution to health, equality and fuel poverty agendas through energy efficiency and by delivering renewable and decentralised energy.
- Delivering improvements in public sector low carbon and climate change performance, including making a substantial contribution to CO<sub>2</sub> reduction commitments and sustainability.
- Decarbonising our energy generation infrastructure, employment and housing stock and transport infrastructure.
- Making substantial progress with the Low Carbon Economy transformational action.
- Providing a focus for growth and development of knowledge and skills.

A single Liverpool City Region SEAP programme has the potential to deliver these multiple benefits through the following activities:

- Integrating, complementing and adding scale to existing projects and programmes of action and investment in renewable and low carbon energy infrastructure projects.
- Providing a framework for public / private partnership at the city region level but also locally.
- Identifying and prioritising projects and actions that would reduce energy demand, deliver clean energy generation and decarbonise our energy infrastructure and the economy.
- Improving the success rate and value of EU funding applications.
- Increasing the likelihood of securing major inward investment to assess the feasibility and delivery of projects.
- Providing opportunities to cluster projects to achieve scale of investment and greater efficiency.
- Pooling resources, sharing skills, sharing effective practice and identifying opportunities for efficiencies in programme delivery.
- Supporting the development of local authority and organisation-specific programmes of activity.
- Providing a mechanism for consistent measuring and monitoring of the economic benefits (new jobs, supply chain, Gross Value Added (GVA)) of investment in energy infrastructure projects.
- Providing a mechanism for consistent measuring and monitoring of carbon emissions across sectors.



### 1.6 SEAP STRUCTURE

The Liverpool City Region SEAP has been prepared in two parts:

- Part 1 sets out the purpose and priorities and the economic and environmental drivers and benefits that underpin a strategic City Region programme.
- Part 2 sets out the Baseline Emissions Inventory and presents the detailed action plans.

A key driver in Part 1 is to provide the context for City Region activity and act as an invitation to public and private sector organisations to work in partnership to develop and deliver a programme of truly city regional scale. Part 1 is a signal that the City Region and local authorities are open for investment in energy infrastructure projects.

Part 1 also sets the context for the City Region in terms of the issues that the Liverpool City Region SEAP must address.

Part 2 of the SEAP focuses on the key priority actions that Local authorities, along with potential partners should invest time and resources in, in order to deliver the projects needed to create jobs, economic growth and reduce CO<sub>2</sub>. It also provides a baseline of the City Region's energy system and what this means in terms of energy consumption (GWh) and carbon dioxide equivalent (CO<sub>2</sub>e) emissions for a baseline year of 2005. Part 2 consists of 5 Action Plans: Action Plan 1 contains key enabling actions that provide the framework for delivering Action Plans 2, 3 and 4. Action Plan 2 deals with energy demand actions, Action Plan 3 sets out energy supply actions and Action Plan 4 addresses transport actions. Action Plan 5 contains the actions needed to progress the development of the Liverpool City Region SEAP in order to inform target setting across sectors, develop actions and inform investment decisions.

Where available, information on the economic and CO<sub>2</sub> impacts of projects and programmes being planned and delivered in Liverpool City Region has been used in each action plan. This has highlighted inconsistencies in how projects are measured across the City Region. For example in terms of emissions projects are often measured for carbon dioxide (CO<sub>2</sub>) and not carbon dioxide equivalent (CO<sub>2</sub>e) or there is little or no understanding of the impact on jobs and growth. Actions have been developed to address these issues in this SEAP.

Action plans do not currently identify who will have responsibility for delivering action(s). This is deliberate in order to promote the buy in and ownership needed to shape and deliver future SEAP actions and projects. The actions presented in this SEAP are purposely high level at this stage and will be developed into smarter plans through discussion, collaboration and partnership. The action plans therefore provide an opportunity to engage, respond and implement this SEAP. They also have the potential to provide an important platform to grow the energy sector supply chain within the City Region and in doing so create jobs and retain economic investment within Liverpool City Region.

## 1.7 WHO IS THE LIVERPOOL CITY REGION SUSTAINABLE ENERGY ACTION PLAN FOR?

Preparation of the Liverpool City Region SEAP has been led by the six Liverpool City Region local authorities in response to the need for greater leadership and a strategic programme for the City Region to deliver energy projects. Local authorities have a key role to play in this agenda, however this is much more than a local authority initiative.

For the SEAP to succeed, actions must be delivered through partnership, with clear ownership and accountabilities identified and a track record of de-risking project opportunities established. This will involve demonstrating how the City Region can show that it delivers programmes of work, can provide security, attract subsidies, create revenues, can develop or work as part of a Special Purpose Vehicle (SPV) and bring economies of scale to projects.

The Liverpool City Region SEAP identifies local authorities as key players in this process because of their track record in delivering successful projects, the assets and services they provide in setting regeneration priorities, influencing growth and development through the planning system and their duty to improve the quality of life and well being of their communities. However, it recognises that the public sector has limits and the Liverpool City Region SEAP therefore targets the private sector in order to bring the necessary skills, investment and drivers to 'make things happen'. Effective partnership working and sharing risks are key themes embedded into the SEAP.

The Liverpool City Region SEAP will require network and utility companies, universities, developers, banks and investment funds as delivery partners. Education, health, emergency and statutory agencies such as Merseytravel and Merseyside Recycling Waste Authority (MRWA) are also significant players in developing the City Region's energy sector and will have significant roles to play in the development and delivery of projects. The Liverpool City Region SEAP programme is therefore an invitation to engage and participate in the delivery of resilient low carbon energy infrastructure projects. Participation is open to all organisations, particularly those who are interested in working on large scale projects across the City Region.

The Liverpool City Region SEAP does not just contain project opportunities; it also identifies key enabling actions for the City Region to help bring forward more projects in the future. Investment in energy infrastructure projects, such as those identified in "Mechanisms for Resilient Energy Infrastructure for the Liverpool City Region" offer the potential to generate significant returns on investment in the medium to long term, whilst providing potential to sustain economic growth across the supply chain.

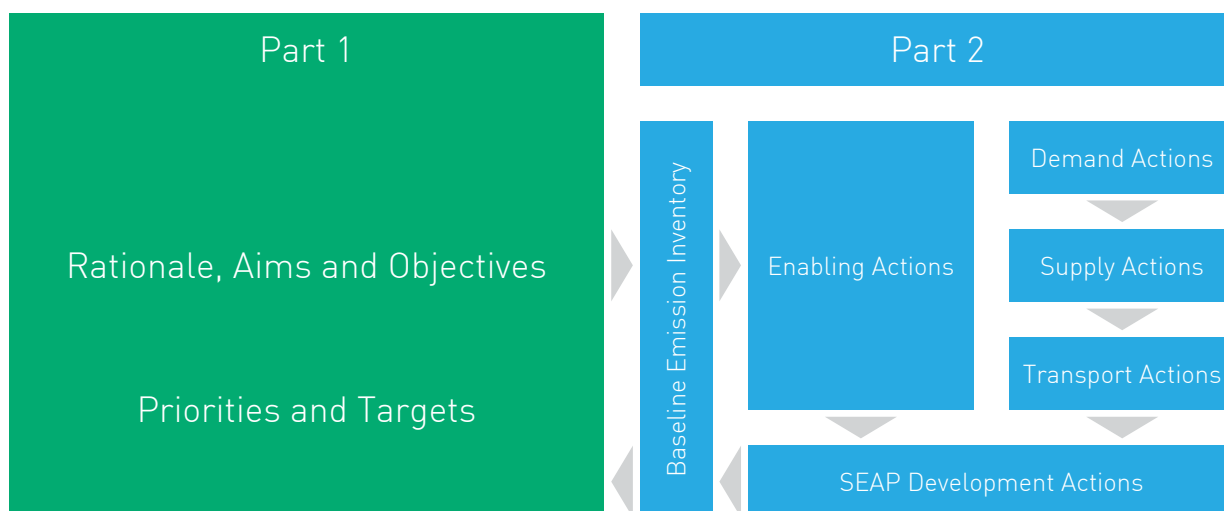


Figure 2: Diagram of SEAP Structure

## 1.8 RELATIONSHIP WITH LOCAL AUTHORITY PROGRAMMES

Across the City Region, individual local authority energy infrastructure projects are starting to emerge, with the most rapid progress taking place in Knowsley and Liverpool. Whilst some of these projects will remain focussed on a specific area, one of the objectives of a co-ordinated Liverpool City Region SEAP programme is to identify where there is an opportunity to combine projects, or jointly address issues across administrative boundaries to provide greater economies of scale and value. Widespread political ownership of the Liverpool City Region SEAP agenda across the City Region is therefore fundamental to success. The Liverpool City Region SEAP provides the co-ordination framework to make best use of joint project opportunities and can also help support an individual local authority or private sector action. Examples of where the Liverpool City Region SEAP programme has the potential to add significant value include:

- Joint EU funding and investment applications.
- Efficiencies in procurement of goods and services to deliver energy projects.
- Increasing the scale of energy projects to improve rates of return to investors.
- Development of a Liverpool City Region heat network.
- Producing integrated programmes of action such as the development of a domestic, industrial and commercial retrofitting programme and an alternative fuel strategy for transport and energy infrastructure.

Participating in the SEAP programme also provides significant potential to gain access to knowledge, skills and resources through collaboration with partner organisations. Effective co-ordination should also lead to significant efficiencies in monitoring progress against the baseline that has been established at the City Region level as part of this work. Accountability is central to effective co-ordination and programme delivery and local authority partners should identify accountable people to drive projects forward and identify joint opportunities that would be enhanced if addressed at the City Region level.

## 1.9 KEY MEASURES OF SUCCESS

To ensure the Liverpool City Region SEAP delivers the economic and environmental benefits needed in the City Region, several measures will be needed in order to understand the economic, energy and environmental impacts of actions. The City Region will work together with partners to develop the measures so that actions and projects can be measured in terms of jobs, economic growth, projects, energy and carbon emission savings. This will provide decision makers with a clear picture of each action's economic and environmental credentials, allowing it to prioritise and maximise the impact of intervention measures.



## 2 Prioritising Actions and Setting Targets

### 2.1 SETTING A TARGET

The SEAP is about transforming the energy system of the City Region to one which limits demand, encourages increasingly efficient consumption, and provides an increasing proportion of supply from decentralised, low carbon sources. This will contribute to the dual aims of growing the low carbon economy and reducing the carbon intensity of energy use in the City Region.

The Low Carbon Economy Action Plan provides a range of means for the measurement of success in growing the low carbon economy, including a target to create 12,000 new jobs by 2015. The ongoing review and monitoring of its implementation will remain the appropriate means of tracking economic impact.

The SEAP can flexibly encompass and capture a range of objectives and targets, but one of its principle aims is to provide a means of complying with the requirements of the Covenant of Mayors, which entails setting and meeting targets based around CO<sub>2</sub> reduction. It is therefore this aspect of performance that the SEAP will focus on as the principal mechanism for strategic delivery across the City Region.

Part 2 of this document provides a detailed overview of the context for setting a CO<sub>2</sub> emission target for the City Region. Target setting will require a level of discussion among partners which has not yet taken place, in order to agree on a figure that is challenging yet achievable.

The minimum target figure set out by Covenant of Mayors is for commitment to a 20% reduction in emissions by 2020 on a 1990 baseline (for which 2005 is an accepted proxy for the UK). Until a locally appropriate target is agreed for the City Region, this figure must therefore be considered to be the adopted target.

However, there is considerable scope for the City Region to stretch its ambitions beyond this level. The Baseline Emissions Inventory presented in Part 2 suggests that a 17% reduction in emissions had already been achieved by 2009. In addition to this, the Climate Change Act commits the UK Government to achieve a national reduction in emissions of 34% on 2005 levels by 2020, and current projections indicate that this target is likely to be significantly exceeded.

### 2.2 THE ACTION PLAN

One of the key functions of a SEAP is to point the way ahead by setting out a programme of discrete actions that will support the overall City Region aim to:

- Reduce demand for energy.
- Improve the efficiency with which energy is used.
- Increase the local availability of decentralised renewable and low carbon energy sources.
- Reduce CO<sub>2</sub> emissions.
- Realise the maximum economic benefit for the City Region.

Part 2 of this document sets out a series of action plans, outlining interventions which will contribute to the strategic objectives of the SEAP. The action plans are characterised into types of action and cover direct interventions on energy efficiency, demand management, energy supply and transport, together with important enabling activities and actions to develop and run the SEAP programme itself. In all, 21 discrete actions are recommended.

The action plans contain measures that in some cases are at least partially ongoing, and others that can be delivered wholly or in part on an opportunistic basis as, for instance, funding sources become available. In this case the action plans form a good means of focussing attention, priority setting, seeking opportunity and for formulating funding bids, potentially with the direct support of SEAP partners as and when resources are available.

However, there are considered to be a set of core priority actions that the City Region, through SEAP partners, needs to work actively to address. These are as follows:

- Put in place a mechanism for co-ordination of the City Region SEAP programme and appropriate accountability.
- Intervene to ensure the delivery of projects already identified (such as those linked to known major development schemes or to the proposed Priority Zones for district heating schemes).
- Work to secure funding through private sector investment, public grant funding or from the financial sector in the development of the City Region's low carbon energy infrastructure.

## 2 Prioritising Actions and Setting Targets

These three actions are seen as the immediate priorities for the City Region, as they will deliver a functioning SEAP programme, signal that the City Region is serious about delivering the immediate low carbon energy opportunities that have already been identified, and prioritise securing the necessary funding to support delivery of the programme.

As these priorities are addressed, the City Region will be confronted with a number of issues that will require a change of thinking and the adoption of new ways of working. Among these are likely to be the development of much closer co-operation between public sector partners and the forging of closer links with the private sector (which may result in the setting up of a formalised arrangement by means of a special purpose vehicle, in the form of an Energy Services Company, or ESCo).

The action plans and immediate priorities identified above will change as the SEAP programme develops over time. However, it is likely that new challenges will continue to emerge and it is important that the commitment of the City Region to address them remains firm, if the goal of achieving a high value added, low carbon energy economy is to be achieved.



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# 3 Next Steps

The City Region is not alone in pressing for co-ordinated action on energy infrastructure. Virtually every major city in the UK is also making progress in what is a competitive market, and the Liverpool City Region needs to position itself strongly to avoid missed opportunities. This has already been recognised by districts in Liverpool City Region, with a number already making positive steps in advancing projects by commissioning the work needed to attract investment.

Energy projects need investment and that investment needs to be financed and repaid. The City Region must compete to attract investment and in some areas there is an urgent need to make significant progress to ensure that opportunities are not missed. There are some major investors and players in the energy sector showing substantial interest in the City Region, and they are already exploring their investment risk and return profiles. It is essential that the Liverpool City Region signals, initially through the SEAP, that it is a low risk destination for their investment.

To deliver the measures needed, there is a need to demonstrate the City Region has a high level of project activity, a commitment and depth of investment and support in advancing projects, an ability to develop credible and clear information and can provide a platform for efficient discussion and negotiation.

The Liverpool City Region is therefore faced with a challenge of moving quickly and decisively to make the most of its unique blend of world class natural assets, skills and infrastructure to position us ahead of the competition. However, to convert this undoubted potential into retained investment will require strong leadership, bold political support, decisive action and investment. Time is short and the window of investment opportunity will start to narrow quickly.

The Liverpool City Region SEAP is a draft document for discussion. It will be presented to partners with the intention of stimulating discussion and encouraging a response to its objectives and priority actions. The draft Liverpool City Region SEAP will be:

- Presented to the LCEC.
- Used as the basis for briefing and discussion with local authority Elected Members.
- Discussed with Chief Executives.
- Presented to potential partners across the Liverpool City Region.
- Form the basis for a Liverpool City Region “Energy Summit” – funded through CLASP.

This period of discussion and consideration should not signal a pause in the processes. All partners are strongly encouraged to continue to advance their own plans and projects.







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## PART 2:

# Baseline and Action Plan

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# 1 The Liverpool City Region Energy System

## 1.1 INTRODUCTION

This section sets out the baseline information (A Baseline Emissions Inventory) on the City Region energy system. The baseline includes information on energy consumption and carbon emissions. An energy system consists of technologies to generate energy and physical infrastructure for the transmission and distribution of energy. An energy system can also be defined by policy, organisations and services that deliver energy to consumers.

When setting a baseline year for establishing and measuring targets, the UK typically uses a 1990 relative baseline. However at a more local level a 1990 baseline is often unavailable. This is due to local authorities having insufficient data on energy consumption and greenhouse gas (GHG) emissions until 2005 through collation of (the former) National Indicator 186 data, which is now produced by DECC.

### KEY FINDINGS

In 2005 the City Region consumed over 37,000 GWh of energy. This was made up of 20% electricity, 51% gas, 29% petroleum products, and less than 1% from renewable, waste, coal and manufactured solid fuels.

From this energy consumption a total of 11,500kt CO<sub>2</sub>e was emitted. This was made up of 38% electricity, 33% gas, 28% petroleum products and 1% from renewable, waste, coal and manufactured solid fuels.

Between 2005 and 2009 energy consumption has reduced by 19% and CO<sub>2</sub>e by 16%.

## 1.2 BASELINE 1: ENERGY CONSUMPTION AND CO<sub>2</sub>e AS AT 2005

In 2005 the Liverpool City Region was identified to have an energy consumption total 37,297 GWh. This total was made up from several energy sources including electricity, natural gas, coal, manufactured fuels, petroleum products, renewable energy and waste. This energy consumption resulted in a carbon equivalent emissions total of 11,641kt CO<sub>2</sub>e for the year.

## 1.3 BASELINE 2: ENERGY USE BY FUEL TYPE

This section presents the main energy sources that are used in the City Region. Figure 3 shows energy used by fuel type, and Figure 4 shows the associated CO<sub>2</sub>.

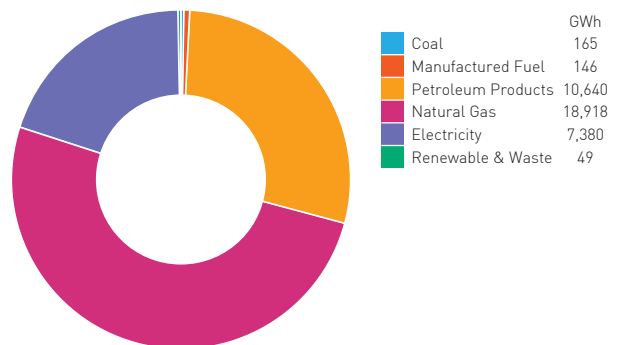


Figure 3: 2005 Energy Consumption (GWh) in the City Region

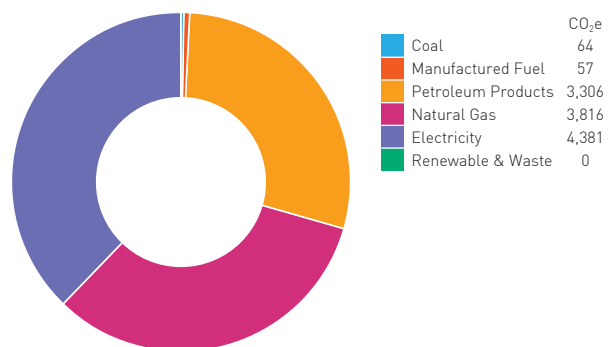


Figure 4: 2005 Estimated CO<sub>2</sub>e (kt) in the City Region

### 1.3.1 Electricity

In 2005 electricity accounted for 20% of the City Region's total energy consumption and 38% of the CO<sub>2</sub>.

Electricity is a secondary source of energy produced by a range of primary energy sources<sup>9</sup>. In the UK the mix of sources used to generate electricity include coal, petroleum, nuclear, natural gas, biogas, biomass and waste and other renewable sources such as wind, wave and hydro.

In the UK industrial consumption was 34% of final consumption in 2005, marginally more than the consumption by households (also 34%), with transport, storage and communications and the services sector accounting for the remaining 32%. Within the industrial sector the three largest consuming industries are chemicals, paper and food, which together account for 41% of industrial consumption.

98% of UK electricity supply in 2005 was home produced and 2% was from imports net of exports. Just 0.5% of home produced electricity was exported. Demand for electricity is predominantly from final consumers, who accounted for 85% in 2005. The remaining 15% is split equally between the energy industry and energy system losses. The electricity industry itself uses 57% of the energy industries' total use of electricity, with a further 12% used for pumping at storage stations. Petroleum refineries were the next most significant consumer with 18% of energy industry use<sup>10</sup>.

### 1.3.2 Natural Gas

In 2005 natural gas accounted for 51% of the City Region's total energy consumption and 33% of the CO<sub>2</sub>e.

The UK has been increasingly dependent on imports of natural gas and this has security and price implications for the City Region's supply of this energy source. The UK relies on gas to provide energy for heating and electricity generation more than any other primary energy source<sup>11</sup>. Historically, the majority of the UK's gas has been provided by the UK Continental Shelf (UKCS), these reserves are declining and natural gas production has been decreasing since 2000.

Use of natural gas has also declined across the UK due to a downward trend in the industrial use of gas, with major industrial sectors showing a decline, particularly the chemicals sector. Gas use in the domestic sector often shows greater variation in use as it is influenced by winter temperatures. In 2005 35% of gas demand in the UK was from the domestic sector, whilst public administration (including schools and hospitals) consumed 4.5%. The commercial, agriculture and miscellaneous sectors together took up 5% and 30.5% of demand was for electricity generation (transformation sector). A further 7.5% was consumed for heating purposes within the energy industries. 1% was accounted for by distribution losses within the gas network. Of the remaining 61%, 2% was transformed into heat for sale to a third party, 13.5% was accounted for by the industrial sector with the chemicals industry (excluding natural gas for petrochemical feedstocks), food and paper making industries the largest consumers<sup>12</sup>.

### 1.3.3 Petroleum Products

In 2005 petroleum products accounted for 29% of the City Region's total energy consumption and 28% of the CO<sub>2</sub>e emissions.

During 2005, consumption of petroleum products in the UK (for all uses including refining processes) totalled 81 million tonnes<sup>13</sup>. Final consumption of oil products (excluding any uses by the energy industries themselves or for transformation purposes) amounted to 74.5million tonnes, with transport accounting for 76% of all petroleum products consumed.

The most significant change in the consumption of petroleum products was the decline in its use for electricity generation, which was primarily due to major electricity producers moving to natural gas as their primary fuel source rather than oil-based fuels.

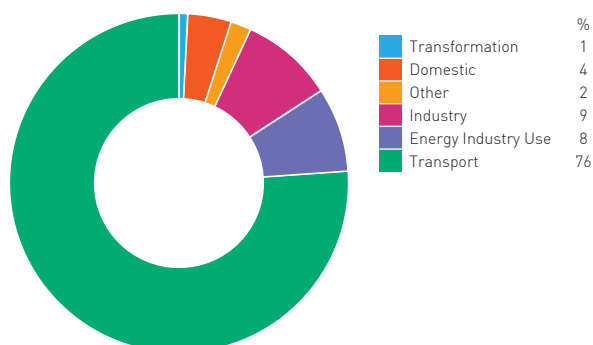


Figure 5: Use of Petroleum Products in the UK, 2005

### 1.3.4 Other Fuels

Less than 1% of the City Region's energy consumption was from Manufactured Solid Fuels, Coal, Renewable and Waste sources. Combined, these energy sources amounted to 1% of CO<sub>2</sub>e.

## 1.4 BASELINE 3: ENERGY USE AND CO<sub>2</sub>e BY SECTOR

In 2005 the City Region's domestic sector consumed the greatest proportion of energy amounting to 39% of the total energy consumed; however the domestic sector had the lowest proportion of the CO<sub>2</sub>e at 22%. The industrial and commercial sectors consumed 38% of the City Region's energy and emitted the largest proportion of CO<sub>2</sub>e at 51%. The transport sector consumed 23% of the total energy consumed and emitted 24% of the CO<sub>2</sub>e. Figure 6 shows the energy consumption and CO<sub>2</sub>e by sector.

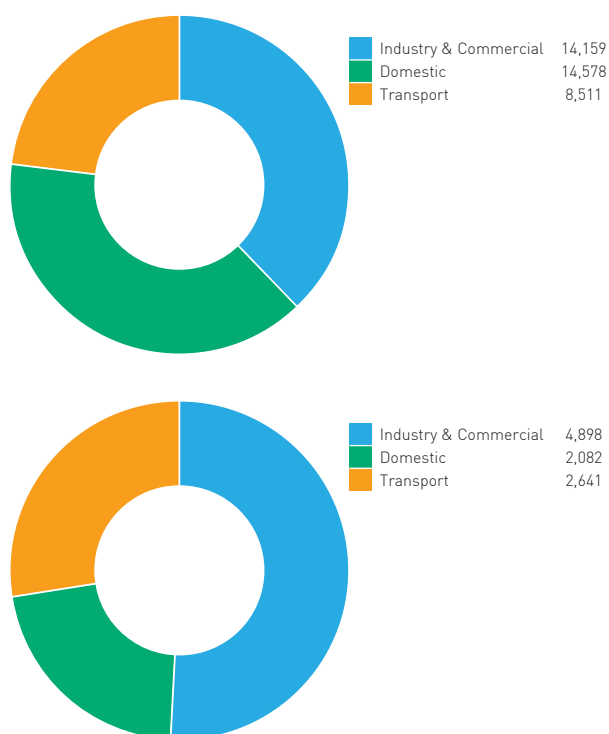


Figure 6: Total Energy Consumption (GWh) and CO<sub>2</sub>e (kt) by Sector

## 1.5 BASELINE 4: ENERGY USE AND CO<sub>2</sub>e PER CAPITA

Measuring energy use and CO<sub>2</sub>e per capita is particularly useful when considering changes in emissions against changing population. This baseline can have limitations, particularly when comparing data with other areas as it is subject to a number of variables such as demographic change, economic activity, and the change in land use, urban and rural form of an area. Because of this, SEAP baselines often focus on domestic emissions per capita only, rather than transport and industrial emissions which are sectors that are subject to much greater change and variation.

For the City Region all sectors are considered per capita. Figure 7 provides analysis of the domestic, industrial and commercial and transport sectors individually and collectively.

As at 2005, the City Region's total CO<sub>2</sub>e per capita amount to 4.7 tonnes of CO<sub>2</sub>e per capita for the industrial and commercial sector, 2.6 tonnes of CO<sub>2</sub>e per capita for the domestic sector and 1.8 tonnes of CO<sub>2</sub>e per capita for transport. The combined total for all three sectors amounts to 9.05 tonnes of CO<sub>2</sub>e per capita.

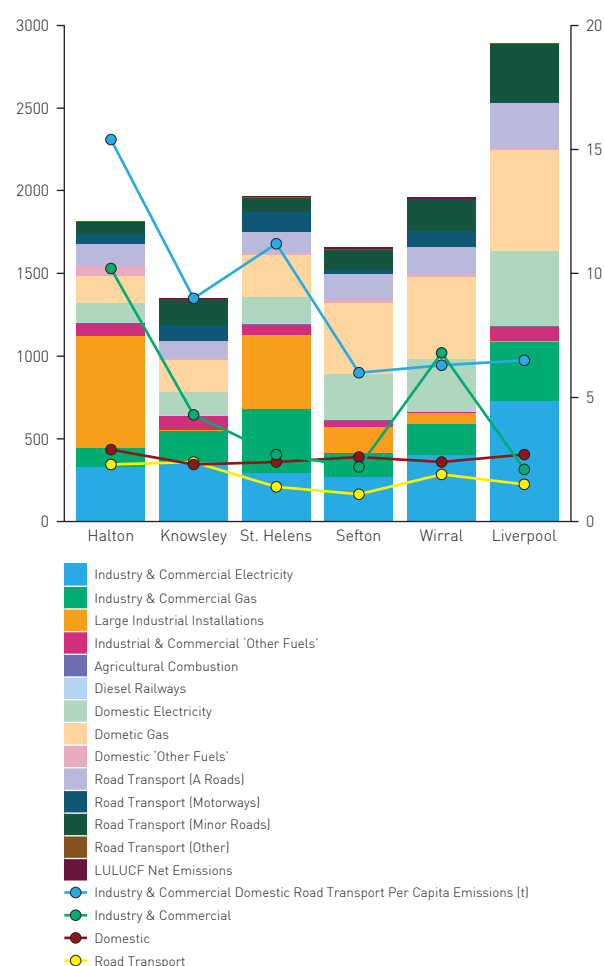


Figure 7: 2005 DECC Estimated CO<sub>2</sub> (kt) by sector & Estimated CO<sub>2</sub> (kt) per Capita in the City Region



## 1.6 BASELINE 5: ENERGY AND CO<sub>2</sub>e SINCE 2005



Figure 8: Energy and CO<sub>2</sub>e 2005 – 2009 (Energy 0- 40,000 GWh) (CO<sub>2</sub>e 0- 14,000kt)

Baseline 5 provides indications of the overall direction of travel for energy consumption and CO<sub>2</sub>e. Trend data has been analysed from the baseline year of 2005 up to 2009.

The data shows that there has been a significant decrease in energy consumption and associated CO<sub>2</sub>e in the City Region.

Between 2005 and 2009 the City Region:

- Reduced its overall energy consumption from 37,297 GWh to 30,181 GWh. A reduction of 19%.
- Reduced its overall CO<sub>2</sub>e emissions from 11,641kt CO<sub>2</sub>e to 9,654kt CO<sub>2</sub>e. A reduction of 17%.

# 2 Setting targets for the City Region CO<sub>2</sub> emission reductions

## 2.1 INTRODUCTION

The main objective in mitigating climate change is to reduce the total GHG emissions up to 2050. This section outlines key issues to consider when setting targets at a City Region and local level, discusses national targets that provide a strategic framework that this and future SEAPs are influenced by and an overview of the established CO<sub>2</sub> targets set by the City Region's local authorities to date.

## 2.2 NATIONAL TARGETS

The UK was first to set its ambition in law, with binding carbon budgets spanning successive Parliaments to give the necessary certainty to investors.

- The UK Climate Change Act requires that the UK reduces its GHG emissions by 80% by 2050 (over a 1990 baseline). This equates to a 77% reduction compared to 2005 levels<sup>14</sup>. In 2008, interim carbon budgets were set to ensure the UK meets the 2050 target. This included a target for a 34% reduction in GHGs by 2020 (over 1990 baseline), which has been increased to 37%<sup>15</sup> by 2020 (over 1990 baseline), and equates to around 34%\* relative to 2005 levels.
- The UK Low Carbon Transition Plan requires that by 2020 there is an 18% reduction in emissions compared to 2008 levels, 40% of the UK's electricity is from low carbon sources and there is a 29% reduction in emissions from homes increasing to 100% by 2050.
- The UK Renewable Energy Strategy (RES) signalled the UK's intention to meet its European commitment to reducing CO<sub>2</sub> by securing 15% of all its energy (30% of electricity, 12% of heat and 10% of transport) from renewables by 2020.

The Carbon Plan sets out how this will be achieved nationally. The plan identifies that carbon reduction will be achieved through the delivery of 'easy wins' including the insulation of all remaining cavity walls and lofts, while continuing to roll out more efficient condensing boilers. In terms of transport the plan identifies that further reductions will be achieved through improved internal combustion engine efficiencies. It also identifies a further 40% fall in emissions from power stations through the closure of most existing coal-fired power stations. Whilst these interventions are deliverable, there is an urgent need to prepare for the future and deliver interventions that are based on technological solutions rather than the relatively easy actions that have been delivered to date and will continue up to 2020. The transition to a low carbon economy will require major investment, however the extent of that investment will be lessened through the energy efficiency measures delivered by 2020<sup>16</sup>.

The Carbon Plan published on 1 December 2011 set out the UK's progress to date and assessed the cost-effective next steps. The Carbon Plan indicates that:

- UK emissions have already been cut by more than 25% on 1990 levels.
- With the policies already in place the economy will significantly exceed the 34% target set for the first 15 years under the Climate Change Act, and would have done so even if the recession had not occurred.
- Meeting the fourth carbon budget of a 50% cut in emissions by the mid-2020s will not have any additional cost implications during the current Parliament, but beyond that will require a decade of mass deployment of key technologies.

\* Please note Arup is currently reviewing this figure

### 2.3 LOCAL AND CITY REGION TARGETS

Each local authority in the City Region can set its own target for reducing CO<sub>2</sub>. Figure 9 provides an overview of targets produced to date. The table shows that at present, targets produced by local authorities vary in terms of their baseline, scope, timescales and ambition. In the absence of an agreed City Region wide target there is a clear need to develop a target that provides alignment for established targets for 2020 and 2050. The analysis to date of national and local levels suggests there is scope to develop a common set of targets.

Progress in setting CO<sub>2</sub> emission targets has been relatively slow nationally. As at April 2011, 28% of English Councils<sup>18</sup>, had medium-term (2015 – 2035) CO<sub>2</sub> reduction targets for their local areas of which 25% of councils had targets that went to 2020 and beyond. Of these Councils, the average equivalent target for the year 2020 was a 29.6% reduction in CO<sub>2</sub>, with just over 6% of councils having a target that is equivalent to a 40% cut<sup>18</sup> by 2020.

Figure 9 provides a summary of CO<sub>2</sub> targets for England's Core Cities. This shows that targets vary based on the type of evidence prepared to inform targets, the capability of cities to deliver actions to reduce CO<sub>2</sub> and the ambition of those cities. The table also demonstrates the inconsistency between baselines, with 1990 and 2005 baselines used. Further inconsistencies exist between targets years, with a combination of 2020 and 2050 generally being used and Birmingham and Liverpool using alternative baseline years of 2026 and 2024 respectively.

Core City	CO <sub>2</sub> Target	From	By	Date of Strategy / Action Plan
Manchester	45%	2005	2020	2011
Bristol	40%	2005	2020	2010
Birmingham	60%	1990	2026	2008
Liverpool	35%	1990	2024	2009
Nottingham	30%	1990	2020	2006
Leeds	80%	2005	2050	2009
Sheffield	60%	1990	2050	2009
Newcastle	60%	1990	2050	2009

Figure 9: Overview of Core City CO<sub>2</sub> Targets

## 2 Setting targets for the City Region CO<sub>2</sub> emission reductions

Area	Target Source	Scope	Timescale	Target
Halton	Halton Carbon Management Plan:	Public Buildings	2006 – 2013	5-10 by 2013 on 2010/11 baseline
	Halton Affordable Warmth Strategy Baseline 2006 / 2007	Borough wide Domestic	2011 – 2016	20% by 2013 35% by 2016
Knowsley	Knowsley GHG Report Baseline 2009/2010	Public Buildings	2010 – 2011	22% by 2016 41% by 2016
Liverpool	Liverpool Carbon Management Plan Liverpool Climate Change Strategic Framework Baseline of 2008/2009	Borough wide Domestic	2008 - 2014	35% by 2014 34% by 2024
	Liverpool GHG Report	Public Buildings	2010 – 2011	35% by 2024
Sefton	Sefton Carbon Management Plan Baseline 2009/2010	Public Buildings	2011 - 2016	25% by 2016
	Sefton GHG Report Baseline 2009/2010	Public Buildings	2010 – 2011	25% by 2016
St. Helens	St Helens Carbon Reduction Strategy	Public Buildings	2010 - 2020	25% by 2020
	St Helens GHG Report	Public Buildings	2010 – 2011	3% per a year
Wirral	Carbon Reduction Plan	Borough wide	2010 - 2025	60% by 2025

Figure 10: Overview of local level carbon targets in the City Region

A potential driver for the Liverpool City Region SEAP is engagement with the Covenant of Mayors initiative and mechanisms for developing a consistent target for the City Region. Covenant signatories need to achieve a minimum of a 20% reduction in CO<sub>2</sub> emissions by 2020 against a 1990 baseline. Whilst this would provide consistency, a 20% target is unlikely to be challenging enough for the City Region (i.e. between 2005 and 2009 baseline analysis shows that the City Region's CO<sub>2</sub> emission have already fallen by 16%). Figure 10 provides an overview of targets set across the City Region. The table shows that there are a range of targets set, based on different baseline years, with different targets and target years. The table identifies the need for the City Region to undertake the detailed carbon modelling and forecasting to create a consistent target for Liverpool City Region for 2020 and 2050.



# 3 The Action Plan

## 3.1 INTRODUCTION

Part 2 of the SEAP sets out the key ongoing and potential actions that are needed for reducing energy demand, improving energy efficiency, increasing renewable and low carbon energy generation and reducing CO<sub>2</sub>e emissions. All actions are set against a 2005 baseline and include information in terms of energy, carbon, employment and economic growth. This will allow for consistent comparison of actions in future against a single baseline year.

## 3.2 UNDERSTANDING SEAP REPORT ACTIONS

### 3.2.1 Introduction

The SEAP contains a set of coordinated actions drawn from existing plans, policies, strategies and programmes already being implemented for the City Region. There are several types of action that shape each action plan.

### 3.2.2 Types of Action

Each action plan contains a number of activities that are planned or underway at national and local levels. These are broadly categorised as ongoing or potential actions.

Ongoing actions are measures that are already being implemented. National actions are delivered to meet EU or UK legislative requirements. These actions would happen without the need for City Region intervention. Local actions include measures that are already being implemented in the City Region and where it has control over the planning and implementation of the action. Some of these actions will also require national support.

Potential actions are planned and currently under consultation and / or set out in plans and policy. National examples include measures contained in the Governments Carbon Plan that would happen without the need for City Region intervention. Local actions include measures that the City Region has control over and where progress is already being made or a where there is known activity to bring forward. Some of these actions will also require national support.

Each action plan then sets out a number of prioritised 'Recommended Actions'. These are new actions that are needed in order to meet a specific issue or gap. At this stage the Liverpool City Region SEAP contains high level actions only. This is intentional and designed to encourage involvement from partners to then develop actions further and / or specific projects that will then form part of a Liverpool City Region SEAP programme.

### Direct, Enabling and Progressive Actions

The SEAP categorises all ongoing, potential and recommended actions into three types:

- Direct actions: include measures that directly result in energy efficiency, renewable or low carbon energy generation and CO<sub>2</sub>e reductions.
- Enabling actions: include measures that support the delivery of Primary Actions. These actions will not result in direct energy efficiency, renewable or low carbon energy generation or CO<sub>2</sub>e reductions, but are critical in effective implementation of the SEAP.
- Progressive actions: include measures for the continual improvement of the City Region SEAP programme. As with enabling actions, progressive actions have been developed to support the implementation of direct actions. Progressive actions also focus on improving how the City Region will measure, monitor and evaluate both enabling and direct actions.

# 4 Action Plan 1: Enabling Actions

## 4.1 INTRODUCTION

This action plan provides a framework of enabling actions that support the effective delivery of direct actions in Action Plan 2: Energy Demand Actions, Action Plan 3: Energy Supply Actions and Action Plan 4: Transport Energy Actions.

It is important to note that enabling actions do not result in CO<sub>2</sub> reductions, it is direct action that reduces CO<sub>2</sub>.

## 4.2 NATIONAL ACTIONS

This section provides an overview of the key policy drivers, mechanisms and resources for delivering energy projects at a national level.

When considering the energy industry it is important to understand the main players that shape, operate and regulate. The first is the National Grid which has two main responsibilities: firstly, as the primary transporter of gas and electricity to ensure there is adequate and reliable network capacity to meet anticipated transportation requirements. Secondly, National Grid is the system operator of the transmission networks and is responsible for balancing activity in both gas and electricity to meet consumer demand. The structure of the markets and the monitoring of companies' conduct within it are the responsibility of Ofgem, whilst the Department for Energy and Climate Change (DECC) has a role in setting the regulatory framework for the market.

There is already a wide range of activity across the UK with the creation of a Green Investment Bank to help meet environmental objectives and promote economic growth, the preparation of a National Infrastructure Plan and National Planning Policy Framework to plan, co-ordinate and deliver future infrastructure and development, reforms to the electricity market, changes to the Climate Change Levy, the introduction of a Renewable Heat Incentive, the review of national waste policy and the review of the regulatory body Ofgem.

## ACTION PLAN 1 CONTENT

This action plan covers a range of policy, regulatory, thematic and financial issues at national and local levels. It is not intended to provide a comprehensive overview of all energy matters and will be adapted over time by partners.

### National:

- Policy, Governance and Partnership - Energy Act 2011, Electricity Market Reform, ORED and EEDO, Market Transformation Programme, Planning, Building Regulations, Zero Carbon Buildings, Community Energy Online, Transport.
- Funding Mechanisms - European Investment Bank, Intelligent Energy Europe, 7 Framework Programme & 8th Horizon Programme, LIFE+, New European Commission Energy Efficiency Fund, European Local Energy Assistance, European Regional Development Fund, Green Investment Bank.

### Local:

- Policy, Governance and Partnership - Planning and Liverpool City Region Umbrella Special Purpose Vehicle.
- Funding Mechanisms - European Regional Development Fund.

### Recommended Actions:

- Action 1: Develop governance and project management structures and resources.
- Action 2 Develop a SEAP delivery mechanism.
- Action 3: Open up the City Region to investment.
- Action 4: Develop an agreed City Region approach to energy planning.
- Action 5: Develop an Energy Masterplan for the City Region.
- Action 6: Develop a City Region energy skills strategy.

### 4.2.1 Policy, Governance and Partnership

Legislation and policy influencing the UK energy industry follows a clear hierarchy. Legislation is influenced by two key sets of policy makers; the UK Government and EU Institutions. Both sets of policy makers influence the UK's energy industry but in different ways. The EU institutions influence the market by introducing regulations, directives and decisions which place implications either upon the UK Government to introduce legislation and policy or directly upon operators within the energy market.

#### Energy Act 2011

The Energy Act 2011 provides a framework for increasing the provision of energy efficiency measures to homes and businesses, enabling and securing low carbon energy supplies, fairer energy markets and improved energy security. The Act includes provisions for the Green Deal whereby it creates a new financing framework to enable improvements to the energy efficiency of households and non-domestic properties, funded by a charge on energy bills that avoids the need for consumers to pay upfront costs.

The Act also includes provision for the private rented sector and ensures that from April 2016, private residential landlords will be unable to refuse a tenant's reasonable request for consent to energy efficiency improvements where a finance package, such as the Green Deal and/or the Energy Company Obligation (ECO), is available. The Act also makes provision to provide for powers to ensure that from April 2018, it will be unlawful to rent out a residential or business premise that does not reach a minimum energy efficiency standard (the intention is for this to be set at EPC rating 'E').

The Act amends existing powers in the Gas Act 1986, Electricity Act 1989 and the Utilities Act 2000 to create a new ECO that will take over from existing obligations to reduce CO<sub>2</sub> emissions (e.g. Carbon Emissions Reduction Target (CERT) and Community Energy Saving Programme (CESP)), which expire at the end of 2012.

### Electricity Market Reform

An Electricity Market Reform White Paper was published in July 2011 in response to the closing down of the UK's coal burning electricity generation by 2015 under the requirements of the Large Combustion Plant Directive (LCPD, 2001/80/EC).

A technical update was produced in December 2011 which begins to outline the details of the formation of a Capacity Market. This is being developed to ensure reliable electricity supplies and avoid the higher prices that could result from supply constraints. This is planned to be achieved through the delivery of the mechanisms such as the Feed-in Tariff with Contracts for Difference (FiT CfD), a Capacity Mechanism and more detail on arrangements for Renewable Obligation Certificates from 2027 onwards.

#### ORED and EEDO

The Office for Renewable Energy Deployment (ORED) has been set up to ensure national targets for renewable energy generation are met. ORED has been set up to work with delivery partners and stakeholders to accelerate deployment across 3 sectors and at least 22 technologies. ORED cuts across policy areas such as energy market reform, energy efficiency, the grid, planning, transport and the environment. Its remit consists of three key components:

- Financial support for renewables including the Renewables Obligation, the Feed in Tariff, Renewable Transport Fuel Obligation, Renewable Heat Incentive and Green Investment Bank.
- Unblocking barriers to delivery by identifying and addressing issues that affect the timely deployment of established renewable technologies such as the planning system, supply chains, connection to the grid, availability and use of sustainable bioenergy and creating communities to benefit through the promotion of community owned renewable energy schemes.
- Innovation by bringing forward technologies that are at an early stages of development and demonstration but are expected to be important contributors for the pathway to 2050.

At a national level responsibility for spending on innovative energy efficiency technologies falls under the remit of DECC's new Energy Efficiency Deployment Office (EEDO)<sup>19</sup> that will provide a wider energy efficiency strategy for the UK.

### Market Transformation Programme

DEFRA's Market Transformation Programme (MTP) supports UK Government Policy on sustainable products. It does this through the development and maintenance of robust evidence on the life cycle impacts and trends arising from products. The programme also ensures there is a source of independent product information available to consumers in order to inform policy decisions, consumer choices and procurement processes. The MTP covers all products that fall under the Ecodesign Directive (2009/125/EC) including products that use, generate, transfer or measure energy (electricity, gas, fossil fuel), such as boilers, computers, televisions, transformers, industrial fans and industrial furnaces.

### Planning

This section presents an overview and update of planning policy in relation to energy projects. Planning has an important role to play in minimising CO<sub>2</sub>e from new developments, refurbishment of the established built environment and integration of new energy infrastructure between new and existing development. However it is essential that other measures outside the remit of the planning system are brought forward in order for CO<sub>2</sub>e reduction targets to be met. An important issue to consider when understanding the role of planning in developing a sustainable energy system is that new development will only result in a reduction of CO<sub>2</sub>e if this replaces buildings that are less energy efficient through their demolition or disuse. If new development results in a net increase of buildings in use then it will not lead to any reductions in CO<sub>2</sub>.

The National Planning Policy Framework (NPPF) was published by the Department of Communities and Local Government in March 2012. It identifies planning as having a key role in the radical reduction of GHGs, minimising vulnerability and providing resilience to the impacts of climate change, supporting the delivery of climate change, and supporting the delivery of renewable and low carbon energy and associated infrastructure.

The NPPF requires that Local Planning Authorities should move towards a low carbon future by planning new development in locations and ways which reduce GHGs, actively support energy efficiency, deliver development that is consistent with the Government's zero carbon buildings policy and adopt national standards. All communities are viewed to be responsible for contributing to renewable and low carbon energy generation, and that this is maximised through positive strategies that promote renewable and low carbon sources, support community-led initiatives, consider the identification of suitable areas for renewable and low carbon energy and associated infrastructure<sup>20</sup> and opportunities for the co-location of heat customers and suppliers. The NPPF addresses Green Belt issues by requiring developers to demonstrate very special circumstances in order for projects to proceed, which is likely to involve demonstrating the national benefits of reducing CO<sub>2</sub> versus local impact<sup>21</sup>.

### Building Regulations

UK Building Regulations are one of the main mechanisms for reducing CO<sub>2</sub> in the built environment. The regulations are statutory instruments that ensure that policies set out in the legislation are carried out. Building Regulations implement Articles 3, 4 and 5 of the EU Energy Performance of Buildings Directive (2002/91/EC). The regulations drive energy efficiency and carbon reduction targets for new development and improvements to the performance of refurbished / retrofitted residential and commercial buildings. Part L of the Building Regulations specifies the Secretary of State's right to approve the methodology for the calculation of energy performance of buildings and approve the minimum energy requirements for new buildings in the form of Target Emission Rates (TER). Part L of the 2010 Building Regulations is the current regulatory framework for residential development in England and reduces CO<sub>2</sub>e by 25% over Part L1A 2006 standards. By 2016 Part L is scheduled to ensure zero carbon standards in new build projects. Zero carbon standards will be challenging to achieve, particularly for the refurbishment of existing buildings. Improving the energy efficiency and reducing the energy consumption of buildings will require innovative materials and building techniques and careful design, installation and commissioning of energy efficiency and renewable and low carbon energy technologies to achieve the necessary standards.

### Zero Carbon Buildings

The Government requires that all new homes in England will be zero carbon from 2016 onwards, and all new non-domestic buildings being zero carbon from 2019 onwards. The initiative is designed to stimulate greater uptake of on-site renewables as part of new development. As part of the budget announcement in 2011, the Government changed the definition of zero carbon homes. The announcement confirmed that only the (regulated) emissions covered by Building Regulations (heating, fixed lighting, hot water and building services) would now be covered by the 2016 policy. Therefore, (unregulated) emissions (from cooking or from plug-in appliances such as computers and televisions) will not be addressed. The omission of unregulated emissions will result in targets being easier to achieve and although payments towards 'Allowable Solutions' will still be required by housebuilders and developers in order to meet energy and carbon targets in planning policy, the costs are likely to be much less than previously thought.

### Community Energy Online (CEO)

CEO has been developed by DECC as a portal to support local authorities and community groups delivering local energy schemes. The CEO is formed around community ownership and management of low carbon energy networks that generate local and sustainable energy. CEO focuses on on-site energy generation from microgeneration and aims to ensure that generation makes a real contribution to decarbonising the grid. It is also focused on delivering efficient energy systems, whereby surplus energy in district heating schemes is used to heat buildings, whilst also ensuring that buildings are designed to zero carbon design and passive energy standards. To achieve effective project delivery the CEO sets out The Community Energy Process. This contains guidance structured by four key stages to guide individuals and communities.

- **Stage 1: Getting your project started:** Stage 1 provides guidance from a range of sources including EST, IDEA, Local Government Association, DECC, MCS and PlanLoCaL on how to get started, the structures that local authorities and communities will need to put in place and the skills that are needed in order to progress projects.
- **Stage 2: Developing your project:** This stage considers the technology options in more detail and focuses on the more specific feasibility assessments that should be undertaken. The guidance sets out the fundamental steps local authorities and communities will have to go through to move a project from an idea to a real commercially viable project via feasibility assessments.
- **Stage 3: Financing and writing the business plan:** Once a viable technology has been identified Stage 3 looks at the types of work that are needed to fund a project and deliver 'financial payback'. This covers a range of issues for local authorities and community groups including the forms of finance available to them, the business planning needed, the mechanisms that may need to be set up in order to secure the investment to finance an energy scheme and the project management required to deliver a project successfully.
- **Stage 4: Project delivery:** Stage 4 provides guidance on the implementation and rollout of projects. Advice includes guidance on procurement, how to set up energy service and billing systems with local consumers, procedures for the installation and testing of energy infrastructure and rollout to energy consumers. The final stage also provides guidance on how to set up the operational and maintenance contracts needed to service the energy schemes in the long term.

CEO delivers the next step (i.e. the installation of low carbon and renewable energy technologies to reduce CO<sub>2</sub> emissions) needed to make further carbon reductions than those realised through improved energy efficiency levels achieved by the Green Deal from 2012. CEO projects aim to provide multiple benefits including stabilising and reducing energy bills, creating rotating community funds - to benefit the whole community, offering a return on public and private investment and community shares, developing financial, project and management skills, creating jobs and improving social networks to begin creating and delivering more low carbon changes and projects.



### Transport

Transport is a critical function in improving quality of life and economic growth through the movement of people and goods. However one of the major issues facing the UK is its reliance on road transport with increased congestion causing environmental harm and resulting in significant cost to the economy.

In July 2009, The Department for Transport published its Carbon Reduction Strategy for Transport. The strategy built on The UK Low Carbon Transition Plan and set out the key actions being undertaken to meet obligations in carbon budgets and the 2050 targets. In order to decarbonise the UK's transport system, the strategy identified the need to support a shift towards new technologies and fuels. Policy drivers such as the EU New Car CO<sub>2</sub> regulation, focusing on efficiency in growth sectors such as vans, development of incentives to reduce emissions in road freight and public transport, whilst looking to improve energy efficiency of rail through the electrification of the network can all result in significant reductions. The strategy also addressed aviation and shipping by outlining how the UK will work internationally to innovate, develop and use fuel efficient technology to reduce emissions. Steps towards making significant change in aviation are already underway through membership of EU ETS, with use of biofuels in aviation planned post 2020.

A shift towards alternative fuels is also a major area where the strategy sets out the UK's approach to use regulation including the Renewable Transport Fuel Obligation and the EU Renewable Energy and Fuel Quality Directives to create market demand whilst ensuring biofuels are sustainable and competitive. A major aspect of the transport strategy is to focus on behavioural aspects through the promotion of lower carbon choices.

This means increased investment in rail and bus transport, improved integration of different modes through use of smart ticketing and improved interchange cycling and walking with other modes of transport.

In January 2011, DfT published its White Paper, Creating Growth, Cutting Carbon, Making Sustainable Local Transport Happen. Whilst investment in infrastructure and fuel is critical the White Paper emphasises the need for a societal shift in making better transport choices. The White Paper identifies that two thirds of all journeys in the UK are less than five miles. The Government sees short-distance, local trips as the area where immediate and the biggest opportunities exist. Whilst there is market potential for change, what is missing are the products and incentives to make the change needed a reality.

The Government sees local solutions and local delivery as providing the basis for change, coupled with the recognition that private car use will remain a popular choice. Therefore there is a need to focus on electric vehicles and ultra-low emission vehicles in order to decarbonise transport.

Intervention measures up to 2020 include development of alternatives to travel, encouraging cycling and walking, making public transport more attractive, car sharing, improved traffic management, freight modal shift, eco driving for HGV and bus drivers, public transport investment, electrification of key rail routes and high speed rail for long journeys between urban areas. All interventions will be implemented between now and 2050 and beyond, with the early development of ultra-low emission vehicle mass markets and development of sustainable choices identified as being the key measures to deliver reductions by 2020 and 2050.

### 4.2.2 Funding Mechanisms

The Government is introducing a range of mechanisms to reduce the costs of installations (eg using Feed in Tariffs [FiT], Renewable Heat Incentive [RHI] and Energy Company Obligation [ECO]) and to spread costs over the long term through neutral energy bills at no “upfront” cost to the householder or landlord (via the Green Deal). Each of the mechanisms are discussed in more detail in Action Plan 3.

Partners such as local authorities, housing associations, energy suppliers, finance lenders and other businesses are developing innovative financing models that combine these different funding sources and adopting collaborative procurement models<sup>22</sup>. In addition to these mechanisms FiT, RHI, Green Deal and ECO a number of other funding models are being developed to implement energy projects. These include prudential borrowing, third party funding from the private sector and European funding sources.

#### European Investment Bank

The EIB offers four main services including loans, technical assistance, guarantees and venture capital. For loans the EIB provides up to 50% of the investment costs of projects with individual loans provided for viable projects that cost more than EUR 25 million and intermediated loans to banks and financial institutions to provides finance to SMEs for projects that are less than EUR 25 million. The EIB’s Corporate Operational Plan and how energy projects meet plan and wider EU objectives. EIB identifies itself as an EU policy driven investor. The EIB activities in the energy sector support sustainability, competitiveness in energy supply, the pioneering of low-carbon technologies and energy efficiency solutions and security of supply by promoting diversified sources of energy.

Type of Finance	Description
Public Works Loan Board (PWLb) “Prudential Borrowing”	The PWLB is a loan facility available to local authorities provided they can satisfy Government “prudential borrowing” requirements in which they have to demonstrate that the loan will be used for an investment which is self financing, eg borrowing to finance renewables projects in which a local authority receives FiT payments.
Third party funding from the private sector	Sources include banks and risk capital investors, which provides capital to invest in energy projects, from which they then generate FiT or Green Deal payments to repay the third party funding. Third party funding can take a variety of forms, including roof rentals, shared equity and partnership schemes.
European sources of funding	European Investment Bank (EIB), the New European Commission Energy Efficiency Fund (EEEF), European Local ENergy Assistance (ELENA) and the European Regional Development Fund (ERDF).

Figure 11: Overview of key finance options for energy schemes (Source: Institute of Sustainability)

### Intelligent Energy – Europe (IEE)

IEE is a programme that supports the use and dissemination of knowledge and experience on energy efficiency, energy diversification and use of renewable energy across transport, domestic, industrial and commercial sectors. Since 2007, IEE II has delivered a range of projects covering the promotion and dissemination, mobilisation of sustainable energy investments and EU energy policy implementation. Applications for funding are called for by the European Agency for Competitiveness & Innovation. The programme has played an important role in the EU meeting the EU 2020 targets. It has enabled more efficient implementation of a number of Directives and other policy initiatives such as the Energy Performance of Buildings Directive 2, the Eco-design Directive, the Energy Labelling Directive and Renewable Energy Directive. The new Energy Efficiency Directive provides the main driver for the final year (2013) of the programme which is responding by creating the institutional and knowledge base needed to close the energy efficiency gap.

As the Intelligent Energy Europe II programme (2007-2013) comes to an end, a public consultation focused on shaping IEE III under the Energy Challenge of the EU programme for Research and Innovation 'Horizon 2020' has been launched from 21st June until 5th September 2012. The main proposal for IEE III is to ensure that it is used to co-finance collaborative actions across the EU to address sustainable energy policy implementation, capacity building and mobilisation of finance for investments in key areas not covered by other programmes or initiatives. A priority for IEE III will be to complement Horizon 2020 activities with market uptake of energy innovations' being a key objective of the programme.

### 7<sup>th</sup> Framework Programme & 8<sup>th</sup> Horizon Programme

Research activities funded by the EU are currently dealt with under the 7th Framework Programme of the European Community for research, technological development and demonstration activities (2007-2013), or FP7. FP7 funds collaborative research projects, 'frontier research' of individual teams (through an 'Ideas' Programme), researcher mobility and career development (through a 'People' Programme), and research capacities and infrastructures (through a 'Capacities' Programme).

All the programmes include opportunities for securing funding for energy related projects, however the main opportunity is the 'Energy Theme' in the Cooperation Programme. The final period for 'calls for proposals' closed in December 2011, with successful bids being announced in 2012. Post 2013, the upcoming 8th Framework Programme (FP8) - Horizon 2020 is the future Framework Programme for Research and Innovation. The programme will build on the successes of the current FP7, the Competitiveness and Innovation Framework Programme (CIP) and the European Institute of Innovation and Technology (EIT).

The EC is proposing an allocation of €6.5 bn to the 'Energy challenge on secure, clean and efficient energy' for research, development and deployment of Horizon 2020 in addition to ERDF allocations for low carbon investments. The ultimate aim is to maximise the contribution of EU funded research and innovation to sustainable growth and jobs, and in doing so address major climate change, energy security and sustainability challenges<sup>24</sup>.

### LIFE+ Environmental Policy and Governance

LIFE+ is a funding programme for the environment. The programme has a wide reaching scope and themes include energy and climate as well as industry and production. It supports technological projects that offer significant environmental benefits. LIFE projects on energy and climate change include energy production and distribution, renewable energy technologies and energy efficiency. Projects cover industry, services, transport and buildings.

### New European Commission Energy Efficiency Fund (EEEF)

EEEF is an investment fund that was launched on 1st July 2011 by the European Commission (EC) as part of the European of the European Energy Programme for Recovery (EEPR). The initial fund will be up to €265m with €125m from the Commission, €75m from the EIB and €5m from Deutsche Bank with the remainder to be identified.

This fund is designed to leverage additional investment from the private sector. The fund is managed by Deutsche Bank and aims to invest in energy saving, energy efficiency and renewable energy projects that achieve at least a 20% energy saving or GHG/CO<sub>2</sub> emission reduction. It can invest directly into a project or through a mechanism that would provide a financial instrument that would mature / be paid back at an agreed rate. Rates will be dependent on risk.

### European Local ENergy Assistance (ELENA)

Across the UK and Europe public bodies are preparing and initiating large energy efficiency and renewable energy projects to meet economic and environmental challenges. The majority of these are at an early stage of development, and need a range of technical and commercial exercises completing in order to attract the funding required to finance a project to be constructed and operational. Because many of the exercises needed require specialist skills, public bodies often need to bring in technical capacity to complete this work.

In response to this issue, the EC and the EIB have established the ELENA technical assistance facility for public bodies to facilitate the mobilisation of funds for investments in local sustainable energy projects. ELENA is financed through the IEE programme and covers a share of the cost for the technical support necessary to prepare, implement and finance an investment programme. This includes feasibility and market studies, structuring of programmes, business plans, energy audits and preparation for tendering procedures.

### European Regional Development Fund (ERDF)

ERDF is a fund focused on reducing economic disparities within and between different areas by supporting economic regeneration and safeguarding jobs. Since 2000, England has benefited from more than €5bn of funding, with a further €3.2 billion being invested between 2007 and 2013 in local projects around the country. These programmes are designed to meet current needs by targeting employment, small and medium-sized enterprises, innovation, high-tech business investment, and other key priorities identified by local partners<sup>25</sup>.

In order to receive ERDF funding, match funding needs to be in place and ERDF regulations on eligible expenditure adhered to. State aid is a consideration that can be overcome if there is a market failure and a fair rate of return and transparency can be demonstrated. Traditionally public match funding has been used, partly because the private sector wants to avoid the monitoring and audit regimes associated with ERDF. However, private developers with projects that are marginal commercially have been known to see this as a viable option.

Around £1 billion of ERDF remains unspent across the UK; this is about a third of the total for 2007- 2013. Agreement has now been reached that draw down and expenditure is allowed in the 2007 – 2013 programme can now happen until 31 December 2015. This effectively allows ERDF to become a rolling programme with a back stop date, whilst the 2014 – 2020 programme gets underway.

### Green Investment Bank

The Green Investment Bank is designed to accelerate private sector investment in the UK's transition to a green economy. Offshore wind power generation, commercial and industrial waste processing and recycling, energy from waste generation, non-domestic energy efficiency and support for the Green Deal will be the first priority sectors for the Bank, subject to approval by the European Commission<sup>26</sup>. State aid approval for the GIB is anticipated in early 2013. In advance of that, the Government has begun making investments in green projects from April 2012, with at least 80% anticipated to be committed by the Bank over the Spending Review period planned for priority sectors.

### 4.2.3 Supply Chain, Skills and Research

The Alliance of Sector Skills Councils is responsible for identifying needs and creating new sets of qualifications. The Alliance works in partnership with the UK Commission for Employment and Skills (UKCES). UKCES form a social partnership that includes CEOs of large and small employers across a wide range of sectors, trade unions and representatives from the Devolved Administrations. Together, they make the economic case for greater investment in skills.

The Sector Skills Councils (SSCs) are recognised by the UK as independent, employer-led organisations that develop Training Quality Standards which lead to National Occupational Standards. These qualifications are then provided by local hubs of the National Skills Academy. Summit Skills is already hosted by the City Region, providing National Skills Academy training for environmental technologies. Nationally other sector skills partners are anticipated to develop other National Skills Academy programmes for construction, manufacturing, science and technology activities needed to deliver the Green Deal to national standards.

## 4.3 LOCAL ACTIONS

The action plan provides an overview of the key activities that have been completed or are underway to provide the policies and mechanisms needed to deliver energy projects in the City Region. In line with the national picture and other cities, the City Region already has a great deal of activity underway in this area. This includes the assessment of the City Region for renewable and low carbon energy generation, preparing a City Region Infrastructure Study and securing funding for the deployment of energy infrastructure.

### 4.3.1 Policy, Governance and Partnership

The implementation of SEAP actions will create a growing need to access expertise. The City Region already has skills and capacity across the public and private sectors to attract and secure investment to finance energy projects. Together, stakeholders including the Liverpool City Region Local Enterprise Partnership, Low Carbon Economy Committee, Merseytravel, Home Energy Conservation Association, Merseyside Recycling and Waste Authority, Merseyside Environmental Advisory Service and the private sector have the track record and skills to facilitate and co-ordinate this capacity in order to finance measures across the domestic, industrial and commercial and transport sectors.

### 4.3.2 Planning

Since 2009 the City Region has undertaken a series of studies to identify the capacity and deployment of renewable and low carbon energy infrastructure. The Liverpool City Region Renewable Capacity Study Stage 1 Report was completed in 2010 and identified that the City Region had sufficient capacity to exceed minimum targets set at a regional level with significant capacity for onshore wind, CHP district heating, energy from waste and microgeneration.

### CASE STUDY

Merseytravel have developed a series of sustainable design standards set out in their Environmental Sustainability Strategy. Standards are based on a cradle to grave concept whereby new builds are designed to be sustainable from the very outset, to use energy and resources conservatively (including reuse and recycling), to embrace the use of renewables and to maximise the amount of materials that can be recycled at the end of their useful life. Materials used result in a minimal environmental impact e.g. products with a low Volatile Organic Compound (VOC) content, low embedded energy and timber from the Forestry Stewardship Council scheme.

The approach to sustainable design is also concerned with ensuring that facilities help deliver Merseytravel's active travel implementation plan i.e. by ensuring that our schemes promote walking and cycling. All schemes are assessed against the Building Research Establishment Environmental Assessment Method (BREEAM) and it is Merseytravel's policy for a building to achieve a BREEAM rating of at least 'Very Good'.

#### 4 Action Plan 1: Enabling Actions

The Liverpool City Region Renewable Capacity Study Stage 2 Report was then completed in 2011. This study involved more analysis of the strategic opportunities for wind and heat network energy infrastructure and to assess the energy consumption and carbon emissions of the City Region's planned housing and employment development up to 2025. The study identified 8 Priority Zone Areas where heat networks could provide decentralised energy for the City Region. The study also identified a Priority Area Zone in Sefton for onshore commercial wind potential, with further wind resource identified in other parts of the City Region that warranted further investigation. A number of other projects have since been completed and are discussed below.

- **Mechanisms for Delivering Resilient Energy Infrastructure Study.** Completed in 2011, the study identified 8 Priority Zones (originating from Renewable Energy Capacity Stage 2 study) where district heating schemes could be delivered. In addition to identifying potential projects the study evaluated a number of Special Purpose Vehicle (SPV) options for delivering types and scale of energy projects. This included the identification of a Liverpool City Region Umbrella SPV which is well suited to the delivery of City Region scale energy projects.

- **Liverpool City Region Planner Capacity Building Project.** This project provides general information and guidance on a range of issues relating to the planning and deployment of heat networks. The project outputs helped increase planning skills and understanding for planners, developers and communities to deliver heat networks.
- **Community Support to Deploying Renewable Energy Project.** The project begins to join up community support outputs and energy projects identified in the Mechanisms Study. The project involved nearly 60 stakeholders and identified 21 community groups, including parish councils, allotment groups, transition towns, local authority lead groups, community centres, faith groups, schools and a dance studio. The project identifies the key barriers and opportunities for community groups delivering energy projects.



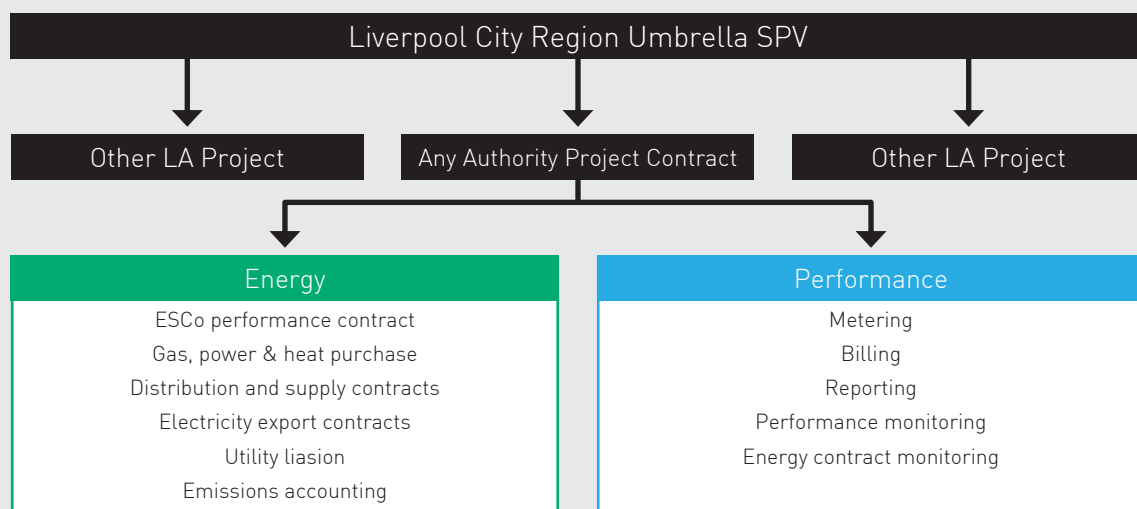


### CASE STUDY: LIVERPOOL CITY REGION UMBRELLA SPECIAL PURPOSE VEHICLE

City Region scale actions and projects brought forward under the Liverpool City Region SEAP are likely to require large investments, have a long timeframe for roll out and involve private sector development as a key feature. This will require complex delivery arrangements that are likely to encounter a low appetite for risk and expectations of revenue earning opportunities, at least during the initial phases of a project's development.

In this situation, ensuring local authority involvement in the governance of a project to meet economic regeneration, carbon saving and 'spin-off' social ambitions should be the priority. The City Region has identified a potential model that would provide a key role for City Region local authorities in taking leadership in delivering intervention measures on energy and carbon. This model takes the form of a Liverpool City Region Umbrella SPV which would be designed to enable numerous projects to flourish across the Liverpool City Region. The model provides a framework from which governance structure and project evidence required to make the most of public sector development and capital funding mechanisms such as ELENA, Community Infrastructure Levy and Allowable Solutions.

If undertaken as an initiative serving all local authorities across the City Region, this will provide economies of scale. In particular such an approach forms a key outcome of the SEAP initiative and provides the basic framework of administration and governance for the delivery of projects. This collective approach will have advantages, particularly administrative economies of scale, when it comes to applying for EU and EIB funding.



### 4.3.2 Funding Mechanisms

#### ERDF

The North West is one of nine regions to qualify for Competitiveness and Employment funding. The North West Operational Programme for 2007 – 2013, outlines the investment priorities for the region. It focuses on four main priorities; (Priority 1) stimulating enterprise and supporting growth in target and markets, (Priority 2) exploiting innovation and knowledge, (Priority 3) creating the conditions for sustainable growth, (Priority 4) growing and accessing employment, such as stimulating enterprise in disadvantaged communities. There are three ERDF funded programmes in the North West that are delivering change in the City Region; these are ecoSMARTER, The Social Enterprise Fund (TSELF) and REECH Merseyside.

In the North West, there is around £8 million of the current ERDF programme fund remaining, with new projects needed in order to allocate this funding. Funds will need to be committed by 31st Dec 2013 and spent by the end of 2015. Low carbon economy is one of the priorities and it is suggested that any thinking around that should connect with the SEAP.

#### 4.3.3 Local Energy Assessment Fund (LEAF)

LEAF was a short-term scheme that closed in March 2012 with a total fund of £10 million managed by a number of community networks and administered by the Energy Saving Trust. LEAF ran as a competition with 200 community organisations able to enter to develop skills and knowledge on energy efficiency and renewable energy generation.

Organisations including parish councils, voluntary associations, development trusts and faith groups were eligible to apply, with up to £50,000 available. Interested communities applied via the Energy Saving Trust with the first allocation of funds provided to successful applicants in December 2011 and the second round in January 2012.

There were a total of 7 successful applicants in the City Region delivering a wide range of energy projects across diverse communities to provide energy specific and wider social and environmental benefits.

#### CASE STUDY: ERDF

EcoSMARTER is an organisation delivering energy efficiency improvements to business through the Carbon Smart Programme. The service follows a blue certification process that includes a site survey, an ecoSMARTER monitor, carbon footprint calculation, half-day workshop and support to help businesses write their own action plan and environmental policy. The support provided helps businesses save money on energy bills through the installation of energy monitors and support to reduce energy consumption. Companies then gain environmental certification through the nationally recognised Carbon Smart Blue Certification.

TSELF aims to help organisations that have a social impact, particularly those working in disadvantaged communities. TSELF is a registered charity which raises funds from a combination of public and private sources. Support is provided in a number of ways – loans of up to £250,000 to purchase property or make improvements to existing buildings; loans of up to £100,000 for vehicles or equipment and loans of up to £50,000 to help with the day-to-day running of the business.

REECH Merseyside programme targets funding at energy efficiency measures for hard to treat properties for over 2,000 homes in the City Region's most deprived areas. There are a total of 13 grant funding agreements across the City Region. REECH provides finance for home improvement measures including the installation of external and internal wall insulation and energy efficient lighting.

### CASE STUDY: CITY REGION LEAF WINNERS

#### Transition Village Eastham and Bromborough

Transition Village Eastham and Bromborough have set up a baseline survey of local properties including an event to raise awareness, and a door to door survey of up to 2,000 households. Community volunteers are trained to help deliver the survey alongside project workers along with students with mild learning disabilities from a local centre.

#### The Longtown District Enterprise Trust

The Longtown District Enterprise Trust have delivered community engagement with workshops, surveys, analysis of local housing stock and identification of demonstration projects. Training possibilities have been developed for local volunteers with visits arranged to other exemplar projects such as Baywind Energy Cooperative and Ashton Hayes Community Group.

#### Peel Road Residents Association

Peel Road Residents Association ran a community engagement day and trained Local Energy Champions. 25 interested households received a home energy review leading to a report identifying potential energy and cost savings with signposting provided to residents to access grants and funding assistance.

#### Liverpool Housing Trust

L8 Green Communities Partnership carried out community awareness and engagement events in three neighbourhoods and with particular communities and sectors. Energy efficiency surveys and investigations have been conducted into ways installation/retrofit measures can maximise community benefits. The surveys investigate barriers to take-up of the Green Deal opportunity and they will also undertake renewable energy outline feasibility studies.

#### Villages Housing Association - Stockbridge Village

Villages Housing Association in Stockbridge Village, Knowsley are training 25 local residents to become Energy Community Champions. These champions offer energy advice across Stockbridge. They will organise a number of community events to promote energy efficiency and will purchase various energy saving devices to compliment the physical home energy works in Stockbridge.

#### Alt Valley

Neighbourhood Services Company Ltd (NSC) is a social enterprise working in the Alt Valley area of Liverpool. They will transform an empty building into a Creative Academy for young people from the community with state of the art energy efficiency technologies, linked to a series of demonstration events to present the benefits to community groups etc. of reducing energy consumption.

#### Fusion21 Energy Efficiency Films

Fusion21 have developed 4 energy efficiency films to support local people, looking at top energy savings tips around the home, effective use of heating controls the benefits of a thermally efficient home, renewable resources and what landlords are doing and could be doing in the future. This is designed specifically for social housing tenants.

### 4.3.4 Supply Chain, Skills and Research

This section provides an overview of the main academic and vocational assets already located in the City Region. It identifies the City Region to have a substantial basis for growing the energy sector and supply chain.

The Green Energy Training Centre (GETC) located in the Wirral International Business Park in Bromborough was the City Region's first training centre dedicated to green energy microgeneration technologies. Funded by the Skills Funding Agency, with joint investment from Stiebel Eltron and Scientiam, the centre provides training on the renewable and low carbon equipment helping installers become accredited for Microgeneration Certification Scheme (MCS).

Liverpool Community College launched its green training centre in November 2011. The centre includes a 3,000 sq ft workshop, and features an 'indoor house', built so that technologies can be installed in a realistic environment. Liverpool Community College will be working with 10 education partners in the North West to deliver National Skills Academy accredited training<sup>27</sup>. Courses on offer will include industry recognised qualifications for electricians, plumbers and heating engineers in sustainable technology, including solar panels, heat pumps and water recycling system installations. These courses will soon be a legal requirement for everyone working in the sustainable industry and the college is advising firms to up-skill their staff now to capitalise on growth in the sector.

Further opportunities exist through partnership working with the Joule Centre for Energy Research, a partnership of North West Universities, commercial organisations and other stakeholders associated with the energy industry. In 2011, this saw the launch of the Stephenson Institute for Renewable Energy at Liverpool University. The Institute brings together energy related research activities from across the university to focus on developing clean and sustainable energy technologies. This includes energy dissipation and friction, wind and marine energy, fusion technology, photovoltaics, carbon capture and storage, sustainable feedstocks, batteries, fuel cells, hydrogen generation and storage, solar harvesting, and energy transport.

Other existing assets in the City Region include the Department of Electrical Engineering and Electronics (including energy efficiency) at Liverpool University and the Research Centre for Electrical Energy Efficiency at Liverpool John Moores University. There is also ongoing work to develop a Building Research Establishment (BRE) Centre for Advanced Retrofit with an in-principle agreement to open in 2012. Work is ongoing to secure the funding with one option including a £6m EPSRC (Engineering and Physical Sciences Research Council) bid being led by the Stephenson Institute for Renewable Energy for a Research Centre into Energy Efficient Communities.

## 4.4 RECOMMENDATIONS FOR ACTION

Action	Need	Description	Progress to Date	Key Steps
Action 1: Develop governance and project management structures and resources	<p>Responsibility and accountability needs to be established for taking the SEAP and its programme of activity forward.</p> <p>Access to appropriate capacity is required to enable the desired level of delivery.</p>	<p>The SEAP provides the mechanism to increase efficiency and co-ordination of activity across the City Region on energy projects.</p> <p>The SEAP can also compliment and add value to existing programme management arrangements such as the Low Carbon Economy Committee (LCEC).</p> <p>One of the requirements for a SEAP is to ensure that there is a resourced mechanism in place to monitor implementation and ensure that changes to the baseline are recorded to track progress e.g. CO<sub>2</sub>e emissions, jobs created, and new investment. This is a requirement for EU Covenant of Mayors (CoM) signatories and will need to be delivered initially for Liverpool but in all likelihood for the whole Liverpool City Region.</p> <p>The City Region will need to identify and agree a lead body / bodies that will co-ordinate the implementation of current and future SEAP actions. Each action plan will need to be resourced and financed through EU, public and private sources.</p>	<p>A number of programme management options have been explored with partner organisations including the Liverpool City Region Chief Executives. It is clear that a single, efficient programme management arrangement is the preferred approach and that alignment with the work of the existing LCEC is desirable.</p> <p>Liverpool has become one of the first areas in the North West to join the Covenant of Mayors initiative. Halton, Knowsley, St. Helens, Sefton, Wirral are considering whether to join Liverpool in becoming Covenant of Mayors signatories. Other initiatives being considered include Smart Cities and Green Capital.</p>	<p>Make arrangements for ongoing operation of the SEAP by assigning a lead organisation (e.g. by placing it within the remit of the LCEC (under the auspices of the LEP), resulting in that body acting as the City Region champion for the SEAP.</p> <p>To develop local authority involvement in the SEAP at senior level, with an accountable officer named for each district.</p> <p>To secure private sector support for the SEAP and involvement in SEAP delivery.</p> <p>To establish operational technical support capacity to the Liverpool City Region SEAP programme to enable delivery.</p> <p>To develop a direct link to the LEP and wider climate change, environmental sustainability agendas to support transformation to a low carbon economy.</p> <p>Develop a progress report mechanism and investment opportunities to the City Region Cabinet.</p>

#### 4 Action Plan 1: Enabling Actions

Action	Need	Description	Progress to Date	Key steps
<p>Action 2</p> <p>Develop a SEAP project delivery mechanism</p>	<p>The City Region study, Mechanisms for Delivering Resilient Energy Infrastructure identified a preferred SPV model that should be considered by the City Region.</p>	<p>City Region scale actions / projects contained in the Liverpool City Region SEAP are likely to require large investments, have a long timeframe for roll out and involve private sector development as a key feature. This will require complex delivery arrangements that are likely to encounter a low appetite for risk and expectations of revenue earning opportunities, at least during the initial phases of a project's development.</p>	<p>Through the completion of the Mechanisms for Delivering Resilient Energy Infrastructure Study, the City Region has identified a potential model that would play a key role in delivering energy projects in the City Region.</p> <p>The study presented the concept of an Liverpool City Region Umbrella SPV which would play a key role in delivering energy projects in the City Region.</p>	<p>Ensure that Liverpool City Region Umbrella SPV options are evaluated and taken forward in parallel with the Liverpool City Region SEAP governance structures.</p>
<p>Action 3: Open up the City Region to investment</p>	<p>Energy projects need investment and that investment needs to be financed and often repaid.</p>	<p>In order to deliver the measures needed to meet the City Region's objectives there is a need to demonstrate the level of project activity, the depth of investment in project analysis, the scope of activity, provide credible and clear information and provide a platform for efficient discussion and negotiation.</p> <p>Dialogue with investors should focus on how the City Region can de-risk project opportunities to meet their risk models. This will involve demonstrating how the City Region can deliver programmes of work, provide security, attract subsidies and create revenues, develop or work as part of a Special Purpose Vehicle and bring economies of scale to projects.</p>	<p>The SEAP provides the starting point for project investment opportunities.</p> <p>Liverpool submitted a bid to host the world's first Green Investment Bank. Although unsuccessful, the bid has stimulated discussion between the City Region and GIB officials.</p> <p>Members of the Low Carbon Economy Committee have an ongoing dialogue with potential investors.</p>	<p>Actively engage with financial institutions to secure investment to finance energy projects and attract low carbon businesses to the City Region. This will include specialist energy finance such as the European Investment Bank and emerging Green Investment Bank in addition to the wider banking sector, private investors, pension, venture capital and equity funds.</p> <p>In partnership with the universities and private sector develop a guide, supplemented with training that would increase project identification, the creation of delivery models and funding applications.</p>



## 4 Action Plan 1: Enabling Actions

Action	Need	Description	Progress to Date	Key steps
Action 4: Develop an agreed City Region approach to energy planning	Several studies have been completed since 2009, making recommendations for the City Region to develop a consistent policy approach to energy and carbon. There is a need to ensure that these recommendations have been taken forward by each local authority and that policies are in conformity with emerging national policy.	Consistency is needed across the City Region on energy and carbon targets for large and small scale energy infrastructure, thresholds on types and scales of development that will trigger onsite generation, energy statements and energy strategies for outline and detailed planning applications, pre application discussions, developer contributions and use of allowable solutions to meet energy and carbon policy requirements set out in the National Planning Statements and the National Planning Policy Framework.	The Liverpool City Region Renewable Energy Capacity Stage 1 & 2 reports contain the relevant evidence and guidance to achieve this. The Mechanisms to Deliver Resilient Energy Infrastructure Study also provides evidence and guidance for setting up Special Purpose Vehicles to implement these policies.	Work with districts on Local Plan energy and climate change policies to ensure there is consistency and clarity on energy matters.  Develop a programme of consultation with the Planning Inspectorate on potential major energy generation schemes in the City Region and with ORED and EEDO on the implementation and future updates of SEAP on demand and supply matters.
Action 5: Develop an Energy Masterplan for the City Region	The City Region needs a common information source and plan that can be readily updated and accessed by local authorities and stakeholders to help attract inward investment and inform planning, project management and commercial decision making.	<p>The action will involve the development of an online, GIS model of the City Region's energy consumption and will need to include mapping of:</p> <ul style="list-style-type: none"> <li>• Energy resources such as wind, solar, biomass and waste stream resource mapping and heat mapping.</li> <li>• Energy infrastructure capacity and improvement plans for utilities.</li> <li>• Existing energy consumption and planned housing and employment development including identification of 'areas of change'.</li> <li>• Installed and operational generation capacity, consented schemes, schemes under construction and pipeline / opportunities for new schemes, that is capable of real time updating.</li> </ul> <p>A critical part of this task will be to ensure all energy masterplanning is based on a 2005 baseline. The City Region will need to undertake work to identify all installed and operational decentralised, renewable and low carbon energy generation infrastructure in the City Region from 2005 onwards.</p>	<p>The City Region will be undertaking joint work on strategic infrastructure for land use planning purposes which can contribute to the development of an energy masterplan. The study will consider the strategic electric, gas, water, highways, rail, aviation, ports, telecommunications and broadband infrastructure needed to deliver planned growth.</p> <p>The Liverpool City Region Renewable Energy Capacity Stage 1 &amp; 2 reports contain the relevant evidence on the energy consumption of proposed housing and employment development up to 2025, strategic network capacity data, energy generation opportunities for wind and heat works.</p>	The Energy Masterplan is taken forward in partnership with utilities companies to develop a brief, standardised methodology enabling energy masterplanning across the City Region.

#### 4 Action Plan 1: Enabling Actions

Action	Need	Description	Progress to Date	Key steps
<p>Action 6: Develop a City Region energy skills strategy</p>	<p>The City Region has a substantial number of academic and vocational assets in place for developing a strong energy sector and supply chain. There is now a need to co-ordinate this as a City Region offer.</p>	<p>In partnership with Liverpool Community College, Liverpool universities and industry develop an academic and vocational skills strategy for energy.</p>	<p>The Green Energy Training Centre (GETC) located in the Wirral International Business Park provides training for MCS accreditation.</p> <p>Liverpool Community College provides National Skills Academy accredited training.</p> <p>Stephenson Institute for Renewable Energy at Liverpool University which brings together energy-related research activities from across the university.</p> <p>The Department of Electrical Engineering and Electronics (including energy efficiency) at Liverpool University and the Research Centre for Electrical Energy Efficiency at Liverpool John Moores University.</p>	<p>Develop a programme of research, innovation, skills development and training across all aspects of the supply chain for renewable and low carbon energy projects.</p>

# 5 Action Plan 2: Energy Demand Actions

## 5.1 INTRODUCTION

This action plan contains the direct actions for reducing energy demand in the City Region's domestic, industrial and commercial sectors. These actions are supported by the enabling actions contained in Action Plan 1, with the relevant actions needed to measure, monitor and review Actions Plans contained in Action Plan 5.

These actions result in CO<sub>2</sub> reductions and direct effects on the low carbon economy of the City Region.

### ACTION PLAN 2 CONTENT

This action plan covers a range of policy, regulatory and financial issues at national and local levels across the domestic, industrial and commercial sectors. It is not intended to provide a comprehensive overview of all energy matters and will be adapted over time by partners.

#### National:

- Domestic - Climate Change Reduction Targets, Community Energy Savings Programme, Warm Front, Green Deal and Energy Company Obligation.
- Industrial & Commercial – Carbon Reduction Commitment Energy Efficiency Scheme, European Union Emission Trading Scheme, Climate Change Agreement.

#### Local:

- Domestic – CERT, Warm Front and CESP.
- Industrial & Commercial – Enworks, ecoSmarter, Carbon Trust and Envirolink.
- Energy Efficiency Measures – Barriers, behavioural change, insulation & draft proofing, low energy lighting, voltage optimisation, heating system replacement, programmable switches, motors and drives, maintaining equipment, Smart Grid.

#### Recommended Actions:

- Action 1: Development of combined domestic, industrial and commercial retrofit programme.
- Action 2: Deliver a programme of behavioural change measures.
- Action 3: Identify new Smart Grid areas.

## 5.2 NATIONAL ACTIONS

### 5.2.1 Domestic

#### Carbon Emissions Reduction Targets (CERT)

CERT is an obligation on suppliers to install energy efficiency measures in the UK housing stock. The CERT programme is scheduled to continue operating until December 2012 at which point it is anticipated that the Green Deal will replace it<sup>28</sup>. The cost to suppliers of achieving the CERT (from April 2008 to December 2012) is estimated to total £5.5 billion. Taking into account the costs, CERT has a positive Net Present Value to society of approximately £17 billion by reducing energy demand, enhancing the UK's security of supply, reducing energy bills, reducing fuel poverty and securing jobs in energy efficiency industries.

The main aim of CERT is to contribute to cutting GHG emissions by 12.5% by 2012 and 80% below 1990 levels by 2050. CO<sub>2</sub> savings will be achieved by energy suppliers delivering measures to provide overall lifetime savings amounting to 293 Mt CO<sub>2</sub> by December 2012. At least two thirds of the increase in target (68%) must be delivered through professionally installed insulation measures.

There is also a drive to focus on 'hard to reach' and vulnerable households. Suppliers were already required to meet 40% of their total target by delivering measures to a 'Priority Group' of vulnerable and low income households, including those in receipt of eligible benefits and pensioners over the age of 70. An additional target has been introduced that requires 15% of savings be achieved in a subset of low income households (a Super Priority Group) considered to be at high risk of fuel poverty.

#### Community Energy Savings Programme (CESP)

CESP targets low income households across the UK to improve energy efficiency standards and reduce fuel bills. CESP promotes a 'whole house' approach and is delivered through the development of community-based partnerships involving local authorities along with energy suppliers and electricity generators. CESP is funded by an obligation on energy suppliers and electricity generators and is expected to deliver up to £350m of efficiency measures amounting to 2,900kt CO<sub>2</sub> savings through improvements to 90,000 homes nationally.

There are 3,428 areas eligible for CESP in England, with a total of 272 (8%) qualifying areas in the City Region. This includes St Helens (19 areas), Liverpool (123 areas), Wirral (41 areas), Sefton (29 areas), Knowsley (42 areas) and Halton (18 areas).

### Warm Front

The Warm Front scheme provides heating and insulation improvements to households on certain income related benefits living in properties that are poorly insulated and/or do not have a working central heating system<sup>29</sup>. The grant scheme is means tested to provide households with up to £3,500 for insulation and heating (gas or electric), increasing to up to £6,000 for oil central heating schemes off the gas network. Grants are available for improvements including loft insulation, draught proofing, cavity wall insulation, hot water tank insulation, gas, electric, liquid petroleum gas or oil heating and conversion of open fronted fires to glass-fronted fire.

### Green Deal and Energy Company Obligation (ECO)

The Energy Act 2011<sup>30</sup> sets out the framework for the Green Deal. The proposed Green Deal is a scheme to help finance energy efficiency improvements in both domestic and commercial properties. Investments will be paid for initially by the Green Deal provider and then paid back by the householder or firm. The loan is issued against the property on which the improvements take place, not the occupier<sup>31</sup>. A critical part of the policy is that it allows loans to be paid back through energy bills.

The aim of the Green Deal is to provide competitively priced loans with repayments linked to energy bills, reducing the risk of default compared to a conventional unsecured loan. By doing this the Government intends the cost of a Green Deal loan to be lower than a normal bank loan<sup>32</sup>. Furthermore, by stretching the repayment period of the loan, it aims to match the payback rate to the rate at which the benefit is accrued.

ECO is a scheme designed to ensure the UK's big energy suppliers are legally obliged to provide support to ensure hard to treat homes and to ensure that the lowest income and most vulnerable households in communities also benefit from the Green Deal<sup>33</sup>.

In June 2012, DECC set out the secondary legislation that signalled the Green Deal energy efficiency market coming into full operation by October 2012. This is supported by measures to provide consumer protection, reduce barriers in the industry and introduce the ECO. The legislation includes support worth around £1.3bn a year to deliver energy efficiency and heating measures across the UK to help tackle fuel poverty and climate change.

The programme is estimated to deliver improvement to 230,000 households per year in low income areas. The Government has published a portfolio of documents that provide further clarity on the Green Deal Programme and ECO. This includes guidance on which measures qualify for Green Deal finance, how the Green Deal will reflect the in-situ performance of energy efficiency measures and the ECO Carbon Saving Community Obligation for Rural and Low Income Areas.

On 14 June 2012, DECC announced the appointments of the Green Deal Oversight Body and Ombudsman to manage the Green Deal programme. Service provider Gemserve, partnered by REAL will run the new Green Deal oversight body for the next three years (starting from August 2012). Together they will be responsible for the registration of assessors, installers and providers and monitoring compliance with the Code of Practice for the programme. Ombudsman Services Ltd will deliver the Green Deal Ombudsman and Investigation Service, which will provide a free service to customers who cannot reach an agreement with their Green Deal Provider over a complaint.

### 5.2.2 Industrial and Commercial Carbon Reduction Commitment (CRC) Energy Efficiency Scheme

The CRC is a mandatory scheme aimed at improving energy efficiency and cutting emissions in large public and private sector organisations. These organisations are responsible for around 10% of the UK's emissions. The scheme features a range of reputational, behavioural and financial drivers which aim to encourage organisations to develop energy management strategies that promote a better understanding of energy usage.

The CRC Energy Efficiency Scheme Allocation Regulations came into force on 24 May 2012 and is the mechanism for the sale of allowances in (the current) Phase One of the Scheme which ran until April 2012. The regulations also reflect changes previously announced to simplify CRC and set an allowance price of £12/tonne CO<sub>2</sub> for sales in 2012.

DECC closed its consultation on the simplification of CRC in June 2012. The consultation included a range of measures to reduce the administrative and regulatory burden of the scheme on participants. Proposed measures include changes to the qualification criteria in relation to half hourly metering specifications and reporting on fuels whereby participants would only need to report on their consumption of electricity, gas, kerosene and diesel (but only kerosene and diesel if they are used for heating). Other measures include clarification on landlord / tenant relationships, changes to the buying allowances for Phase 2 of the scheme (whereby the auctioning of allowances would be scrapped and replaced by two fixed price sales per year) and a decision on whether to retain the CRC performance league table.

### European Union Emissions Trading Scheme (EU ETS)

The EU ETS is a phased mechanism that operates by allocating and trading GHG emission allowances throughout the EU one allowance represents one tonne of carbon dioxide equivalent (CO<sub>2</sub>e). Phase I ran from January 2005 to December 2007 and Phase II runs from January 2008 to December 2012 and includes revised monitoring and reporting rules, more stringent emissions caps and additional combustion sources. Phase III will run from January 2013 to December 2020 and will impose more challenging emission reduction targets on installations subject to the EU ETS. The aim is to gradually phase-out the free allocation of allowances that took place in Phases I and II, replacing them with a system of allowance allocations through auctions and broadening the scheme to more industrial sectors and GHGs. In addition, the aviation industry, from 2012 is included and will need to adjust quickly to the requirements of the EU ETS. The UK submitted its National Implementation Measures (NIM) to the European Commission on 12 December 2011. The NIMs document sets out the levels of free allocation of allowances to installations under Phase III in accordance with Article 11 of the revised ETS Directive (2009/29/EC).

Phase III of the EU ETS will deliver two-thirds of the EU's total 21% emission reduction target by 2020 (based on 2005 levels). This means that by 2020, the EU ETS will be saving 500 Mt CO<sub>2</sub>e per year, making it the biggest single policy instrument for addressing climate change in the EU. These emission reductions will increase further if the EU moves to a 30% GHG emission reduction target. For the UK, the EU ETS will cover about 48% of national CO<sub>2</sub> emissions from Phase III<sup>31</sup>. It is expected that the ETS will deliver two-thirds of the first three UK carbon budgets under the Climate Change Act 2008. Up to 300 million allowances from a new entrants reserve of the EU ETS will be used to support the demonstration of carbon capture and storage (CCS) and innovative renewable technologies. There is the potential for Member States to opt out small emitters and hospitals so as to reduce regulatory burden<sup>34</sup>.

### 5.2.3 Climate Change Agreements

Climate Change Agreements (CCA) set the terms under which eligible companies may claim the Climate Change Levy reduction. Energy intensive industries can obtain a 65% discount from the Climate Change Levy, provided they meet challenging targets for improving their energy efficiency or reducing their carbon emissions.

The current CCA scheme expires in March 2013. In January, DECC published the Government response to a consultation on simplification of CCAs which is planned to from April 2013 until 2023. The January 2012 publication set out the final policy direction of the new Scheme. This consultation includes the technical detail of key policy issues including new proposals on how renewable heat is treated in carbon and energy targets and accounting, the content outline of the new regulations on the eligibility basis for the new scheme and revised charging scheme proposals.

## 5.3 LOCAL ACTIONS

### 5.3.1 Domestic

The City Region contains around 665,500 homes<sup>35</sup> in total. In 2005 the City Region's domestic sector consumed the greatest proportion energy amounting to 39% (14,578 GWh) of the total energy consumed; however the domestic sector had the lowest proportion of the CO<sub>2</sub>e at 22% (2,082 kt).

There are a significant number of established energy efficiency programmes being implemented in the City Region. Local authorities, registered social landlords, private landlords, utility providers and organisations such as the Energy Savings Trust are delivering measures across the City Region's social and private housing stock through implementation of ERDF funding, CERT, Warmfront and CESP.

Around 22% of the total housing stock is social housing (estimated at 148,297 social housing units) and has estimated carbon footprint of 568.2 kt CO<sub>2</sub> per year. For the social housing sector alone, estimates suggest a 38% (216 kt CO<sub>2</sub>) reduction in CO<sub>2</sub> can be achieved.

#### DELIVERING ENERGY EFFICIENCY IN HOMES

Through delivery of CERT and Warm Front over the last 3 years there have been over 140,000 individual measures on 120,000 domestic properties. This equates to around 19% of the total housing stock having at least one intervention, resulting in significant CO<sub>2</sub> savings across the City Region's housing stock. Implementation of measures through CERT alone have resulted in improvements to 78,100 homes and around 96 kt CO<sub>2</sub> savings. Further savings have been achieved through Warm Front which has delivered improvements to over 45,000 homes across the City Region.

#### DELIVERING ENERGY PROJECTS IN AREAS OF GREATEST NEED

The City Region's REECH Merseyside programme is ERDF funded, with over £7 million of funding allocated, 50% of which is committed to 5 agreements that will result in energy efficiency and microgeneration projects to over 50% of the total properties within the scope of REECH (2,000 homes).

Schemes that are progressing include: Stockbridge Village (Villages Housing Association), Four Acre Green (Helena Partnerships), Everton Energy, Toxteth and Bootle Solar (Plus Dane), Castlefields (Plus Dane), Peel Road (Riverside), Energy Efficiency (Liverpool Housing Trust), Demonstration Project (Liverpool Mutual Homes) and Neighbourhood Solar – (Good Neighbour Community Energy).

### Industrial and commercial

There are over 49,000 business and commercial users in the City Region. The industrial and commercial sector's energy consumption amounted to 14,159 GWh (38%) in 2005, and resulted in the highest proportion of CO<sub>2</sub>e at 51% (4,898 kt CO<sub>2</sub>e).

There are a number of organisations active in the City Region that have provided a package of support to industry and businesses. This includes Carbon Trust, Enworks, Envirolink and ecoSMARTER who have a strong track record of delivering carbon reduction across Liverpool City Region. The City Region's supply chain includes companies such as Capita Symonds Ltd energy audit services, GE Power Controls and Impact Control Systems Ltd who provide building and energy management services, with process management services delivered by Corus, ESi Automation Ltd and Presidio.

#### CASE STUDY: ENWORKS

Enworks has provided specialist advice to help Liverpool City Region businesses reduce their carbon footprints with 42 kt CO<sub>2</sub>e of savings achieved to date. Enworks estimate that 15.1 kt CO<sub>2</sub> of annual savings have been achieved by local businesses with another 128.14 kt CO<sub>2</sub> of pipeline savings.



The public sector is also making significant progress in reducing CO<sub>2</sub> emissions. All local authorities are now required to produce annual greenhouse gas (GHG) reports that provide details of the emissions from their own estate and operations. Each local authority in the City Region also has a carbon management or reduction plan in place to reduce the costs of energy, water, fuel use and waste generation. Each plan is developed to demonstrate leadership to partners and local communities, protect the environment, limit impacts from climate change and comply with legislation such as the CRC Energy Efficiency Scheme.

### 5.4 ENERGY EFFICIENCY MEASURES

This section provides a framework of measures that can be used to reduce energy demand and improve efficiency across the domestic and industrial and commercial sectors. The measures will typically apply to retrofitting existing buildings but will also apply to other forms of infrastructure. This is particularly important for the City Region which has a diverse range of infrastructure such as tunnels, rail tracks and terminals, ports and highways, where measures such as efficient lighting and regular maintenance operational infrastructure will help reduce CO<sub>2</sub> emissions. The section begins with an overview of the key barriers that can limit the deployment of energy efficiency interventions.

#### 5.4.1 Barriers to Energy Efficiency

Reducing energy use through conservation and improved efficiency often offers significantly cheaper carbon savings compared to alternatives such as increased renewable energy generation<sup>36</sup>. There are a wide range of market and non-market barriers in delivering energy efficiency.

Key barriers include<sup>37</sup>:

- **Basic financial barriers** - including the potentially higher upfront costs of energy efficiency products, e.g. wall insulation solutions for solid wall structures, and the interest rates available to households.
- **Hidden costs** - including 'transaction costs' associated with finding reputable providers, time costs of disruption, and the costs of differences in quality of product or service.
- **Lack of information** - this has strong links to the behaviours of households and businesses – because they do not know their level of their energy consumption, how energy can be reduced, by how much and what cost, they do not consider an investment in energy efficiency as necessary.

- **Risks and uncertainty** - uncertainty about future energy prices can deter households from investing since they cannot be assured of further savings. Households may also be wary of the risk associated with unfamiliar products.
- **Poorly aligned incentives** - this occurs where there is leasehold / rental tenure, whereby a 'landlord-tenant' split occurs with landlords under-investing in energy efficiency measures because their tenants pay the energy bills. Conversely tenants have no incentive to reduce their energy use if the landlords pay the energy bills.
- **Regulatory barriers** - the UK has a complex regulatory system in place. This can cause barriers to energy consumers as to which regulations apply to them and what the implications and opportunities are.

#### 5.4.2 Behavioural Change

Developing a sustainable energy system and reducing CO<sub>2</sub> is much more than making physical improvements to energy infrastructure, the energy efficiency of buildings and transport, and activities associated with living and working in the City Region.

The key principle when developing behavioural change interventions is that there is a plan and management strategy in place to provide staged and stepped actions. This includes an ongoing, long-term commitment to ongoing promotion. Piecemeal projects and a failure to build on actions will not result in effective and long lasting behaviour change. The rebound effect is a term used when some or all of the expected reductions in energy consumption from implementation of energy-efficiency improvements are offset by an increasing demand for energy. There are three types of rebound effect from energy-efficiency improvements: direct, indirect and economy-wide<sup>38</sup>.

There are a wide range of options available to the City Region to improve behaviours in energy consumptions. This includes the use of smart metering in homes to provide real time information on energy consumption, which in turn encourages consumers to reduce energy consumption. Smart metering is also a scalable solution that can be used on a building, street, neighbourhood, city and district levels. The scalability of a solution can lead to competition between different areas and so drive down energy consumption.

### **CASE STUDY: ENCOURAGING BEHAVIOUR CHANGE**

CRed Wirral provides an online tool where people choose from a range of carbon reducing pledges to change their lifestyle. After a pledge has been made they can track their progress via a unique 'My Pledges' view. Users can see the impact of their pledges in kilograms/tonnes of CO<sub>2</sub> saved (and the impact of pledges made by all users in the CRed Wirral community). CRed Wirral also gives access to news, events and links for further information and support.

### **CASE STUDY: UNDERSTANDING BEHAVIOUR CHANGE**

Liverpool John Moores University is to carry out a project to understand the impact of a 'green' building programme on the well-being, health and attitudes towards energy conservation of Merseyside residents. 400 households will be assessed before and after work has been carried out on their homes in order to gain a better understanding of how the interventions affect those concerned, and how they relate to changes in patterns of energy use.

### **5.4.3 Insulation and Draft Proofing**

The heating and cooling energy losses of a building can be significantly reduced by improving its thermal insulation. As well as conventional solutions like loft and cavity insulation there are new technologies being developed that can be applied directly to internal or external walls which mean that solid and small cavity walls can benefit from improved insulation. Solutions include dry lining, spray technologies and cladding.

The replacement of old windows with standard double glazing (e.g. double glazed 16mm with a low emissivity hard coating) will reduce the heat losses that occur through building fabric. Increased reductions could be achieved through the installation of triple glazing (e.g. triple glazed 16mm cavity with a low-emissivity hard coating).

Draft exclusion, and keeping doors and windows shut can also help keep warm or cool air in as necessary.

City Region insulation supply chain providers include Hemsec Manufacturing Limited and Knauf Insulation.

### **5.4.4 Low Energy Lighting**

The replacement of old incandescent bulbs with fluorescent alternatives and LEDs can provide a low cost, efficient alternative for spotlights. Switches and sensory controls can also be upgraded to automatically switch lights off when a room is empty and /or when there is sufficient natural daylight.

City Region lighting supply chain providers include Ex-Or Ltd and Morgan Hope Industries Limited.

### **5.4.5 Voltage Optimisation**

Electricity flows can vary considerably rising above and falling below 240V. This leads to inefficient energy consumption. Voltage optimisation systems offer simple solutions to reducing a building's supply voltage so that it is still high enough for all electrical appliances to work properly, but not as high as provided by the National Grid. For example all appliances sold and used in the EU will work at 220V, while the UK grid normally supplies 240V. The lower voltage also means appliances generate less heat, which can lengthen their operational life.

### 5.4.6 Heating System Replacement

With efficiencies of 90% and above, modern boilers are much more efficient than old ones. The age and efficiency of boilers can have a major impact on the energy consumption of a home for heating. Therefore consideration of boiler replacement is very important. There are various options available including like for like replacements, Combined Heat and Power (CHP) systems and lower cost upgrades such as retrofitting systems to boilers that will improve overall efficiency such as fitting thermostatic valves to radiators, and installing or upgrading a building's energy management system.

### 5.4.7 Programmable Switches

These are low-cost, plug-in devices that can be set to automatically switch electrical appliances on and off, as and when required. These solutions are better suited to industrial and commercial properties which generally have more predictable operational and occupancy patterns.

### 5.4.8 Mechanical Ventilation and Heat Recovery (MVHR)

The use of MVHR provides multiple benefits including energy efficiency, controlled ventilation whilst maintaining high levels of air tightness and air quality in buildings. Research completed by the Zero Carbon Hub and the NHBC Foundation<sup>39</sup> indicates that whilst MVHR has the ability to have a positive effect on energy consumption, Indoor Air Quality and health, failures in the design, installation and commissioning of MVHR systems result in poorly performing systems not delivering the anticipated benefits. The most up to date recommended advice requires:

- Design considerations such as ensuring MVHR units are suitable for specific building types and that the location of units are carefully considered, ensuring there is space and easy access for servicing and repair.
- High installation standards in accordance with design and manufacturers' specifications, to ensure efficient MVHR operations.
- MVHR systems are commissioned in accordance with relevant ventilation compliance guidance.
- System users are provided with clear, easy to understand instructions for summer and winter system operation.

### 5.4.9 Replacement of Motors & Drives

Many industrial and commercial buildings consume large amounts of energy via various motors, drives and pumps that are used to run building heat and water systems. Replacing older fixed-speed drives with variable-speed drives (which have much more effective and responsive) can make significant reductions in energy consumption. The City Region's supply chain for motors and drives includes GE Power Controls and R Baker (Electrical) Limited.

### 5.4.10 Maintaining Equipment

As equipment and machinery gets older its efficiency reduces. Well planned and comprehensive maintenance programmes improve operational efficiency and increase the life of such infrastructure, reducing energy consumption.

Measures are often simple and include cleaning of air conditioning condensers, eliminating leaks from compressed air and hydraulic systems, and flushing through heating systems to remove blockages from pipework. It can also mean developing Just in Time (JiT) processing to ensure that production lines and associated machinery and storage facilities are not operating unnecessarily.

The development and adoption of LEAN practices across all industrial and commercial processes will identify the need to properly maintain equipment and machinery.

### 5.4.11 Smart Grid

A key factor relevant to promoting the wider agenda for a low carbon energy future is the Smart Grid approach to energy management. Smart Grids are anticipated to transform energy management by delivering electricity to residents and businesses using two-way digital technology. This technology facilitates the control of appliances at consumers' properties, recognising when energy is not needed and switching appliances off (subject to prior arrangements). By using energy management solutions, energy demand is reduced and efficiency increased, making the most of the existing electricity network without the need for major network improvements in distribution infrastructure.

City Region supply chain providers for monitoring and metering include EA Technology, CBISS Ltd, Motherwell Control Systems Limited and Presidio.

## 5.5 RECOMMENDATIONS FOR ACTION

Action	Need	Description	Progress to Date	Key steps
<p>Action 1: Development of a domestic, industrial and commercial retrofit programme</p>	<p>A combined retrofit programme represents a huge business opportunity for the City Region.</p> <p>Building on the requirements of the Energy Act 2011, there is a very strong case for setting minimum energy efficiency standards for all buildings types and tenures.</p>	<p>Domestic, industrial and commercial retrofit are one of the City Region's most significant challenges in tackling fuel poverty, increasing energy efficiency and tackling climate change.</p> <p>The City Region develops a comprehensive programme of retrofit measures for the domestic sector for all housing types and tenures, leasehold and freehold commercial and industrial building stock.</p> <p>By combining domestic, industrial and commercial retrofit agendas there will be greater scope to ensure SMEs are covered by intervention measures.</p>	<p>CERT, Warm Front and CESP have already delivered significant CO<sub>2</sub> reductions.</p> <p>The SEAP provides the basis for delivering a package of energy efficiency measures for retrofitting all building types.</p> <p>REECH Merseyside provides a significant pilot for domestic retrofit projects, with over 2,000 homes to be improved across the City Region. REECH also provides the City Region with an emerging evaluation model that can be developed and adapted to measure interventions.</p>	<p>HECA to continue building on the established energy efficiency programmes being delivered in the City Region.</p> <p>City Region to encourage and facilitate joint working on industrial and commercial energy efficiency.</p> <p>Develop accurate assessment of performance improvements using SAP-based modelling and develop a 'building by building' assessment model and programme that avoids the risk of ineffective 'one size fits all' intervention packages.</p> <p>Develop - by working directly with landlords and tenants - procedures to minimise disruption of day-to-day living and working interventions.</p> <p>Engage with professional organisations including the National Home Improvements Council, Construction Products Association, Royal Institute of British Architects, Royal Institute of Chartered Surveyors, Institute of Sustainability, Federation of Master Builders, National Federation of Roofing Contractors, National Energy Foundation and the Electrical Contractors Association to develop programmes and local supply chains.</p>
<p>Action 2: Deliver a programme of behavioural change measures</p>	<p>Behavioural change is increasingly overlooked by policy makers. Behavioural change is fundamental to reducing energy demand and long term carbon savings.</p>	<p>The City Region develops a programme of mitigation measures that are rolled out in parallel with retrofit programmes.</p> <p>Behavioural measures will be designed to limit instances of direct, indirect and economic wide rebound effects from energy efficiency improvements made to housing, industrial and commercial buildings.</p> <p>There are also opportunities to integrate behavioural change measures across the domestic, industrial and commercial and transport sectors.</p>	<p>The Energy Saving Trust Advice Centres, CRed Wirral, Enworks, ecoSmarter, Stephenson Institute and universities provide a significant asset for the City Region to utilise in developing behavioural change and rebound strategies across the domestic, transport, industrial and commercial sectors.</p>	<p>The City Region to encourage and facilitate joint working on behavioural change.</p> <p>Work with partners to review existing behavioural change initiatives such as CRed to develop a programme of behavioural measures across the domestic, industrial and commercial and transport sectors.</p>

## 5 Action Plan 2: Energy Demand Actions

Action	Need	Description	Progress to Date	Key steps
Action 3: Identify new Smart Grid areas	Smart Grids are likely to provide a cost effective and flexible technology option for reducing demand. Due to the nature of Smart Grid it also provides an instant platform for community led projects.	The City Region works with partners through Action 5 Energy Masterplanning in Action Plan 1 to develop a portfolio of Smart Grid Priority Zones. This action would include undertaking research on Smart Grids in the City Region in partnership with universities and private sector partners.	21 Community Groups identified in the City Region that are actively seeking to deliver energy projects.  Smart Grid Pilot Project being delivered in Toxteth that provides a delivery model and partners which future schemes can learn from.	City Region to build on the partnerships developed from the City Region's existing Smart Grid pilot.  Undertake a mid-term evaluation of Toxteth Smart Grid Pilot Project to identify early lessons learned.  Ensure that the identification of Smart Grid opportunity areas forms part of the Energy Masterplanning action in Action Plan 1.

# 6 Action Plan 3: Energy Supply Actions

## 6.1 INTRODUCTION

This action plan contains the direct actions for increasing energy generation in the City Region for domestic, industrial and commercial sectors and to the UK grid. These actions are supported by the enabling actions contained in Action Plan 1 with the relevant actions needed to measure, monitor and review contained in Action Plan 5. These actions result in CO<sub>2</sub> reductions and impact directly on the City Region's low carbon economy.

All modern buildings need energy to provide heating, electricity and often cooling for comfort and functionality. These energy demands are traditionally met by a mix of electricity and gas supplied by the National Grid, with gas boilers and potentially chillers serving individual buildings. This action plan focuses on the deployment of technologies to increase the generation of renewable and low carbon technologies that could provide feasible alternatives.

## 6.2 SUPPLY: LARGE AND COMMUNITY SCALE ACTIONS

### 6.2.1 Introduction

Larger scale energy schemes include commercial scale schemes (e.g. wind farms, and combined heat and power (CHP) plant, typically 5 MW or more) and community scale schemes (e.g. above 45kW<sub>s</sub> (heat) and 50kW<sub>s</sub> (electricity) in capacity). Drivers for large scale energy generation include the projected doubling of electricity demand by 2050 and expected energy price volatility, coupled with the need to reduce GHG emissions by 80% by the same year based on 1990 levels.

This section outlines the main options available that could provide energy to the City Region and help decarbonise the National Grid.

## ACTION PLAN 3 CONTENT

This action plan covers a range of policy, regulatory and financial issues at national and local levels for large, community and micro-generation scale energy generation. It is not intended to provide a comprehensive overview of all energy matters and will be adapted over time by partners.

### National:

- Large and community scale – Transforming and planning the energy system, Renewables Obligations, transmission and distribution.
- Micro-generation – Micro-generation Strategy, Micro-generation Certification Scheme, Feed in Tariffs, Renewable Heat Incentive.

### Local:

- Large and community scale – Tidal, Wind, CHP & Heat Networks (CHP, Heat Networks, energy from biomass, energy from waste).
- Micro-generation – Solar photovoltaics, solar water heating, heat pumps.

### Recommended Actions:

- Action 1: Develop the City Region's energy sector supply chain.
- Action 2: Support the development of combined heat and power and heat networks.
- Action 3: Support the identification of new opportunities for wind generation.
- Action 4: Support the development of the Mersey Tidal Project.
- Action 5: Support the delivery of building integrated solar photovoltaics and solar hot water.
- Action 6: Support the delivery of building integrated ground source heat pumps (GSHP) and air source heat pumps (ASHP).



### 6.2.2 National Actions

#### Transforming and planning the energy system

There are two ways the UK can develop a low carbon energy system. One option is to decarbonise the grid whereby heat, electricity and transport fuels would be generated by centralised generation (including nuclear) resulting in a 'decarbonised' electricity network. The second option is through a decentralised energy system, whereby a larger volume of smaller scale generation is dispersed across urban and rural areas. Each option has strengths and weaknesses and implications for local authorities and communities. There are several scenarios and targets that need to be considered when achieving a low carbon energy system. These include:

- The DEFRA Market Transformation Programme scenario (MTP) which assumes that 16% of our electricity will be from renewable sources by 2020.
- The UK Low Carbon Transition Plan sets a targets of 40% of the UK's electricity from renewable sources by 2020.
- The UK Renewable Energy Strategy (RES) which identifies that 30% of electricity will come from renewables by 2020.

The Planning Inspectorate is the Government agency responsible for examining planning applications for nationally significant infrastructure projects. For energy this relates to (onshore and offshore) large scale energy developments of 50 MW and over, and associated infrastructure. Currently the City Region has 3 National Infrastructure Planning energy projects being dealt with by the Planning Inspectorate. This includes the Alexandra Dock Biomass Project, The Mersey Tidal Scheme and the Burbo Bank Extension Offshore Windfarm, demonstrating the City Region's emerging significance at a national level.

For energy developments that are below 50 MW, it is essential that the City Region has clear and consistent planning policies that deal with all forms of energy generation and are well integrated with climate change policy. It will also be important that developers and communities are aware of the benefits of renewable energy projects as part of the neighbourhood planning process.

National Policy Statements (NPS) for energy were designated on 19 July 2011 to guide decision making on applications for energy infrastructure. This includes:

- Overarching national energy infrastructure policy - This recognises that Combined Heat and Power is technically feasible for all types of thermal generating stations, including nuclear, energy from waste and biomass.
- Renewable energy generation - This applies to large generation from on shore wind, biomass and waste plants (over 50 MW generating capacity). Combustion plants which generate electricity using waste or biomass are also included.
- Fossil fuel electricity generating infrastructure - This covers nationally significant electricity generating infrastructure with over 50 MW of electricity generating capacity.

#### Renewables Obligations

The Renewables Obligation<sup>40</sup> is the main mechanism for larger scale renewable electricity projects in the UK, with smaller scale electricity generation projects supported through the Feed in Tariff schemes. Under the Obligation, Renewable Obligation Certificates (ROCs) are issued to generators for each MWh of renewable electricity generated. The number of ROCs received per MWh of generated electricity depends on the type of technology and how it is operated. Where a supplier does not have sufficient ROCs to meet their obligation then they must pay an equivalent amount into a 'buy-out' fund which pays for the administration costs of schemes, with the surplus proportionally paid back to suppliers in relation to the number of ROCs they have produced to meet their own obligation.

#### Transmission and Distribution

National Grid owns the electricity transmission network in England and Wales and operates the entire transmission system throughout the UK. National Grid also own and operate the gas transmission system throughout UK and a gas distribution business across the heart of England.

The major issue facing the UK is the electricity grid. The principal role of the National Grid is to maintain the energy balance between generation and demand economically, whilst ensuring that this is achieved within the capability of the network. This is achieved by operating the electricity infrastructure at a range of voltages, depending upon its position within the overall network<sup>41</sup> and requires the ability to forecast system conditions and manage the risks inherent in operating the power network safely.

A shift towards renewable energy places significant challenges on the transmission grid, as the generation of renewable energy is much more variable. Technologies such as electric vehicles, heat pumps and smart meters will require electricity networks to be upgraded in order to cope with more variable energy generation and demand. In response, the National Grid will need to meet increases in variable generation and demand by designing a complex control environment with more Quadrature Boosters (QBs), HVDC cables and compensation equipment incorporated into the network system<sup>42</sup>.

### 6.2.3 Local Actions

There is already a good understanding of the potential for renewable and low carbon energy generation in the City Region. The City Region is host to a number of businesses that can provide specialist services for the energy industry and service the deployment of energy infrastructure.

The following sections begin to outline this potential, and where information is available provides projections of the City Region's capacity to deliver a low carbon energy system through grid decarbonisation and decentralised options.

#### CITY REGION TRANSMISSION AND INFRASTRUCTURE SUPPLY CHAIN

Cross Services Group Limited, A & N Plant, Corus, Cross Services Group Limited, Cumberland Cathodic Protection Ltd, LS Cables, Robert Smith Steel and Tratos Cables.

### Transmission and Distribution

The majority of the City Region's electricity network has existing capacity to accommodate new development. There are many areas of the network where there is in excess of 2MVA, which provides an electricity network capacity for approximately 750 - 1,000 new homes being built without improvements being needed. There are further areas where there is spare capacity of more than 10MVA which could supply up to 4,000 new homes.

Despite this capacity, a large scale development coming forward in the City Region such as an industrial or commercial development would reduce any spare capacity significantly. There are also a number of areas across the City Region that have network capacity below 2MVA including North Sefton, North West Liverpool, much of St Helens and Bromborough. It will therefore be critical that the City Region continues to monitor and plan for network improvements in partnership with utility providers. Discussions are ongoing between local authorities and utility providers to undertake energy master planning exercises to identify the full extent to which local network capacity can meet current and future demand and supply.

### Tidal

The Mersey Estuary has one of the largest tidal ranges in the UK, and with this the potential to generate electricity that would make a significant contribution to the Government's target to secure 15% of UK energy from renewable sources by 2020. Several options have been investigated as part of detailed feasibility work, with a preferred scheme identified and estimated to have an annual energy yield of 920 – 1,000 GWh per year. The scheme is estimated to result in 8,030 kt CO<sub>2</sub> savings over 20 years, equating to 401.4 kt CO<sub>2</sub> a year, but this ultimately depends on the wider energy mix achieved in future and carbon sequestration. The work undertaken to date has identified that such a scheme would incur high construction costs, and therefore is unlikely to go ahead without changes at a national level that provide improved support for delivering secure renewable energy. If such a scheme was to become commercially viable, it could deliver enough renewable electricity to meet the average needs of 200,000 homes<sup>43</sup>.

### Hydroelectricity

A strategic assessment of resource capacity identified the City Region to have a total of capacity of 3 MW for small scale hydro electricity generation. This is a very small proportion of in terms of contributing to the City Region's energy supply and is not considered as a priority area of action for reducing CO<sub>2</sub>. The City Region is host to a number of businesses such as Mowlem Engineering Power and Renewables Solutions UK Ltd that can support the deployment of any local opportunities and there may be opportunities for local communities to bring forward proposals for small scale schemes.

### Wind

The City Region has been assessed for wind resource capacity in a number of studies which have identified a suitable average wind speed (i.e. above 5 – 6 meters per second) which would result in wind schemes generating good quantities of electricity for the City Region.

A strategic assessment by Government of resource capacity, identified the City Region to have a potential capacity of 619 MW for commercial wind generation and 13 MW for small scale wind generation. The City Region already has 10 MW of operational large scale wind turbines at Seaforth Docks in Sefton. Strategic assessments have also identified Sefton to have potential for an additional 19 MW of large scale wind generation that should be prioritised for detailed investigation. In terms of small scale wind generation, as at December 2011, there were 8 wind installations in the City Region receiving FiT with a generating capacity of 0.051 MW.

The City Region has a developing supply chain that has initially grown around the City Region's emerging presence for servicing offshore wind industry; however this could be readily adapted to service the onshore wind sector also. For smaller, community scale wind generation projects, the City Region currently hosts a total 6 MCS accredited installers that can provide local services for this sector.

### CITY REGION WIND SUPPLY CHAIN

632 MW of potential resource capacity.

19 MW of large scale potential already identified for detailed investigation.

6 MCS installers in the City Region to service small scale projects.

### HELPING REDUCE COSTS FOR OFFSHORE WIND

The Liverpool City Region Offshore Wind Supply Chain Report produced in 2010 identifies a range of opportunities to develop an offshore wind supply chain, and has significant existing assets in place to attract 1st and 2nd tier suppliers. Cost reduction is a key issue for the industry as identified in the 2010 report and recent research produced by the Offshore Wind Cost Reduction Task Force in June 2012.

The Offshore Wind Cost Reduction Task Force Report sets out key actions for industry and Government to cut the cost of generating electricity in the sector by over 30% to £100 per megawatt hour (MWh) by 2020. The Task Force report builds on the findings of a new study by The Crown Estate which also concludes that reaching £100 per MWh is achievable within the next seven years. The Government continues to see offshore wind as a vital part of the low carbon energy mix and the new report identifies the UK as being on course to reduce the cost of electricity from offshore wind substantially. The Crown Estate study also shows how reductions can be achieved, with actions identified to reduce costs by over 30%.

There is significant opportunity for the City Region to position itself as a key player in the drive to reduce costs for the industry. Partners should continue to develop the Liverpool City Region offshore wind offer by continuing to promote its capital assets, skilled and flexible workforces, links to global supply chains and investment and ability to develop innovative solutions for the industry.

## CHP & Heat Networks

### Combined Heat and Power (CHP)

CHP systems generate electricity and capture waste heat providing higher overall efficiencies than conventional generation. CHP can be provided in micro (below 50 kWe), small (below 1.5 MWe) and large (from 1 MWe up to hundreds of MWe). There are three stages to CHP which must occur in sequence; power generation, heat recovery and heat use.

In its simplest form, CHP employs a gas turbine, an engine or a steam turbine to drive an alternator, with the resulting electricity which is generated used either wholly or partially on-site. The heat that is produced during the generation of the electricity is recovered and can be used to raise steam or hot water for industrial processes, or to provide space heating and cooling for offices or factories<sup>44</sup>.

### CITY REGION SUPPLY CHAIN

The City Region hosts a number of suppliers for CHP including Clarke Energy Limited, Mowlem Engineering Power and Terra Consult Ltd.

### Heat Networks

Heat networks / district heating are infrastructure for delivering heat and cooling to multiple buildings from a central heat source. Heat is generated in an energy centre and pumped through a network of pre-insulated pipes to the consumer. At this point heat is either fed directly into the consumer's central heating system or transferred by a heat exchanger contained within a hydraulic interface unit (HIU), which also contains a heat meter for monitoring heat consumption for billing purposes.

One of the long-term benefits of district heating is its scalability. Once the initial pipework is established, new developments and buildings can be plugged into the main distribution network, with local distribution networks delivering heating or cooling to customers at competitive cost. Any building can be connected into the network, including dwellings, retail, commercial buildings and industrial facilities. A number of technologies can be used to provide the heating; combined heat and power, biomass and energy from waste.

The Mechanisms for Delivering Resilient Energy Infrastructure Study, completed for the City Region in 2011 identified 8 schemes that total over £200 million in capital investment cost and would result in 119 kt CO<sub>2</sub> a year. A further 4 schemes have been shortlisted in the study with significant potential, however more detailed investigation is needed to estimate the capital costs and CO<sub>2</sub> savings.

Potential Scheme	Capacity MWe	Capacity MWth
Liverpool City Centre West	3	3.3
Liverpool RLHT and UoL	3.5	3.85
Knowsley KIP and South	9	9.9
Sefton Southport and Formby DGH	1.5	1.65
St. Helens Sutton Leisure and Lea Green	0.5	0.55
Halton Daresbury	0.6	0.66
Wirral Wirral Waters	7	7.7
Halton Runcorn Docks	0.5	0.55

Figure 12: Summary of Potential Heat Networks

### CITY REGION ACTIVITY

There is significant potential for heat networks across Liverpool City Region. 8 project opportunities have already been identified and prioritised, with a combined heat and power capacity of 54 MW.

Two of those schemes (Liverpool University Campus and Knowsley Industrial Park) have already entered more detailed technical and commercial analysis for that will lead to design specification and procurement.

### Energy from Biomass

A key consideration for the City Region when considering energy from biomass for heat and electricity generation is the source of the fuel supply, the security of that supply and the logistics involved in getting it to plant. Biomass CHP requires a suitable demand and use for the heat produced. This can be achieved either via direct use of heat energy within a local process, such as an industrial process or via a district heat network.

A strategic assessment of resource capacity (i.e. biomass resources considered include animal and vegetable waste, waste wood, managed woodland and energy crops) identified the City Region to have a total of capacity of 24 MW for biomass generation. The City Region – due to its existing port located land supply and rail and water infrastructure – is proving to be a very attractive area for large scale biomass generation, that significantly exceeds the domestic resource capacity. This is most evident in the Alexandra Dock Biomass project which is currently being considered for a generating plant with capacity for 100 – 150 MW of power generation.

The City Region's biomass supply chain includes Mowlem Engineering Power, Oldham Bros Ltd, Renewables Solutions UK Ltd, Viridis Energie Consultants, Liverpool Wood Pellets, Billington Biofuels, Walkers Organic Solutions (formerly WRS Composting Ltd), Chase Environmental Services Ltd, Fleming Technical Ltd and the Mersey Docks & Harbour Company.

#### CITY REGION ENERGY FROM BIOMASS ACTIVITY

24 MW of City Region produced biomass resource capacity.

Plans for up to 150 MW biomass plant in port location using local and wider biomass fuel supply.

Established biomass / biofuel supply chain with 10 businesses identified in the City Region that could provide local services to sector.

### Energy from Waste (EfW)

The waste management sector in the UK accounted for 3.6% of the UK's total estimated emissions of GHGs in 2008 or 22.7 million tonnes of carbon dioxide equivalents (CO<sub>2</sub>e) of which 89% arises from landfill, 9% from waste water handling and 2% from incineration<sup>45</sup>. A key consideration for the City Region when considering energy from waste for heat and electricity generation is the source of the waste supply, the security of that supply and the logistics involved in getting it to the generation plant.

The Joint Merseyside Recycling and Waste Management Strategy (2011 – 2041) sets out the City Region's approach to using waste as a resource through the recovery of energy from waste. The strategy will contribute to national targets to reduce CO<sub>2</sub> and will support local authorities in the City Region to address climate change. The strategy identifies that by diverting biodegradable waste such as food, garden waste and paper from landfill, the production of methane (over 20 times more damaging than CO<sub>2</sub>) will be reduced, whilst CO<sub>2</sub> savings will be realised by reducing the use of materials used for manufacture and industrial processes and reducing energy generation using fossil fuels.

#### CITY REGION ENERGY FROM WASTE ACTIVITY

Up to 273 MW of capacity from 6 schemes across the City Region.

9 MW operational.

64 MW with planning consents.

100 MW of generation capacity under construction.

95 MW scheme being prepared for planning.

### CASE STUDY: WASTE PREVENTION AND CARBON REDUCTION TOOL

ERM Consultants, Defra, WRAP and 10 UK local authorities, in conjunction with CIWM and LARAC, established a research consortium to draw together data and experiences on waste prevention and developed a tool to do this (i.e. the Waste Prevention and Carbon Reduction Tool). The tool considers an initial set of prevention schemes (e.g. Love Food Hate Waste, Home Composting, Textiles re-use, WEEE re-use and Furniture re-use) and provides analysis of:

- The quantity of carbon in the waste stream the tool accommodates different waste compositions, allowing each partner authority to investigate its own waste stream.
- The life cycle impact of waste prevention measures.
- The resulting carbon impact of a specific waste prevention measure in combination with the waste stream studied.
- The cost impacts or savings associated with the waste prevention measures.

A strategic assessment of resource capacity identified the City Region to have a total capacity (i.e. waste streams considered include municipal waste, commercial and industrial waste, landfill gas, sewage gas and sludges) of 77 MW from energy from waste sources. As with energy from biomass, the City Region is proving to be a very attractive location for energy from waste plant. There are a total of 6 schemes with a total capacity of 273 MW in the City Region – 1 scheme is operational, 3 schemes have received a planning consent, 1 scheme is under construction with potential for expansion and 1 is being prepared for planning. The City Region hosts a number of suppliers for EfW including Clarke Energy Limited, Mowlem Engineering Power and Terra Consult Ltd.

Scheme	Energos	Biossence	EMR	INEOS Chlor	PDM (Granox)	Peel / Covanta
Location	Kirkby Business Park	Hooton Park, Eastham	Alexandra Dock, Bootle	Weston Point, Runcorn	Ditton, Widnes	Ince Marshes, Elton
Authority	Knowsley	Wirral	Sefton	Halton	Halton	Cheshire West & Chester
Technology Type	Gasification	Gasification	Gasification	Conventional EfW	Conventional EfW	Conventional EfW
Capacity	9 MW	30 MW	25 MW	100 MW	9 MW (Stage 1) 14 MW (Stage 2)	95 MW
Status	Planning consented	Planning consented	Planning consented	Under construction	Operational -	Preparatory work started

Figure 13: Summary of potential EfW capacity in Liverpool City Region



### CASE STUDY: MRWA

Merseyside Recycling and Waste Authority (MRWA) is in the latter stages of procuring new infrastructure through its Resource Recovery Contract.

Government funding has been approved for this contract through the Private Finance Initiative (PFI) to deliver a facility to recover energy from the City Region's residual municipal waste. The facility will be CHP enabled to maximise the recovery value from the residual waste through the sale of electricity and heat.

The contract is expected to be awarded in 2012 with the main recovery facility being built outside Merseyside and operational from 2015. The contract will run until 2041. The procurement will take into account the impacts of the management of waste further up the hierarchy. The main driver for this is a commitment to the diversion of waste from landfill through recovery to remain compliant with the EU Landfill Directive and avoid increasing disposal costs. The key benefits of the EfW facility will be:

- Diversion of biodegradable waste to meet or exceed Merseyside's Landfill Allowances.
- Recovery of value from at least 75% of waste in line with the Waste Strategy for England 2007.
- Economies of scale procuring long term contracts that provide value for money.
- A source of secure low carbon and renewable energy.

### Energy Storage

Energy storage will become a critical part of resilient energy infrastructure, bringing multiple benefits to energy suppliers and consumers. Drivers include the need for peaking plants to meet changes in supply and demand conditions, whilst transmission and distribution systems are becoming congested during periods of peak and off peak demand. Another key issue is emergency planning, where system critical services such as health, police, fire, communication and data services are vulnerable to energy system failures.

Storage technologies can be applied at grid level through to small scale building applications, and matches supply and demand by shifting generated energy from off peak times to when it is needed. A key benefit of energy storage is that it can reduce the need for investment in transmission and distribution infrastructure improvements. It can also provide reserve energy supplies in the event of a system failure when the regular energy supply fails. Technologies include:

- Sodium Sulphur (NaS) Batteries
- Flow Batteries
- Lead Acid Batteries
- Lithium ion (Li-ion) Batteries
- Sodium Nickel Chloride Batteries
- Liquid Air Energy Storage
- Compressed Air Energy Storage (CAES)
- Pumped Hydro Energy Storage (PHES)
- Flywheels
- Superconducting Magnet Energy Storage (SMES)

## 6.3 SUPPLY: MICRO-GENERATION ACTION

### 6.3.1 Introduction

Microgeneration is defined under the Energy Act 2004 as  $\leq 45\text{kWs}$  (micro-heat) and  $\leq 50\text{kWs}$  (micro-electricity). Microgeneration can refer to community scale energy which may fall within these capacities.

This section sets out actions to deploy micro-generation integrated on-site into buildings. The SEAP does not cover all micro-generation technologies, instead it focuses on the most technically feasible and viable technologies available to date. It will be important that as new technologies come to market (and are recognised by initiatives such as DEFRA's Market Transformation Programme and Microgeneration Certification Scheme) future versions of the SEAP will need to recognise and factor their potential contribution to energy generation, CO<sub>2</sub> and the economy.

### 6.3.2 National Actions

#### Micro-generation Strategy

The Microgeneration Strategy was published in 2011 by DECC along with the Microgeneration Industry Contact Group Action Plan. The strategy sets out the non-financial barriers to microgeneration that must be tackled to maximise the deployment of small scale, localised energy generation. The strategy is informed by the Green Energy Act 2009 and is restricted to England only, although some proposals may apply across Great Britain. The strategy focuses on increasing the deployment of renewable micro-heat to meet renewable and carbon targets, as domestic space heating is the single largest contributor to the UK's carbon emissions from heat. The strategy sets out a number of actions with key deliverables, milestones, and responsibilities, based on the following work streams:

- Microgeneration Certification Scheme (MCS) – maximising the effectiveness of the MCS scheme in ensuring high-quality design and installation of microgeneration systems and improving consumer confidence.
- Standard Assessment Procedure (SAP) – creating a regulatory environment and assessment framework that enables accurate representation of the contribution of microgeneration technologies to low carbon homes and buildings.
- Insurance and Warranties – enabling policy makers and industry to understand consumer protection.

- Skills and knowledge – ensuring there are sufficient skills and knowledge in the industry to meet the demand.
- Technology – promoting microgeneration technology deployment, producing clear guidance on technologies, addressing grid and connection issues, and encouraging a sustainable market growth for microgeneration.
- Communities – the strategy discusses the transition between microgeneration schemes and community scale and decentralised energy solutions.

#### Micro-generation Certification Scheme (MCS)

The MCS certifies microgeneration technologies used to produce electricity and heat from renewable sources. The MCS is linked to financial incentives including Feed in Tariffs (FiT) and Renewable Heat Incentive (RHI).

MCS is a BS EN 45011 Scheme managed by Gemserve and REAL. The scheme is focussed on ensuring the quality of renewable technology installations and products. It is an industry led and funded scheme consisting of 10 Technical Working Groups. Each Technical Working Group develops the MCS Standards and Scheme documents based on international and European standards to which MCS working group members contribute to.

#### Feed in Tariffs (FiTs)

FiTs have been introduced by the Government to help increase the level of renewable energy in the UK. FiTs are monetary payments made to ordinary energy users for their own self generated renewable electricity.

FiTs are available for individual households and businesses looking to install most forms of renewable electricity generation in all sizes up to 5MW. The first major consultation on FiTs has now concluded with significant reductions to solar photovoltaic tariff rates. Whilst this does impact on the viability of Solar PV energy schemes, they will continue to be viable with good payback periods.

On 24 May 2012, the UK Government announced the revised cost control framework for Solar PV. This included details of the new tariff rates for Solar PV which will come into effect on 1 August 2012.

From 1 August 2012:

- Revised Tariff Rates will now be closely aligned with the Energy Performance Certification (EPC) of buildings.
- The new tariff rate for Solar PV  $\leq 4\text{kWp}$  will drop from 21p/kWh to 16p/kWh with an EPC band D or higher for the installation to be eligible for FiT (if band E or less the lower tariff rate has also dropped to 7.1p/kWh).
- The export tariff rate will increase to 4.5p/kWh for all new Solar PV installations.
- The tariff period (lifetime) will be reduced for Solar PV from 25 to 20 years for all new Solar PV installations.
- The generation tariff for multiple installations (more than 25) will be set at 90% of the standard generation tariff.

A key issue from the review of subsidies is that Government policy can have a significant impact on energy markets and supply chains. It will therefore be important that future projects and programmes in the City Region have robust risk profiles.

### Renewable Heat Incentives (RHI)

RHI is the first financial support scheme for renewable heat of its kind in the world. The scheme will be introduced in two phases. In the first phase, long-term tariff support will be targeted in the non-domestic sectors, at the big heat users - the industrial, business and public sector - which contribute 38% of the UK's CO<sub>2</sub>e.

Phase 2 of the RHI scheme will see households moved to the same form of long-term tariff support offered to the non-domestic sector in the first phase. This transition will be timed to align with the Green Deal which is intended to be introduced in October 2012.

On 11 June 2012, the UK Government announced the planned spend for 2012/13 to 2014/15. Available RHI spend has been set at an upper limit of £70m for 2012/13, with spending for 2013/14 and 2014/15 currently unchanged. The upper limit of £70m ensures that the 2013/14 budget of £251m would be enough to pay for existing installations and new installations were the 2012/13 limit to be reached. A higher limit for 2012/13 would leave insufficient funds available in the following year for new installations and therefore could damage the renewable heat industry.

Technology	Voucher value
Solar thermal hot water	£300
Air-to-water heat pump	£850
Ground-source or water-source heat pump	£1250
Biomass boiler	£950

Figure 14: RHPP Vouchers by Technology

On 26 March 2012 the UK Government announced further support for the domestic sector under a second phase of the Renewable Heat Premium Payment Scheme (RHPP). RHPP is a one-off grant designed to help towards meeting the costs of installing renewable technologies in your home, until the RHI is introduced for domestic customers.

### 6.3.3 Local Actions

#### Solar photovoltaics (PV)

Solar PV is a technology option that generates electricity by converting energy from the sun into electricity through semi conductor cells. The electricity generated can be used and / or be stored directly in the building when it is installed. Where the energy generated is more than the demand / consumption, the electricity can be exported to the electricity grid or stored. There has been a significant increase in the deployment of Solar PV since the introduction of the FiT.

A strategic assessment of resource capacity by Government identified the City Region to have a total capacity of 237 MW for solar photovoltaics. As at December 2011, there are almost 1,200 PV installations in the City Region receiving FiTs, resulting in a generating capacity of 3.38 MW.

The City Region has a growing supply chain in this sector with over 60 MCS accredited Solar PV installers and established research and testing services for photovoltaics allocated in Daresbury Science and Innovation Park, where high performance computing facilities for modelling of Intermediate Band Solar Cells are located.

#### CITY REGION SOLAR PV ACTIVITY

Up to 273 MW of potential capacity across the City Region.

3.38 MW of installed capacity and 1,200 installations since the introduction of the FiT.

66 MCS accredited Solar PV installers in the City Region.

#### Solar water heating

Solar hot water is a technology option that uses the sun to heat water. A solar hot water system is predominantly used to provide hot water for washing with, stored in a highly insulated hot water cylinder tank. The system can also be integrated with radiators and underfloor heating.

Solar hot water is a way of producing zero carbon heat to partially displace the burning of gas or other fossil fuels for heat generation. A strategic assessment of resource capacity by Government identified the City Region to have a total of capacity of 237 MW for solar hot water heating. The City Region hosts 20 MCS accredited solar hot water installers.

#### CITY REGION SOLAR HOT WATER ACTIVITY

Up to 273 MW of potential capacity across the City Region.

20 MCS accredited solar thermal installers in the City Region.

#### Heat pumps

There are two types of heat pumps - Ground Source Heat Pumps (GSHP) and Air Source Heat Pumps (ASHP). Given the current CO<sub>2</sub> intensity of National Grid electricity, most GSHP and ASHP currently provide a negligible overall benefit, particularly at lower co-efficient of performance (CoP). However, as the National Grid decarbonises the benefits of heat pumps will improve significantly and the technology should be considered in the future.

GSHPs are a method of either extracting heat stored in the ground to provide domestic hot water and heating or to reject excess heat for cooling. GSHPs take in heat at a certain temperature and raise it to a higher temperature using the same process used in refrigeration. The ground gains heat by solar radiation warming near surface rocks and groundwater and from the Earth's natural geothermal gradient. A strategic assessment of resource capacity identified the City Region to have a total of capacity of 503 MW for GSHP. The City Region currently has a total of 15 MCS accredited GSHP installers.

ASHPs take in heat at a given temperature and raise it to a higher temperature using the same process used in refrigeration, except to heat rather than cool a space. The benefit of ASHP compared to GSHP is the smaller size (and therefore reduced land requirement) and cost as there is no need for civil works to install the infrastructure. A strategic assessment of resource capacity identified the City Region to have a total of capacity of 2,013 MW for ASHP. The City Region has a total of 14 MCS accredited ASHP installers registered.

#### CITY REGION HEAT PUMP ACTIVITY

Up to 2,516 MW of potential capacity across the City Region.

16 MCS accredited GSHP & ASHP installers in the City Region.

## 6.4 RECOMMENDATIONS FOR ACTION

Action	Need	Description	Progress to Date	Key steps
<p><b>Action 1: Develop the City Region's energy sector supply chain</b></p>	<p>There is a growing and varied supply chain in the City Region comprising of 1st, 2nd and 3rd tier suppliers covering manufacture, installation, operation and maintenance of a wide range of technologies.</p> <p>The City Region will need to support and grow its microgeneration supply chain to capture the potential of the local resource capacity, economic and job creation.</p>	<p>This will require engagement with the universities, the Microgeneration Certification Scheme (MCS), the Green Energy Centre, Liverpool Community College, Daresbury Science Park to develop project opportunities for the 8th Framework Programme – Horizon 2020 funding.</p> <p>Analysis of resource capacities in the City Region has identified potential shortfalls in local supply chains and some technology options. For example heat pumps present the largest market opportunity in terms of potential capacity, however this is not reflected in the number of MCS accredited installers located in the City Region.</p>	<p>An identified potential of almost 3 GW of microgeneration capacity in the City Region.</p> <p>An established supply chain to service commercial and micro-generation projects including 99 MCS accredited installers to date.</p> <p>Established capital assets to support sustainable supply chain growth including Daresbury Science &amp; Innovation Campus, The Green Energy Training Centre, Wirral International Business Park, Heath Business Park, Liverpool Community College, The Department of Electrical Engineering and Electronics at Liverpool University, Stephenson Institute for Renewable Energy at Liverpool University, Wavertree Technology Park and Research Centre for Electrical Energy Efficiency at Liverpool John Moores University.</p>	<p>City Region works to develop its microgeneration supply chain.</p> <p>Develop a City Region wide procurement framework for installers and appropriate mechanisms to ensure that successful companies from outside the City Region use local supply chains and labour as part of their service.</p> <p>Work with existing MCS accredited installers in the City Region to develop the necessary capacity to meet future procurement requirements to increase the scope for local businesses to deliver local projects.</p> <p>Work with partners to develop long term opportunities for 1st, 2nd and 3rd tier suppliers to service large / commercial and microgeneration sectors.</p>
<p><b>Action 2: Support the development of combined heat and power and heat networks</b></p>	<p>There is a need to utilise the benefits of CHP / heat networks to provide integrated, efficient and scalable energy solutions across the City Region.</p>	<p>There is a comprehensive evidence base in place that demonstrates the suitability and deliverability of CHP / heat networks as a key technology for reducing CO<sub>2</sub> in new and established areas.</p> <p>This will require development, implementation and enforcement of policy that requires all energy generation plant in the City Region to be CHP enabled.</p>	<p>Energy from Waste facilities are the most advanced technology option with up to 273 MW generation capacity being brought forward by the market.</p> <p>8 sizeable project opportunities for heat networks have been identified and prioritised across the City Region with a combined heat and power capacity of 54 MW.</p> <p>Two schemes (Liverpool University campus and Knowsley Industrial Park) have already entered more detailed technical and commercial analysis.</p> <p>Alexandra Dock Biomass presents an opportunity for power generation up to 150 MW.</p>	<p>City Region to prioritise and support the delivery of viable CHP and district heating projects.</p> <p>Prepare policy and guidance for achieving 'CHP enabled' energy generation plants across the region.</p> <p>Identify and market test local heat consumers / customers.</p> <p>Through the delivery of Energy Masterplanning in Action Plan1, the City Region identifies further Priority Zones for energy centre/ plant and district heat networks.</p> <p>City Region works with partners to develop delivery mechanism options for each scheme.</p>

## 6 Action Plan 3: Energy Supply Actions

Action	Need	Description	Progress to Date	Key steps
Action 3: Support the identification of new opportunities for wind generation	The City Region has the potential to provide 634 MW of capacity offering significant energy generation and employment growth opportunities.	<p>Through the delivery of Energy Masterplanning in Action Plan 1, the City Region identifies further Priority Zones for commercial and community scale wind turbines.</p> <p>The action should also look at developing a model where there is a known appetite for wind projects and where the local community can share the financial benefits of any turbines.</p> <p>Wind generation also offers growth potential for manufacture, construction and installation to complement the City Region's growing Offshore Wind supply chain and existing 6 MCS installers of small scale turbines</p>	<p>Strategic wind resource mapping has been completed across the City Region.</p> <p>Sefton is the only district with an installed and operational capacity of 10 MW of commercial scale wind generation and is also identified to have a further 19 MW of commercial scale potential identified to contain a Wind Priority Zone.</p>	<p>Work to identify new opportunities for wind generation, provide independent analysis on the potential for community benefits and advice on the most suitable delivery mechanisms.</p> <p>In each of Priority Areas:</p> <p>Make early engagement with the District Network Operator and Ministry of Defence with a view to commissioning relevant constraint studies.</p> <p>Work with partners and communities to secure planning permissions and install anemometers for detailed wind resource monitoring.</p> <p>Commission relevant logistics / traffic management and health and safety studies needed for the deployment of large scale wind turbines.</p>
Action 4: Support the development of the Mersey Tidal Project	A Mersey Tidal project has the potential to be the City Region's most significant intervention measure to reducing CO <sub>2</sub> .	<p>A Mersey Tidal project has the potential to be the City Region's single largest generator of renewable energy and energy sector employer in the City Region.</p> <p>The City Region continues to support the progression of the Mersey Tidal project as partners bring proposals forward.</p>	<p>Several options have been investigated as part of detailed feasibility work, with a preferred scheme identified and estimated to have an annual energy yield of 920 – 1,000 GWh per year.</p> <p>The preferred scheme is estimated to result in 8,030 kt CO<sub>2</sub> savings over 20 years, equating to 401.4 kt CO<sub>2</sub> a year.</p>	<p>Recognising the complexity of the project in a sensitive environmental location, the City Region will engage with partners to ensure there is timely consideration and resolution of constraints so that the delivery of a viable project can proceed on a sustainable basis.</p>

## 6 Action Plan 3: Energy Supply Actions

Action	Need	Description	Progress to Date	Key steps
<p>Action 5: Support the delivery of building integrated solar photovoltaics and solar hot water</p>	<p>The Government's review of FiTs and resulting reduced tariff rates have emphasised the need to:</p> <ul style="list-style-type: none"> <li>• Develop new delivery models for the deployment of the solar.</li> <li>• De-risk the City Region by identifying areas of greatest solar suitability.</li> </ul>	<p>Through the delivery of Action 5 Energy Masterplanning in Action Plan 1, the City Region identifies Priority Zones at street and neighbourhood level for the deployment of solar options.</p> <p>This will involve the need to increase understanding of network capacity and connections of large volumes of small scale embedded generation.</p>	<p>The REECH programme provides a market of up to 2,000 homes where solar technology can be installed.</p> <p>There are over 60 MCS accredited solar installation companies in the City Region.</p> <p>Solar is identified as preferred technology option for Community Groups in the City Region.</p> <p>Halton Council has already procured solar installers for delivering Solar PV systems on public buildings. Wirral are embarking on a similar tender process.</p>	<p>Support work to identify solar opportunities across the City Region across domestic and industrial and commercial sectors.</p> <p>Provide independent analysis on the role, benefits and performance of FiT &amp; RHI subsidies.</p> <p>Include advice on the most suitable delivery mechanisms for deployment.</p> <p>Solar suitability mapping of roof and open space for the installation of Solar PV and solar hot water.</p>
<p>Action 6: Support the delivery of building integrated ground source heat pumps (GSHP) and air source heat pumps (ASHP)</p>	<p>Working in partnership there is a need to de-risk the sector by assessing the realistic potential for deploying heat pumps to generate decentralised renewable energy.</p>	<p>There is an identified potential capacity of over 2.5 GW for heat pumps in the City Region. In order to optimise the effective of heat pumps they will need to be implemented as the grid network becomes decarbonised or where there are opportunities to combine heat pumps with on-site renewable and carbon generation.</p>	<p>There are 16 MCS accredited installers of heat pumps in the City Region.</p>	<p>Through the delivery of Energy Masterplanning in Action Plan 1, the City Region identifies Priority Zones at street and neighbourhood level for the deployment of heat pumps.</p> <p>Each Priority Zone will also be informed by data for retrofit programmes and new development proposals.</p> <p>Work is undertaken to ensure there is sufficient local supply chain capacity to capture the wider economic benefits of over 2.5 GW of potential capacity.</p>



# 7 Action Plan 4: Transport Actions

## 7.1 INTRODUCTION

This action plan contains the direct actions for securing a sustainable energy system for the transport sector. These actions are supported by the enabling actions contained in Action Plan 1, with the relevant actions needed to measure, monitor and review contained in Action Plan 5. It is important to note that enabling actions do not result in CO<sub>2</sub> reductions; it is direct actions that reduce CO<sub>2</sub>.

A key part of this action plan is the Merseyside third Local Transport Plan (LTP3) and the Merseyside Atmospheric Emission Inventory (MAEI). The LTP3 was launched in April 2011, and together with the MAEI provides a robust policy and monitoring framework for measuring the impact of sustainable transport intervention measures in the City Region. However, from April 2012 the MAEI will be maintained as a Sefton-only resource due to the withdrawal of funding from the LTP budget.

### ACTION PLAN 4 CONTENT

This action plan covers a range of policy, regulatory, thematic and financial issues at national and local levels. It is not intended to provide a comprehensive overview of all energy matters and will be adapted over time by partners.

#### National:

- Vehicle and driver efficiency, low emissions vehicles, aviation, shipping and freight, renewable and alternative fuels.

#### Local:

- Forecasting CO<sub>2</sub>, behavioural change, vehicle and driver efficiency, low emissions vehicles, aviation, shipping and freight, renewable and alternative fuels.

#### Recommended Actions:

- Action 1: Deliver a programme of behavioural change.
- Action 2: Develop a programme of alternative fuel infrastructure.

The content of this action plan is therefore shaped by both the LTP3 and MAEI to ensure consistency with established City Region policy. Actions contained in this action plan have been developed to enhance the key actions in the LTP3 rather than replicate them.

## 7.2 NATIONAL ACTIONS

### 7.2.1 Vehicle and Driver Efficiency

To have any chance of reducing CO<sub>2</sub> from transport to meet 2050 targets, a low carbon substitute for longer journeys and significant changes to travelling behaviour is required. That means driving less, and when driving is the only practical option, driving slower.

There are three main factors that affect fuel efficiency: traffic, weather conditions and the performance of the vehicle being driven. In addition to the operational efficiency of vehicles, improved driving standards can result in reduced fuel consumption. At a national level, there is ongoing work with bus, freight and logistics industries to lower emissions and costs.

The Driver CPC Safe and Fuel Efficient Driving (SAFED) scheme has been established for Larger Goods Vehicle (LGV) and Passenger Carrying Vehicle (PCV) drivers who drive professionally throughout the UK. It is a requirement of the EU Directive 2003/59, which is designed to improve the knowledge and skills of professional LGV and PCV drivers throughout their working life. There are two parts to the legislation including the Initial Qualification (which must be achieved by new LGV and PCV drivers along with their vocational licence to enable them to use their licence professionally) and Periodic Training. This involves 35 hours of training every 5 years which must be attended by all professional drivers.

Reducing the distance travelled is a significant measure that combines cost savings and environmental impact to present a compelling case to businesses and commuters. Sustrans' Research and Monitoring Unit has developed a model to estimate the value of the carbon savings generated by TravelSmart. The model assumes a roll-out of TravelSmart to all households in urban areas of England over a ten-year period. Based on outcomes of recent programmes, the annual carbon savings generated by this programme would reach at least 0.6Mt CO<sub>2</sub> by year 10<sup>46</sup>.

### 7.2.2 Low Emission Vehicles

In order to meet 2050 targets, the Government has launched a number of support measures to develop and promote next-generation of ultra-low emission vehicle technologies. This includes electric, plug-in hybrid, and hydrogen fuelled vehicles which will reduce emissions in a way that recognises that UK's preferred mode of transport is private car use. In 2011, the DfT published the national strategy 'Making the Connection: the Plug-In Vehicle Infrastructure Strategy'. The strategy launches the Plugged-in Places programme and made £30m available to match-fund eight pilot projects (East of England, Greater Manchester, London, Midlands, Milton Keynes, North East, Northern Ireland and Scotland) with installing and trialling recharging infrastructure in the UK to support the Carbon Plan commitment to install up to 8,500 chargepoints. This will be delivered through the Office for Low Emission Vehicles (OLEV) is a cross-Whitehall team comprising people and funding from the Departments for Transport, Business, Innovation and Skills and Energy and Climate Change.

The strategy aims to ensure that recharging infrastructure is targeted, with the majority taking place at home, after the peak in electricity demand. The strategy also makes provision for workplace recharging for commuters and fleets, with a targeted amount of public infrastructure where it will be most used. Key measures introduced by the strategy include:

- Development of Permitted Development Rights to allow installation of vehicle chargepoints in car-parking areas.
- Enabling businesses subject to CRC to discount electricity used to charge plug-in vehicles from their total electricity consumption.
- Include policy on plug-in vehicle infrastructure in the National Planning Policy Framework.
- Include information on plug-in vehicles and workplace recharging as part of the Green Deal.

### 7.2.3 Aviation, Shipping & Freight

UK emissions from international transport have grown by 75% between 1990 and 2009. As a proportion of total GHG emissions, international transport emissions have risen from 3% in 1990 to 7% in 2009<sup>47</sup>. Over the last 50 years, most of the UK's freight has been transported by road, with road freight contributing to 92% of domestic freight related emissions<sup>48</sup>. Nationally there is a recognised need to shift from road based freight transport to rail and water. Whilst rail and water has the capacity to make the necessary carbon reductions needed to meet 2050 targets, significant investment in infrastructure will be needed across the UK to achieve this. This is due to significant barriers in terms of infrastructure capacity and track length and competing demands for this track from the rail passenger sector.

There is no internationally agreed way of allocating emissions from aviation or shipping to individual nation states. In October 2011, the Government concluded its consultation on the "Sustainable framework for UK aviation" which identified the need to consider its energy needs on two fronts: the need to reduce exposure to fluctuations in fuel prices and to reduce CO<sub>2</sub> emissions as they would make up an increasingly large proportion of the UK's total emissions as other sectors reduce their carbon emissions. The aviation industry was then added to the EU ETS (Emissions Trading Scheme) in January 2012. The scheme applies to all airlines that fly in and out of the EU. Emissions will be capped at 95% of historical emissions and revenues raised will be retained by Member States. It is expected that the majority of the cuts will be met by airlines purchasing international credits created through the Kyoto protocols rather than through the purchase of EU ETS credits or reducing their own emissions<sup>49</sup>. However this has been met with mixed reactions and challenges lie ahead. In May 2012 a Parliamentary Report on EU ETS and aviation identified that there are significant challenges noting that 'International aviation organisations and non EU countries have expressed strong opposition to the scheme, with countries such as India and China instructing their airlines not to take part in the scheme. This could, in the long term, lead to non compliant airlines being banned from flying to EU countries.

The freight industry is beginning to take positive steps to understand its carbon emissions with the Logistics Carbon Reduction Scheme (Liverpool City Region) developed by the Freight Transport Association as a first step in achieving this. Liverpool City Region is an industry led initiative to reduce road freight emissions through recording and reporting. The scheme works by measuring the fuel consumption of businesses signed up to the initiative. Data recorded includes fleet numbers, fuel consumption and business activity.

Progress is also beginning to be made in the shipping sector, where an EU working group<sup>50</sup> has been established to develop and assess options for the inclusion of international maritime transport in the EU's GHG reduction commitment. Action is needed urgently, as emissions from ships are a large and growing source of GHGs. For example, shipping greenhouse emissions are expected to more than double by 2050.

### 7.2.4 Renewable and Alternative Fuels

Under the Energy Act 2004, the Renewable Transport Fuel Obligations Order 2007 introduced a scheme in April 2008 to increase the percentage of renewable fuel used in road transport in the UK. The order obligates refiners, importers and any other suppliers of fossil based road transport fuels to ensure that a specified percentage of the road fuels they supply are made from renewable sources. Suppliers of biofuel will earn certificates to be used as evidence of meeting the obligation. The Renewable Transport Fuel Obligation (RTFO) covers suppliers who supply at least 450,000 litres per year. The Renewable Fuels Agency (RFA) is responsible for monitoring compliance with the RTFO.

All EU member states were required to supply 5.75% biocontent by energy in their transport fuel by 2010. The UK was the first country to mandate the supply of biofuel and attempt to link this to GHG and sustainability performance, however the work undertaken in the UK on biofuel blend targets has led to a reduced target being set (from 5% of fuel by volume in 2010/11 to 5% by volume by 2013/14). This falls below the EU target, and is compounded by the fact that the UK targets are volume rather than energy based.

The EU has now introduced the Renewable Energy Directive (RED) which requires 10% of energy used in transport in each member state to be from renewable sources by 2020.

This can include renewable electricity, but the majority of supply needs to be from biofuels. The RED requires sustainability criteria to be met and a qualifying level of GHG saving, initially a 35% reduction rising to 50% from 2017 or 60% for new production plant from 2018. Assuming that there isn't a significant reduction in the total energy required for transport by 2020, the UK example shows how stretching a 10% target is. In addition there is likely to be a significant requirement for certain sectors, such as fleets, to use high blends if the targets are to be met<sup>51</sup>.

## 7.3 LOCAL ACTIONS

### 7.3.1 Introduction

The 2005 SEAP baseline identified that the transport sector consumed 23% (8,511 GWh) of the total energy in the City Region and emitted 24% (2,641 kt) of CO<sub>2</sub>e.

The third Local Transport Plan for Merseyside (LTP3) is the key document for reducing CO<sub>2</sub> emissions across the City Region. Implementation of LTP3 is now beginning through a range of partnerships. This action plan provides a starting point for implementing direct actions in accordance with LTP3. LTP3 aims to work closely with the emerging strategies for Green Infrastructure and provides key actions to deliver cleaner more efficient energy use, CO<sub>2</sub> reductions, economic growth and improved health.

The LTP3 has been informed by the Liverpool City Region Transport Model (Liverpool City RegionTM)<sup>52</sup>. This model was then linked to the Merseyside Atmospheric Emissions Inventory (MAEI) which measures the GHG emissions of the Liverpool City RegionTM and the impacts of measures such as improved vehicle efficiency, the introduction of electric vehicles and the electrification of the rail line between Liverpool and Manchester.

Three scenarios were modelled that forecast the impact of the LTP in reducing CO<sub>2</sub>. The model shows that CO<sub>2</sub> initially increases regardless of LTP measures being introduced; this is due to forecasts indicating significant increases in traffic due to the City Region's domestic and economic growth. By 2024 this increase is then addressed through advances in cleaner vehicle technology. This results in CO<sub>2</sub> falling back to 2008 (identified as 1,500 kt CO<sub>2</sub>) rates in 2024, however the LTP states that the modelling - particularly in relation to CO<sub>2</sub> - is considered to be conservative and that greater reductions in CO<sub>2</sub> are expected by 2024.

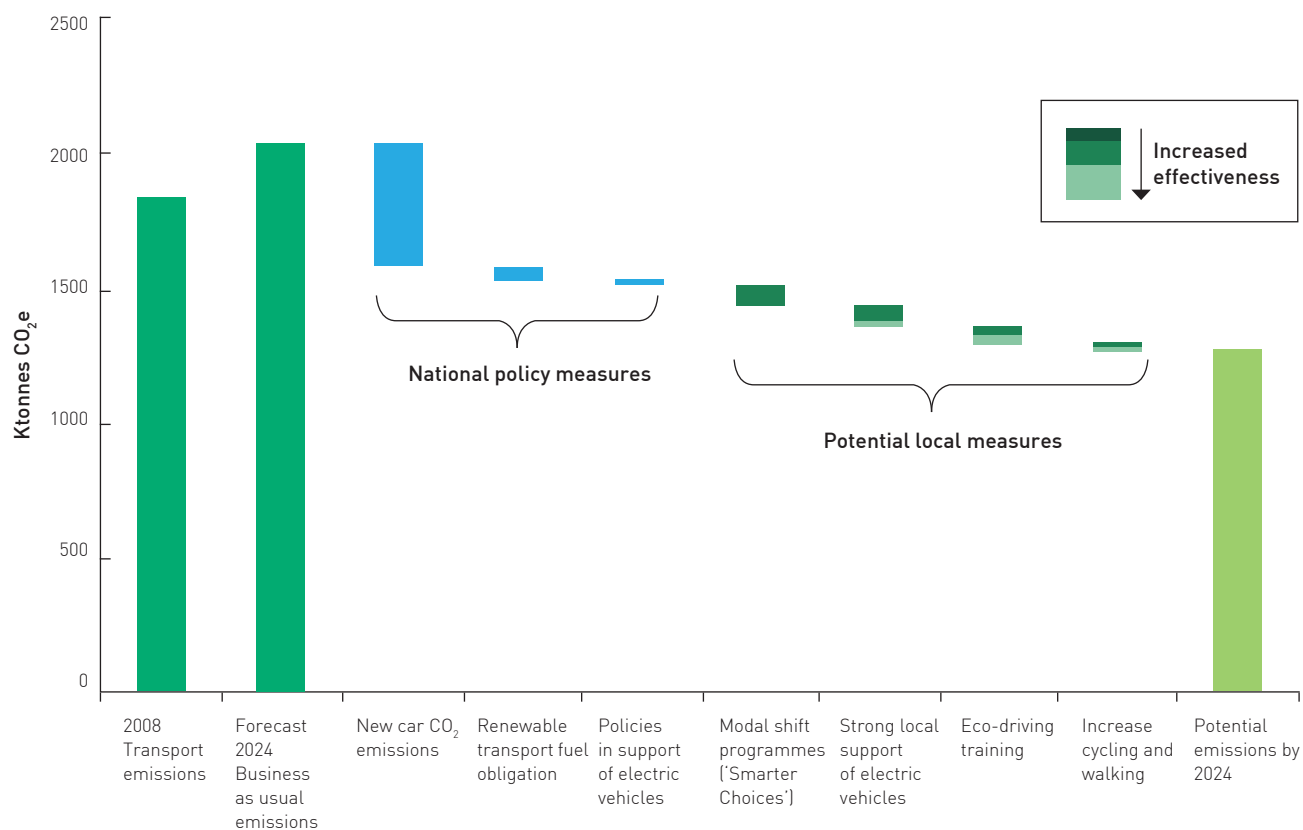


Figure 15: Carbon projections from the Liverpool City Region Transport Model

### 7.3.3 Behavioural Change

The LTP3 aims to increase sustainable travel by changing the way transport is integrated with housing, planning, health and environmental policies to ensure sustainable modes are the option of choice and available to all that are living and working in the City Region. This is achieved through the promotion of Smarter Choices via TravelWise and an Active Travel Strategy for the City Region. Active Travel Strategies are designed to improve and expand facilities, encourage cycling and walking to reduce CO<sub>2</sub> and increase accessibility to employment and services.

Further measures include working in partnership with service providers such as Energy Saving Trust Advice Centres to ensure effective targeting of programmes around fuel efficient vehicle choice, alternative fuels and driving techniques, and delivering major infrastructure to improve the efficiency of established and future development. LTP3 also prioritises the use of SCOOT (Split Cycle Offset Optimisation Techniques) systems across all districts and explores opportunities for shared learning to reduce congestion and traffic emissions.

The LTP3 also aims to implement measures through Merseytravel supported services and Statutory Quality Bus Partnerships to reduce emissions produced by public transport without increasing the cost of service provision. LTP3 actions include setting vehicle number reductions, use of alternative fuels, driver training and management equipment and vehicle engine specifications.

### 7.3.4 Vehicle and Driver efficiency

The LTP3 aims to reduce levels of stationary and slow-moving traffic - which lead to inefficient fuel consumption and greater levels of carbon emissions by continuing to manage congestion. LTP3 identifies the prioritisation of maintenance programmes as a key action for meeting the wide objectives of the Liverpool City Region. The LTP3 currently identifies this as ensuring that the network allows for the efficient movement of people and goods, provides a safe environment for vulnerable members of the community and encourages cycling and walking. It must also become more resilient to extreme weather. Network management and maintenance action has been identified to ensure that:

- All new transport projects take account of future climatic conditions and are planned accordingly.
- Highway/Transport Asset Management Plans (H/TAMP) including proper consideration of climate change and that transport contributes to the delivery of a Green Infrastructure Strategy.
- Energy generation and efficiency become key drivers of new infrastructure and maintenance schemes. For example identifying opportunities for on-site generation and energy efficiency savings for transport infrastructure such as the two Mersey Tunnels, road maintenance, lighting, signalling, vehicle fleets, and operational management considerations including transport management.

In addition to LGV and PCV licensed drivers, there are potential CO<sub>2</sub> savings associated with increasing the driving efficiency of private road users. This is a more challenging area than professional drivers as there are no regulatory training requirements once a person has passed.

### 7.3.5 Low Emissions Vehicles

The LTP3 recognises that the provision of charging infrastructure will become a major issue for the City Region. To meet this challenge LTP3 identifies eLive as a key project that would be used to provide the infrastructure needed for electric vehicles to charge.

Other measures include the electrification of the rail infrastructure by working with Merseyrail Electrics to decarbonise the energy supply to make the rail network carbon neutral.

### 7.3.6 Aviation, Shipping & Freight

The City Region contains major infrastructure for aviation and shipping made up of ports and docks, the Liverpool John Lennon Airport (LJLA) and multimodal freight at infrastructure. Together this contributes to 34,000 jobs and £1.1 billion of GVA each year.

LJLA is a significant contributor to the economy. The airport is one of the fastest growing airports in the UK, serving 5.3 million passengers in 2009<sup>53</sup>, resulting in it becoming the 10th busiest airport in the country. The airport has plans to grow, with a masterplan prepared that sets out expansion plans for 2030. This includes a World Cargo Centre and runway extensions that will increase cargo handled to 100,000 tonnes per year<sup>54</sup>. The City Region is one of the few areas in the UK that holds information on CO<sub>2</sub> from aviation. This is produced by the Merseyside Atmospheric Emissions Inventory (MAEI). In 2010 the MAEI identified LJLA emitted 48,383kt CO<sub>2</sub>e.

The City Region's port infrastructure is also a significant contributor to the economy, with the Port of Liverpool at its hub. In 2010 the MAEI identified shipping emitted 126,615 kt CO<sub>2</sub>e and with growth plans in place this is likely to increase significantly without policy intervention measures.

The Liverpool SuperPort represents a major growth opportunity and aims to make the City Region one of the UK's primary international gateways by 2030. SuperPort is projected to result in an additional 73million tonnes of traffic handled by the City Region, an additional 1.24 million tonnes of rail freight traffic through the Port of Liverpool and a further 9 million tonnes of rail freight rail and waterbourne distribution parks. Whilst this growth would indicate an increase in carbon emissions, it will result in a nationally significant shift of traffic from roads to rail and water modes of transport, resulting in CO<sub>2</sub> reductions.

Another growth area that provides national benefits in CO<sub>2</sub> reductions is the Mersey Multimodal Gateway (3MG). 3MG is an inter-modal logistics park that offers access to the UK's deep-sea ports with six daily train services to the key south coast ports of Felixstowe, Purfleet and Southampton. 3MG has direct access to the West Coast Mainline, has immediate access to the UK's motorway network, Port of Liverpool and Manchester Ship Canal and is close to LJLA and Manchester airport. The park covers two hundred hectares and handles in excess of 150,000 containers each year of which some 60,000 are moved by rail.



### CASE STUDY: LIVERPOOL JOHN LENNON AIRPORT LAST CALL

The airport was the first in the UK to offer a carbon compensation facility to passengers. In partnership with Mersey Forest's Last Call, the facility allows passengers to offset their carbon impact either at the point of departure or as part of an online booking facility (based on the average emissions from a European flight). The airport then matches all donations given on an annual basis. Mersey Forest then uses the money raised in a variety of ways to support environmental messaging.

### 7.3.7 Renewable and Alternative Fuels

LTP3 identifies Low Emissions Strategies (LES) as key to reducing CO<sub>2</sub> emissions and improving air quality and in doing so, improving the health of the City Region and economic growth through market creation for new technologies. Actions include the introduction of electric vehicles and charging point infrastructure and preparing a complementary strategy that seeks to reduce reliance on oil.

### CASE STUDY: BIONIC (SUSTAINABLE BIOFUELS IN THE COMMUNITY)

In 2007 Merseytravel began a 3-year project funded by the EU Intelligent Energy Europe Programme investigating the use of sustainable biofuels in transport. The BIONIC (Sustainable Biofuels in the Community) project examined barriers to the use of sustainable biofuels and potential solutions for those wishing to use them. During the project a network of suppliers and users was formed to encourage sharing of best practice, information exchange and networking with the aim of increasing the use of sustainable biofuels across North West England.

During the project Merseytravel produced a set of Best Practice Guidelines for local authorities and are now developing a strategy to promote the wider use of sustainable biofuels. Learning from BIONIC will be taken forward through the LTP, particularly in preparation of an Alternative Fuels Infrastructure Strategy and work with the freight sector.



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## 7.4 RECOMMENDATIONS FOR ACTION

Action	Need	Description	Progress to Date	Key steps
Action 1: Deliver a programme of behavioural change	There is an opportunity to integrate measures as part of a wider behavioural change strategy that would cover transport, domestic, industrial and commercial sectors.	<p>The City Region develops a programme of behavioural measures that are rolled out in parallel with transport energy efficiency and alternative fuel actions.</p> <p>The mitigation measures will be designed to limit instances of direct, indirect and economic wide rebound effects from energy efficiency improvements made to transport infrastructure and driver behaviours.</p>	<p>The LTP3 already provides access to a wide range of initiatives and resources through Smarter Choices via TravelWise and Active Travel Strategies.</p> <p>Partnerships with service providers such as Energy Saving Trust Advice Centres and use of tools such as SCOOT to reduce congestion and traffic emissions.</p> <p>The LTP3 also supports Statutory Quality Bus Partnerships to reduce emissions produced by public transport.</p>	<p>The City Region need to encourage and facilitate joint working on behavioural change.</p> <p>Work with partners to review existing behavioural change initiatives mechanisms such as CRed to develop a programme of behavioural measures across the domestic, industrial and commercial and transport sectors.</p>
Action 2: Develop a programme of alternative fuel infrastructure	LTP3 identifies the development of an Alternative Fuels Strategy as a key policy mechanism for planning and implementing new infrastructure for biofuel and electric vehicles.	<p>The City Region identifies pilot projects for alternative fuel infrastructure. The programme of projects would be informed by enabling actions in Action Plan 1 such as the alternative fuels infrastructure strategy, energy masterplanning and the development of an energy security and independence strategy.</p> <p>The City Region develops biofuel pilot projects for public and private transport and energy generation for CHP/ heat networks.</p> <p>The City Region also supports the rollout of Biofuel guidance from the BIONIC project across the domestic and industrial and commercial sectors to increase use of biofuel in energy generation for electricity and heat.</p>	<p>Merseytravel have produced a set of Best Practice Guidelines for local authorities and are now developing a strategy to promote the wider use of sustainable biofuels.</p> <p>Learning from BIONIC will be taken forward through the LTP, particularly in preparation of an alternative fuels infrastructure strategy and work with the freight sector.</p>	Develop a brief for the preparation of a City Region alternative fuels strategy and in doing so consider the benefits of widening its scope to include fuels for non-transport energy consumption.



# 8 Action Plan 5: SEAP Progression Actions

## 8.1 INTRODUCTION

This action plan contains actions that focus on the continual improvement of the City Region SEAP programme. As with enabling actions, progressive actions have been developed to support the implementation of direct actions. Progressive actions also focus on improving how the City Region will measure, monitor and evaluate both enabling and direct actions.

The Liverpool City Region SEAP provides a baseline and framework for taking this forward, however more action will be needed in order to increase certainty and support decision making on big issues.

The actions contained in this action plan will enable the City Region to address gaps identified through the process of developing the Liverpool City Region SEAP.

A driver for this action plan is the Covenant of Mayors (CoM) initiative and the requirements it will place on local authorities and partners to report on SEAP progression via Baseline Emissions Inventories. Another driver is the increasing requirement for robust, credible and comprehensive information needed to attract and secure investment to finance projects.

## 8.2 KEY ISSUES TO CONSIDER

A current barrier to action within Liverpool City Region is the lack of consistency of data and evidence to set accurate and realistic targets and intervention measures across other sectors. Key assets such as the Merseyside Atmospheric Emissions Inventory and Liverpool City Region Transport Model provide comprehensive and robust tools for future evidence preparation and monitoring.

However, there are variances between the baselines used, inconsistencies in the coverage of monitoring of some sectors, and in some cases significant gaps in the information needed to target actions.

The focus of this action plan is to identify key actions to take forward the necessary evidence preparation and development of actions that will be required. There are a number of issues that need to be considered when developing these key actions.

### ACTION PLAN 4 CONTENT

A driver for this action plan is the Covenant of Mayors (CoM) initiative and the requirements it will place on local authorities and partners to report on SEAP progression via Baseline Emissions Inventories.

Another driver is the increasing requirements for robust, credible and comprehensive information needed to attract and secure investment to finance projects.

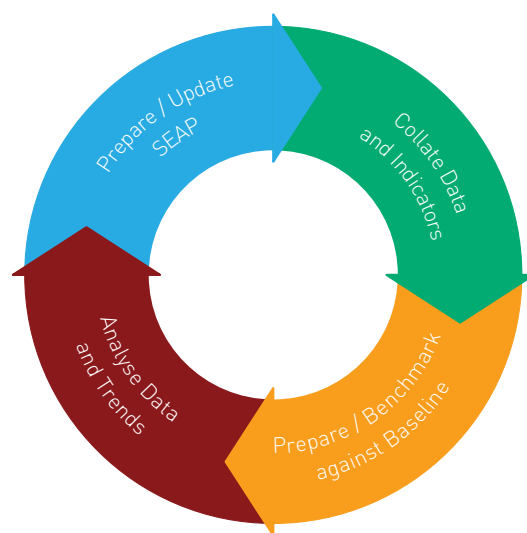
It is not intended to provide a comprehensive overview of all matters, and will be adapted over time by partners.

#### Issues covered include:

- Baseline years, targets, indicators, embodied energy and measuring actions.

#### Recommended Actions:

- Action 1: Develop options and agree detailed modelling and forecasting of energy consumption and CO<sub>2</sub>.
- Action 2: Measuring actions.
- Action 3: Lobbying, research and data collation to improve the quality and accuracy of energy evidence.
- Action 4: Reviewing and refining targets.



### 8.2.1 The baseline year that CO<sub>2</sub> targets and actions are measured against can vary

When setting targets at a national level the UK typically uses a 1990 relative baseline. However, at a more local level a 1990 baseline is often unsuitable. This is due to local authorities not holding sufficiently detailed data at local levels on energy consumption and GHG emissions from 1990. The majority do not have any data until 2005. Consequently, there is a need to adjust targets set at a national level (i.e. 1990) to a 2005 baseline year. The Liverpool City Region SEAP provides a 2005 baseline from which future targets and actions can be measured against.

### 8.2.2 The need to set targets in terms of cumulative impact rather than target years

Due to the impacts of population growth and associated human activity, focusing emission reductions for a specific year of action would not result in the reductions needed to address climate change. For example, if a target is set for 2020, no actions were taken until 2019 and during that period emission rates remained the same up to 2019, then merely delivering the actions in the final year to reach the target would be no good. Put simply, the damage in respect to climate change will have already been done. There is a need to take real action now in order to achieve 'real time' mitigation of climate change.

### 8.2.3 Indicators used to measure energy and CO<sub>2</sub> can change

At a national level there have been significant changes to national indicators and the reporting requirements for local authorities. The Government has reduced the requirements for local authorities to produce information for national indicator reporting.

Many indicators have now been abandoned entirely, some have been decentralised to a local level only and others are now being owned and maintained by DECC. For example, the Department for Communities and Local Government (CLG) announced in October 2010 that it was decentralising Local Area Agreements (LAAs) and replacing the National Indicator Set with a single comprehensive data list from April 2011 onwards. This is set out in a Single Data List that provides a catalogue of all the datasets that local Government should submit to central Government in a given year<sup>55</sup>. This has resulted in DECC now taking ownership of a number of indicators that were previously the responsibility of local authorities and which build on the indicators identified in the Single Data List.

In addition to the changes to data collecting and returns to central Government, there have been changes to how local governance can ensure climate change policies and programmes are developed to protect and help the most vulnerable, particularly the fuel poor. In March 2011 a Memorandum of Understanding (MoU) was agreed between the Local Government Group (LGG) and the Department for Energy and Climate Change (DECC). The MoU's objectives include meeting the 80% GHG emissions reduction target in the Climate Change Act 2008 by 2050 against a 1990 baseline, meeting fuel poverty targets arising from the Warm Homes and Energy Conservation Act 2000 and to meet the target to supply 15% of the UK's energy consumption from renewable energy by 2020, as set out in the 2009 Renewable Energy Directive.

The MoU sets out how DECC and the LGG will work together to help and encourage all councils to take firm action by reducing the carbon emissions from their own estate and operations; reducing the carbon emissions from homes, businesses and transport infrastructure, creating more appropriate renewable energy generation, using council influence and powers, and participating in national carbon reduction initiatives at the local level, particularly the roll out of the Green Deal, smart metering and renewable energy deployment.

### 8.2.4 Dealing with embodied energy

Further issues exist when considering what is included and excluded from energy consumption and emissions totals. This is typical of issues relating to imports and exports of goods and the means by which goods are transported. This SEAP uses a baseline that looks at emissions produced where energy is used, rather than where a product is consumed. This is known as production and consumption accounting. For example, the emissions associated with an electrical appliance bought from a retailer in the City Region would be attributed to where that appliance was made. Consequently, if the appliance was not made in the City Region the embodied energy used and associated emissions to manufacture the appliance will not be counted in the City Region's total. In the UK, production emissions are less than consumption emissions, as the UK imports much more goods than it exports. This is true of most developed economies.

Many areas omit CO<sub>2</sub> from sources such as aviation and shipping. There is no internationally agreed way of allocating emissions from international transport to individual nation states for aviation or shipping. However aviation is now being added to the EU ETS and for shipping an EU working group<sup>56</sup> has been established to develop and assess options for the inclusion of international maritime transport in the EU's GHG reduction commitment.

There is a strong case for carbon footprinting for SEAPs to include embodied energy and carbon. There are six GHGs covered by the Kyoto Protocol. These are carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), sulphur hexafluoride, hydrofluorocarbons and perfluorocarbons. These GHGs can be measured in carbon equivalents (CO<sub>2</sub>e) and weighted (e.g. Methane is over 20 times stronger than CO<sub>2</sub>, nitrous oxide is 310 times stronger than CO<sub>2</sub> and chlorofluorocarbons several thousand times stronger than CO<sub>2</sub>). There are a number of options and scopes<sup>57</sup> for measuring emissions that can produce emissions totals for CO<sub>2</sub><sup>58</sup> only, all GHGs separately<sup>59</sup> whilst others provide CO<sub>2</sub> equivalents (CO<sub>2</sub>e)<sup>60</sup>.

This SEAP already provides totals for CO<sub>2</sub>e using a baseline year of 2005, and assumes that aviation and shipping emissions will be the same in 2050 as they are in 2005. Future versions of the SEAP should consider more comprehensive carbon footprinting of supply chains provided by Scope 3 assessments and to include the emissions from aviation (i.e. John Lennon Airport) and shipping (i.e. Port of Liverpool and the future SuperPort).

### 8.2.5 Measuring Actions

The Liverpool City Region SEAP will need to be subject to several measures in order to have a full understanding of the environmental and economic impacts of an action. Measures will include:

- Energy – measured in GW and GWh.
- CO<sub>2</sub> savings measured as CO<sub>2</sub> e.
- Projects – measured in terms of number of projects identified, number bidding for funding, number securing funding, number commencing and number completed.
- Employment – measured by number of jobs created in energy sectors.
- Economic growth – measured in terms of Gross Value Added.

At present, actions are measured using existing evidence from a range of sources. It should be noted that at this stage there are significant gaps in the information available for measuring actions. This relates to the contribution each action will make in terms of CO<sub>2</sub> reduction for 2020 and 2050 targets, job creation and economic growth. Consequently one of the key actions of this SEAP will involve commissioning the work needed to measure actions consistently. This work will need to be undertaken in parallel with work required to set a robust and credible City Region target for CO<sub>2</sub> reductions discussed in Part 1, Section 5 of the SEAP.

Where calculations have been made for actions, it should be noted that these are based on the best available information, however this information available to carry out analysis varies considerably between sectors and actions and therefore should be re-visited in future SEAP reports as new information becomes available.

## 8.3 RECOMMENDATIONS FOR ACTION

Action	Need	Description	Progress to Date	Key steps
<p>Action 1: Develop options and agree detailed modelling and forecasting of energy consumption and CO<sub>2</sub></p>	<p>The work undertaken to date has identified significant evidence gaps, and where evidence is available inconsistencies between the methods, baselines and data sources used for calculating carbon.</p>	<p>The City Region will need to develop an approach to modelling / forecasting carbon emissions. This will typically be based on use of econometric modelling of population growth forecasts and use of the Liverpool City Region Transport Model. Consideration should also be given to use of the Merseyside Atmospheric Emissions Inventory (MAEI) and DEFRA guidance on carbon emission reporting. Modelling will need to cover:</p> <ul style="list-style-type: none"> <li>• National and local targets for reducing GHG emissions.</li> <li>• Energy consumption and CO<sub>2</sub> by sector through the use and further development of econometric model(s) used by the City Region and local authorities.</li> <li>• Energy consumption and CO<sub>2</sub> from aviation and shipping.</li> </ul>	<p>The SEAP provides a consistent baseline that can be used, developed and adapted to meet a wide range of local, UK and European baseline requirements.</p> <p>A Low Carbon Indicators Report has been prepared that provides supporting information to assist the adaption of energy and carbon modelling across the domestic, transport, industrial and commercial sectors.</p>	<p>The City Region develops a robust and consistent carbon model that can be used to measure carbon across sectors collectively and individually.</p> <p>There is also a strong case to address embodied CO<sub>2</sub> and undertake total carbon footprinting for the City Region. The City Region should consider completing a full Scope 3 assessment of the domestic, industrial and commercial and transport sectors.</p>
<p>Action 2: Measuring actions</p>	<p>Actions will need to be measured on a number of economic and environmental criteria in order to inform decision making, prioritisation of actions and performance.</p>	<p>The City Region must develop and implement a methodology for measuring all direct actions for energy demand, supply and transport action plans.</p> <p>Each action will need to be measured in terms of energy, CO<sub>2</sub> savings, number of projects created, employment (Number of jobs) and economic growth (Gross Value Added).</p>	<p>There are a number of models available at local and national levels. This includes an evaluation model developed for the REECH Merseyside programme that measures jobs, GVA and CO<sub>2</sub>e. National tools include HM Green Book evaluation guidance and the DECC Carbon Evaluation Tool.</p>	<p>Develop and agree an evaluation and assessment methodology to ensure economic benefits for the City Region are maximised.</p>

## 8 Action Plan 5: SEAP Progression Actions

Action	Need	Description	Progress to Date	Key steps
<p>Action 3: Lobbying, research and data collation to improve the quality and accuracy of energy evidence</p>	<p>Improved data collation and sharing is a national issue and a priority for the City Region.</p>	<p>The City Region completes a comprehensive review of all existing domestic and industrial commercial data. In doing so, the City Region develops agreements with relevant custodians of data to ensure information is shared. This should be guided through existing examples of data sharing between Government organisations such as the Energy Rebate Scheme.</p>	<p>A Low Carbon Indicators Report has been prepared through CLASP funding that provides a review of existing sources.</p> <p>It is anticipated that in response to the Energy Act 2011 there will be improvements in the availability of information. For example, DECC are proposing to make details of the 5.5 million properties that currently have an Energy Performance Certificate (EPC) available together with information about the energy efficiency of the property and recommended improvements.</p>	<p>The City Region engages with stakeholders such as the Scottish Power, Electricity North West, National Grid, MAEI team, universities, Merseytravel, MRWA, Energy Savings Trust, Carbon Trust, Envirolink, Enworks and ecoSMARTER.</p> <p>The City Region works with partners and other sub regions and cities to propose a regulatory change to Government that will allow energy consumption data from individual domestic and commercial customers to be shared for the purposes of energy planning and improving energy efficiency.</p>
<p>Action 4: Reviewing and refining targets</p>	<p>Following completion of energy consumption and CO<sub>2</sub> modelling, City Region targets should be developed for 2020 and 2050 and each local authority.</p>	<p>Targets should be informed by:</p> <ul style="list-style-type: none"> <li>National targets set out in the Climate Change Act, Low Carbon Transition Plan and Renewable Energy Strategy.</li> <li>Local targets set out in climate change, carbon/ GHG plans and reports provided by local authorities and the private sector.</li> </ul> <p>Once overall targets have been developed at City Region and local authority levels, further disaggregation of targets will be needed. This will include analysis within the domestic, industrial &amp; commercial and transport sectors to set specific sector targets. This will then provide the basis for analysing the extent to which direct actions in Action Plans 2 and 4 will result in CO<sub>2</sub> savings.</p>	<p>The SEAP provides the starting point for target setting and provides an interim target for 2020.</p> <p>The SEAP provides an overview of national targets, current targets set by local authorities in the City Region and the average target rate of local authorities in England.</p>	<p>The setting of targets will need to follow an agreed methodology and approach to monitoring. This will include agreement on:</p> <ul style="list-style-type: none"> <li>The metric used for measuring CO<sub>2</sub></li> <li>Using a 2005 baseline.</li> <li>Setting targets to 2020 and 2050 with potential for 2030 and 2040 targets.</li> </ul>

# Acknowledgements

The preparation of this first Sustainable Energy Action Plan (SEAP) has required input, support and guidance from a number of key stakeholders. We would like to acknowledge this assistance and extend our thanks to:

Eon, Halton Council, Home Energy Conservation Association, Knowsley Council, Liverpool City Council, Merseyrail, Merseyside Fire, MEAS (Merseyside Environmental Advisory Service), Merseytravel, MRWA (Merseyside Recycling Waste Authority), Scottish Power, Sefton Council, St. Helens Council, Wirral Council.

This list is not exhaustive and there are a wide range of other key stakeholders that will be engaged with to inform the content and implement this and future SEAPs. This includes but is not limited to:

BIS (Department for Business, Innovation & Skills), Carbon Trust, CBI (Confederation of British Industries), CLASP (Climate Change Local Area Support Programme), CLG (Communities and Local Government), DECC (Department for Energy and Climate Change), Energy Agencies (24 agencies in UK registered on the European Commission), Energy Savings Trust, Envirolink, Enworks, HCA (Homes and Communities Agency), John Lennon Airport, Liverpool John Moores, Liverpool University, Local Enterprise Partnership (LEP), Local Enterprise Partnership for Liverpool City Region, NW Carbon Action Network, Private Sector / Liverpool City Region, Chambers of Commerce, UK Carbon Action Network.

We gratefully acknowledge the early stage support provided by the Climate Change Skills Fund (CCSF), administered by the Climate Change Local Support Programme (CLASP) for the North West Innovation and Efficiency Partnership (NWIEP).







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# APPENDICES

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# Appendix A - Identified Decentralised Energy Opportunities in the Liverpool City Region

The table lists the decentralised energy project opportunities that have been progressively identified and tracked from the Liverpool City Region Renewable Energy Capacity Studies (2009-10) through the Mechanisms of Energy Infrastructure Delivery for the Liverpool City Region report (2011) and now to the Sustainable Energy Action Plan (2012). These are the opportunities recommended as Priority Zones for District Heating schemes. As the SEAP develops this directory of project opportunities will be further developed to cover a range of different interventions to ensure that project tracking is comprehensive and up to date. The information presented has been updated to reflect the known position as of April 2012 but it is accepted that further updates will be required on the basis of progress with projects, funding opportunities and City Region priorities as the SEAP goes through a consultative process.

Sub Region Local Authority	Location Description	Space-types Potential customers / partners	Approx Viable Capacity	Potential Constraints	Comments
Liverpool	City centre area to West of Lime Street station and East of Prince's Dock	Commercial buildings. Retail (shopping centres). Hotels. Town Hall. Law Courts and prisons. Leisure facilities. Residential buildings (flats).	≈ 3 MWe	Likely costs of pipework installation in dense urban area. Mix of land ownership. Built heritage. Air quality.	Any CHP capacity will depend heavily on take-up within identified area. SHLAA plans feature new build-out areas in close proximity to priority zone. Need to identify potential energy centre sites.
Liverpool	Royal Liverpool Hospital & University of Liverpool	Hospital. University Campus.	≈ 3.5 MWe	Requirement to cross Lime St rail cutting to link to South of University Campus.	Royal Liverpool Hospital represents key anchor load.
Knowsley	Knowsley Business Park & South of Industrial Park	Existing Commercial buildings. Light Industry Emerging. New employment land build-out. Energos energy-from-waste plant.	9.0 MWe (proposed by Energos)	Potential requirement to cross East Lancashire road to access emerging Industrial Park load centres.	Significant benefit offered by the commitment of Energos to install generation plant. Heat availability not necessarily limited by emergence of related demands.
Sefton	Development areas around Southport & Formby District General Hospital	Existing Hospital Emerging New College Residential. Light Industry. Hotel.	≈ 1.5 MWe	Planned Kew Southport residential development is awaiting cleanup of contaminated land. Build-out dates for new King George V College not known.	Southport & Formby District General Hospital represents key anchor load. Good mix of space-types planned within close proximity to Hospital.
St Helens	Area around Sutton Leisure Centre and Lea Green distribution centre	Existing Leisure Centre Sports College Distribution Centre Emerging. New employment land build-out.	≈ 0.5 MWe	Viability will depend on build-out phasing on employment land.	Leisure Centre represents potential anchor load.

Sub Region Local Authority	Location Description	Space-types Potential customers / partners	Approx Viable Capacity	Potential Constraints	Comments
Halton	Green-field area in Daresbury to West of A56	Existing Business Park Science Park Emerging.  New employment land build-out New residential.	≈ 0.6 MWe	Planned build-out area is relatively large at approx 2KM in length.	Existing load centres are at either end of planned development area, with feasibility of connection dependent upon new- build elements and precise types New-build scheme providing opportunity to introduce DH from the start.
Wirral	Wirral Waters (Peel)	Planned Commercial/ Office space.  Retail & Leisure Residential Hotels.	≈ 3.5 MWe	Extent to which heat network could serve entirety of site could depend on timing & phasing of scheme.  Any anchor load(s) would ideally emerge early within scheme build-out.	Potential to size plant against sizeable and mixed heat loads New-build scheme providing opportunity to introduce DH from the start.
Halton	Runcorn Docks	Planned.  Large Residential area.  Likely requirement for complimentary non-residential spaces.	≈ 0.2 - 0.7 MWe (based solely on residential build-out of between 1,200 – 4,000 homes).	Pure residential would not provide suitable mix to maximise plant size.	Scheme at this scale is likely to require provision of associated additional Community, Commercial and Retail spaces New-build scheme providing opportunity to introduce DH from the start.
Sefton	Bootle Docks	Biomass energy plant with allied energy requirements and commercial case energy export needs. Capacity →100 MWe.	Application in progress with Major Infrastructure Unit.	Work in Progress.	Tie-in potential to Peel Liverpool Waters development (DES 12) Proximity to Renewable Energy Systems.  Proximity to Sefton Council Public buildings.
Liverpool	Liverpool Waters	High density, large scale mixed-use development to modern standards of energy efficiency.	Work in Progress.	Work in Progress. Depends on model adopted, could be on-site energy centre or link to existing heat network.	Tie-in potential to Sefton EMR (DES 11) energy centre supplies of energy forming links with wider Sefton community.
Liverpool	Eldonian Village	Dual fuel energy centre proposed with district heating network. ESCo arrangement under development.	28 MWe (based on information from Eldonian Group.	Engineering constraints.	Tie-in with Liverpool Waters and other local areas.
Knowsley	Jaguar Land Rover		Work in Progress.	Work in Progress.	

# Appendix B - Project Opportunity Long List

This second table identifies projects that were included in the Liverpool City Region Renewable Energy Capacity Study on a long list of potential projects but were not, after evaluation, recommended for District Heating Priority Zone Status because there was insufficient information available about the development or a lack of certainty about its delivery within a reasonable timeframe. Some of these projects have developed and the detail in the table reflects what is known of them as at April 2012. It remains a possibility that some of these projects will become priorities for SEAP intervention and there will be a need to update and review this list on an on-going basis including adding new project opportunities as they emerge.

Area	Development Projects	Details	Comments
Merseyside Wider Area	Peel Energy Estuary	Power from the Mersey scheme in the Mersey estuary that has the potential to supply up to 260,000 homes.	Not applicable as Priority Zone (PZ) as this scheme is off-shore and consequently not subject to planning controls. However, policy recommendations have considered facilitating relevant on-shore infrastructure. As of April 2012 project 'paused' following completion of feasibility studies.
Halton	Weston Point Energy from Waste	INEOS ChlorVinyls is a leading manufacturer of chlorine and PVC. This is a highly energy intensive site. The latest investment at the Runcorn Site will see the construction of £400 million Energy from Waste CHP plant.	INEOS website suggests that heat generated via EfW will be used to raise steam for use on site. As of April 2012 construction of this CHP is well under way. All energy produced is expected to be utilised on the Ineos site.
	Runcorn Docks	Runcorn Docks will be subject to comprehensive redevelopment for a residential led, mixed use development with the capacity to deliver up to 4,000 households, delivered by Peel Ports.	Identified as a DH Priority Zone. Note that given the identified potential, it is recommended that opportunities are discussed with developers in advance of any planning application
	Daresbury	Largest single development area in Halton with potential to deliver significant amounts of housing and employment development. This includes an extension to the world class Science and Innovation Campus and Daresbury Park.	Identified as a DH Priority Zone. Note that given the identified potential, it is recommended that opportunities are discussed with the developer in advance of any planning application.
	3MG (Mersey Multimodal Gateway)	Multimodal logistics and distribution facility in Ditton, Widnes (184 ha), focused on B8 employment development to deliver regionally significant logistics and distribution development.	Not identified as a Priority Zone, however future potential may exist. As of April 2012 a scheme has come forward for planning consent. A CHP scheme is linked to the proposal but under a separate planning application. CHP may service 3MG site and other nearby businesses.
	Widnes Waterfront	This area is an employment-led, mixed-use regeneration area (C3, D2, B1, B2, B8), encompassing 139 ha. The area also includes planning permission for the Hive Development on the Widnes Waterfront Venture Fields site (07/00011/OUT), a new leisure park with a mix of entertainment facilities, restaurants and hotel.	Not identified as a PZ, however this may have potential and should be tested using the viability tool.
Knowsley	Knowsley Industrial Park	Planning permission has recently been granted to build an Energy from Waste Gasification plant in Knowsley, through the technology supplier Energos.	Identified as a DH Priority Zone. See notes below regarding Knowsley Industrial Park.
Liverpool	Liverpool Waters	Mixed use development on a large scale, now (April 2012) with outline planning consent including a commitment to decentralised energy.	Whilst not originally identified as a priority zone, given that a mixed use development is proposed, there would be merit in investigating further with the developer what opportunities may be available and how these could be linked to other existing and proposed development. Liverpool Waters could provide a significant anchor load serviced either through an on-site energy centre or by linkage to off-site heat networks e.g. Eldonian Village or RES at Bootle Docks.

Area	Development Projects	Details	Comments
Liverpool	Royal Liverpool Hospital	To be redeveloped and to continue operation of on site CHP.	Identified as a DH Priority Zone (PZ). Note that given the identified potential, it is recommended that opportunities are discussed with the developer in advance of any planning application.
	Liverpool University	Independent energy masterplan being prepared favouring city centre campus. Currently the University has a new £14m energy centre that aims to reduce the university's annual energy consumption.	Identified as a DH Priority Zone. Note that as works are ongoing looking at energy opportunities, there may be value in engaging further with the developer to seek opportunities for sharing knowledge and experience.
	Dock Estate. Stonebridge Business Park. Project Jennifer. Alder Hey Hospital	Further information on these projects would be necessary to enable comment.	
Sefton	Council own building stock energy review	Identification of specific areas of interest for renewable energy. Working with Capita investigating the details for potential of district heating in the borough. Information is not currently available to inform this study.	The opportunities being identified by the Capita study are not currently available, however, the policy framework recommended in this report should provide a supportive framework for results that emerge.
	Southport Floral Hall.	Has an existing CHP plant.	It can be assumed that existing CHP plant has been sized to meet existing building(s) demands. In lieu of any details of existing loads and age of plant (i.e. Likely replacement timescale), this is not felt to constitute a PZ at present.
	Kew Southport	New housing and small business units on a former landfill site. A gas fired CHP is being considered (for 10% renewables target) on this site which is close to Business/Commerce Park.	Identified as a DH Priority Zone. It is recommended that if the opportunity remains, then discussions could be had with the developer to investigate potential to broaden the scope of the energy element of the proposal. As of April 2012 a planning application is under consideration not utilising a decentralised energy option.
	Sefton Business/Commerce Park	Current connected grid electricity capacity is limiting development potential on this site. It could cost up to £2m to upgrade the connection according to Scottish Power.	Is adjacent to the above development and would best be considered as part of related identified PZ.
	Mersey Docks and Harbour	Gasification EfW plant proposed to accept industrial waste.	Whilst not identified as a priority zone, this development proposal may offer an opportunity to provide heat to the local area as well as connect into the National Grid. Opportunities may be investigated through the application process.
	Sainsburys	Plan for new store at Crosby to feature biomass boiler.	In lieu of electricity generation, it is unlikely that a commercial case would exist to upsize any such boiler and deliver heat to additional buildings. This is due to the costs of infrastructure that need to be recouped.
	Peel Ports	Mersey Docks and Harbour features a major steam raising CHP installation 10-12 years old.	It can be assumed that existing CHP plant has been sized to meet existing building(s) demands. In lieu of any details of existing loads and age of plant (i.e. likely replacement timescale), this is not felt to constitute a PZ at present.
	Pontins at Ainsdale	Existing leisure destination that may have potential as a key energy load.	Whilst site may feature maintained heat requirements during peak seasons, it is felt unlikely that such a requirement is present all-year round in order to allow plant to operate and serve any would-be connecting loads (most likely neighbouring residences).

Area	Development Projects	Details	Comments
St Helens	InterRail Freight Facility	In 2006 an application was made for a large scale inter-modal freight facility at the former Parkside Colliery. The developer has now withdrawn from the proposal and future development of the site is not uncertain.	It is understood that the timescale for this development remain unknown and that its implementation remains uncertain.
	Lea Green Colliery	650 homes proposed.	Not identified as a PZ, however this may have potential.
	Worsley Brow	1,200 homes proposed.	Not identified as a PZ, however this may have potential.
	Vulcan Works	650 units proposed.	Not identified as a PZ, however this may have potential.
	Triplex Housing (ex Triplex Site)	300 units proposed.	Not identified as a PZ, however this may have potential.
	United Glass Site (New Rugby Stadium)	18,000 seat rugby stadium, food superstore, sport and leisure facilities.	Not identified as a PZ, however this may have potential.
Wirral	Biossense, Eastham	Planning Permission granted for 30 MW gasification plant.	Further information on this proposal would be required before potential could be identified.
	Bidston HWRC	Methane recovery site.	Further information on this proposal would be required before potential could be identified.
	Wirral Waters	Peel development proposed to include 10% renewable energy.	Identified as a DH Priority Zone. As of April 2012 outline planning consent has been granted for initial phases of East Float development. Decentralised energy is planned through on-site CHP energy centre.
	Bromborough Masterplan	Bromborough Energy Group (group of businesses) were keen for local energy generation which would provide consistent energy prices and be low in carbon emissions. A feasibility study has been carried out but no clear project has emerged to date.	Once a project emerges, this could offer a good opportunity for introduction of renewable energy of some form.
	Woodside Masterplan	Endorsed by Wirral Council Cabinet in August 2005. Major mixed use waterfront regeneration scheme currently subject to pre-application discussions.	Not identified as a PZ, however this may have potential.
	Tesco Heswall	CHP planning application recommended for approval.	Application is believed not to be in relation to biomass.
	Wallasey Docklands	Land based infrastructure for receiving power generated by the off shore wind farm at Burbo Bank, which will have a capacity of up to 234 MW following expansion if allowed.	More details would be needed in order to build up a picture of heat requirements and related density.
	Port Sunlight	Close to the Bromborough Area (above) is the historic Port Sunlight Village. The Village Trust has applied for funding to create a small scale biomass facility to test potential for low carbon energy supply in the area. There is further potential to develop this area further for a wider district scale energy scheme, taking advantage of the land ownership structure, the development mix and the proximity to other large scale business and industrial units.	Not identified as a PZ however there would be value in investigating further potential in this area.



# Appendix C - Project Funding Options

Funding Option	Funding Source	Financial Instrument
Local Authority Internal Reserves	Public sector	Equity
Prudential Borrowing from Public Works Loan Board (PWLb) <sup>61</sup>	Public Sector	Debt
Developer contributions (Community Infrastructure Levy (CIL) <sup>62</sup> or Section 106 Agreements)	Public Sector	Subsidy
Feed in Tariffs (FITs) <sup>63</sup> /Renewable Heat Incentive (RHI) <sup>64</sup>	Public Sector	Subsidy
Renewables Obligation <sup>65</sup>	Public Sector	Subsidy
Allowable Solutions <sup>66</sup>	Public Sector	Subsidy
Carbon Emissions Reduction Target (CERT) <sup>67</sup>	Public Sector	Grant
Enhanced Capital Allowances (ECA) <sup>68</sup>	Public Sector	Subsidy
European Union (FP7) Framework Programme for Research and Technical Development <sup>69</sup>	Public Sector	Grant
Green Investment Bank (GIB) <sup>70</sup>	Public Sector	Debt
European Investment Bank (EIB) <sup>71</sup>	Public Sector	Debt
European Energy Efficiency Fund (EEE-F) <sup>72</sup>	Public Sector	Debt/Equity
Project and Municipal Bonds	Public Sector	Debt
Commercial bank	Private Sector	Debt/Mezzanine
ESCO/Contractor	Private Sector	Debt
Climate Change/Green Investment Funds	Private Sector	Debt/Equity
Salix Finance <sup>73</sup>	Public Sector	Debt
Business Rate Retention: Renewable Energy <sup>74</sup>	Public Sector	Tax subsidy
Tax Increment Financing (TIF) <sup>75</sup>	Public Sector	Debt
Community Energy Saving Programme (CESP) <sup>76</sup>	Public Sector	Grant
Pension Funds	Private Sector	Debt/Equity
Private Equity/Venture Capital	Private Sector	Equity
Sovereign Wealth Funds	Private Sector	Debt/Equity

# End Notes

- <sup>1</sup> <http://peakoiltaskforce.net/download-the-report/2010-peak-oil-report/>
- <sup>2</sup> Liverpool City Region Economic Review, 2011
- <sup>3</sup> Liverpool City Region's Knowledge Economy: delivering new opportunities for growth. Summary 2011-2020 available at: <http://www.merseyside.org.uk/dbimgs/KE%20SUMMARY%20DOC%20FINAL%20pdf.pdf>
- <sup>4</sup> Liverpool City Region Visitor Economy Strategy to 2020 available at: [http://www.merseyside.org.uk/dbimgs/TMP\\_Visitor%20Economy%20Summary%20Strategy.pdf](http://www.merseyside.org.uk/dbimgs/TMP_Visitor%20Economy%20Summary%20Strategy.pdf)
- <sup>5</sup> SuperPort Action Plan: Delivering Economic Growth 2011-2020 available at: [http://public.edition-on.net/links/3058\\_super\\_port\\_action\\_plan.asp](http://public.edition-on.net/links/3058_super_port_action_plan.asp)
- <sup>6</sup> Institute of Mechanical Engineers, Policy Statement 09/03
- <sup>7</sup> <http://www.bis.gov.uk/assets/biscore/economic-development/docs/r/11-1338-rebalancing-britain-liverpool-city-region>
- <sup>8</sup> DECC Fuel Poverty Statistics. Source: [http://www.decc.gov.uk/en/content/cms/statistics/fuelpov\\_stats/fuelpov\\_stats.aspx](http://www.decc.gov.uk/en/content/cms/statistics/fuelpov_stats/fuelpov_stats.aspx)
- <sup>9</sup> 'primary energy' refers to resources that produce energy such as oil, gas, coal, nuclear, renewables. Electricity is secondary energy because it is generated from primary energy
- <sup>10</sup> Digest of United Kingdom Energy Statistics 2006, Chapter 5
- <sup>11</sup> Parliamentary Postcard, The Future of UK Gas Supplies, October 2004, Number 230
- <sup>12</sup> Digest of United Kingdom Energy Statistics 2006, Chapter 4
- <sup>13</sup> Digest of United Kingdom Energy Statistics 2006, Table 3.4
- <sup>14</sup> The Climate Change Committee (CCC) published its first report in December 2008 'Building a low-carbon economy – The UK's contribution to tackling climate change. The First Report of the Committee on Climate Change December 2008' The report suggested that Greenhouse Gas (GHG) (all six Kyoto gases) emissions within the UK would need to be reduced by 80% on the year 1990, which, they stated, is the equivalent of a reduction of 77% on the year 2005. This is an important issue for the City Region SEAP as it shows that a 1990 baseline year is not essential. In terms of the target the committee has since gone further and suggested that we will need to reduce our CO<sub>2</sub> by 90% over 1990 – with this corresponding to a reduction of 89% on 2005.
- <sup>15</sup> The Climate Change Committee (CCC) published its second report in December 2010 'The Fourth Carbon Budget Reducing emissions through the 2020'.
- <sup>16</sup> The Carbon Plan: Delivering our Low Carbon Future was published in December 2011.
- <sup>17</sup> There are 354 councils in England
- <sup>18</sup> Friends of the Earth, Survey of carbon reduction targets of councils in England, April 2011
- <sup>19</sup> The EEDO is programmed to be formed by December 2011, Annex C Carbon Plan Action Summary
- <sup>20</sup> by following the approaches used in the National Planning Statement for Energy Infrastructure and Renewable Energy.
- <sup>21</sup> by following the approaches used in the National Planning Statement for Energy Infrastructure and Renewable Energy.
- <sup>22</sup> Institute for Sustainability
- <sup>23</sup> [http://ec.europa.eu/research/horizon2020/index\\_en.cfm?pg=h2020](http://ec.europa.eu/research/horizon2020/index_en.cfm?pg=h2020)
- <sup>24</sup> <http://www.communities.gov.uk/regeneration/regenerationfunding/eur>  
[opeanregionaldevelopment/200713fund/](http://www.communities.gov.uk/regeneration/regenerationfunding/eur)
- <sup>25</sup> <http://nds.coi.gov.uk/content/detail.aspx?NewsAreaId=2&ReleaseId=422445&SubjectId=15&DepartmentMode=true>
- <sup>26</sup> North West Training Council, Southport College, Wirral Metropolitan College, Knowsley Community College, West Cheshire College, St Helens College, Liverpool John Moores University, Blackpool & the Fylde College and OLCI Construction Training Merseyside
- <sup>27</sup> [http://www.decc.gov.uk/en/content/cms/funding/funding\\_ops/cert/cert.aspx](http://www.decc.gov.uk/en/content/cms/funding/funding_ops/cert/cert.aspx)
- <sup>28</sup> [http://www.direct.gov.uk/en/Environmentandgreenerliving/Energyandwatersaving/Energygrants/DG\\_10018661](http://www.direct.gov.uk/en/Environmentandgreenerliving/Energyandwatersaving/Energygrants/DG_10018661)
- <sup>29</sup> Energy Bill 2011, received Royal Assent on October 2011
- <sup>30</sup> Boosting Energy IQ, Policy Exchange 2011, Page 40
- <sup>31</sup> The government expects domestic Green Deal loans to be more competitive than a typical 11% annual interest rate on an unsecured loan. It does not provide similar estimate for the non-domestic sector. DECC (2010)
- <sup>32</sup> Green Deal and Energy Company Obligation Consultation Document, November 2011
- <sup>33</sup> [http://www.decc.gov.uk/en/content/cms/emissions/eu\\_ets/phase\\_iii/phase\\_iii.aspx](http://www.decc.gov.uk/en/content/cms/emissions/eu_ets/phase_iii/phase_iii.aspx)
- <sup>34</sup> Energy Savings Trust Home Energy Efficiency Database (HEED)
- <sup>35</sup> Boosting Energy IQ, Policy Exchange, Page 5, 2011
- <sup>36</sup> NERA (National Economic Research Association) classifications
- <sup>37</sup> Greening, L., Greene, D. L., & Difiglio, C. (2000). Energy Efficiency and Consumption - The Rebound Effect – A Survey. Energy Policy, 28, 389-401. doi:10.1016/S0301-4215(00)00021-5.
- <sup>38</sup> Mechanical Ventilation with Heat Recovery in New Homes, Interim Report, January 2012
- <sup>39</sup> Proposals for the levels of banded support for renewable electricity generation under the Renewables Obligation for the period of 2013 – 2017 are currently out for consultation until 12 January 2012.
- <sup>40</sup> The National Grid features electrical transmission at either 400kV or 275kV and links power station generation to Grid supply points, where power is transformed to lower voltages. Electricity then links to regional distribution networks that connect to heavy industry or to primary substations. These substations transform the incoming 132kV feed to 66kV or 33kV, where other industry uses connect and Extra High Voltage (EHV) networks serve large regional substations. A further voltage drop occurs to establish localised "High Voltage" (HV) 11kV and 6.6 kV networks which distribute electricity around towns and cities, via either overhead or buried cables. A final stage of transformation to Low Voltage (LV) subsequently occurs before distribution to residential, commercial and light industrial buildings.
- <sup>41</sup> National Grid - Operating the Electricity Transmission Networks in 2020 – Update June 2011
- <sup>42</sup> Source: <http://www.merseytidalpower.co.uk/content/feasibility-study-stage-3>
- <sup>43</sup> Carbon Trust, Combined Heat & Power Technology Fact Sheet
- <sup>44</sup> DEFRA Climate Change Action Plan 2010
- <sup>45</sup> <http://www.sustrans.org.uk/what-we-do/travelsmart/what-does-travelsmart-achieve/reducing-carbon-emissions>
- <sup>46</sup> DfT Transport energy and environment statistics 2011. Source: <http://assets.dft.gov.uk/statistics/releases/transport-energy-and-environment-statistics-2011/energy-2011.pdf>
- <sup>47</sup> Rail Freight, Getting on the Right Track, Institute of Mechanical Engineers, 2008

- <sup>48</sup> [www.parliament.uk/briefing-papers/SN05533.pdf](http://www.parliament.uk/briefing-papers/SN05533.pdf)
- <sup>49</sup> the European Climate Change Programme II (ECCPII) ("WG 6 - Reducing greenhouse gas emissions from ships")
- <sup>50</sup> BIONIC, Sustainable Biofuels in the Community. Source: <http://www.bionic-project.eu/downloads.htm>
- <sup>51</sup> The Liverpool City Region<sup>TM</sup> is a multi-model model consisting of a highways model, public transport model and demand model. The highways and public transport model deal with the routing of vehicles and passengers throughout the transport system, whilst the demand model deals with traveller choices in terms of the amount of trips made, the mode of travel used, the time when trips occur and the distribution.
- <sup>52</sup> MDS Transmodal Liverpool SuperPort Economic Trends Study
- <sup>53</sup> Liverpool John Lennon Airport Masterplan, November 2007
- <sup>54</sup> For more information visit the single data list page of the CLG website (<http://www.communities.gov.uk/localgovernment/decentralisation/tacklingburdens/singledatalist/>)
- <sup>55</sup> the European Climate Change Programme II (ECCPII) ("WG 6 - Reducing greenhouse gas emissions from ships")
- <sup>56</sup> The new Greenhouse Gas (GHG) reporting process is categorised in three scoping categories: Scope 1 addresses all direct GHG emissions, Scope 2 addresses all indirect emissions from electricity, heat or steam and Scope 3 address other indirect emissions
- <sup>57</sup> CO<sub>2</sub> accounts for 85% of all greenhouse gas emissions
- <sup>58</sup> The new Greenhouse Gas (GHG) reporting process is categorised in three scoping categories: Scope 1 addresses all direct GHG emissions, Scope 2 addresses all indirect emissions from electricity, heat or steam and Scope 3 address other indirect emissions.
- <sup>59</sup> The key guidance when calculating CO<sub>2</sub> includes the DECC & Defra Guidance on how to measure and report your greenhouse gas emissions (September 2009) and the annual updates for carbon conversion factors i.e. 2011 Guidelines to Defra/DECC's greenhouse gas conversion factors for company reporting (IAEA for DECC/Defra, October 2011)
- <sup>60</sup> See: <http://www.dmo.gov.uk/index.aspx?page=PWLB/Introduction>
- <sup>61</sup> See: <http://www.communities.gov.uk/planningandbuilding/planningsystem/communityinfrastructurelevy/>
- <sup>62</sup> See: [www.decc.gov.uk/en/content/cms/meeting\\_energy/Renewable\\_ener/feedin\\_tariff/feedin\\_tariff.aspx](http://www.decc.gov.uk/en/content/cms/meeting_energy/Renewable_ener/feedin_tariff/feedin_tariff.aspx)
- <sup>63</sup> See: [www.decc.gov.uk/en/content/cms/meeting\\_energy/renewable\\_ener/incentive/incentive.aspx](http://www.decc.gov.uk/en/content/cms/meeting_energy/renewable_ener/incentive/incentive.aspx)
- <sup>64</sup> See: [www.ofgem.gov.uk/Sustainability/Environment/RenewableObl/Pages/RenewableObl.aspx](http://www.ofgem.gov.uk/Sustainability/Environment/RenewableObl/Pages/RenewableObl.aspx)
- <sup>65</sup> See: [www.zerocarbonhub.org/definition.aspx?page=9](http://www.zerocarbonhub.org/definition.aspx?page=9)
- <sup>66</sup> See: [www.decc.gov.uk/en/content/cms/funding/funding\\_ops/cert/cert.aspx](http://www.decc.gov.uk/en/content/cms/funding/funding_ops/cert/cert.aspx)
- <sup>67</sup> See: <http://etl.decc.gov.uk>
- <sup>68</sup> See: <http://cordis.europa.eu/fp7/energy>
- <sup>69</sup> See: [www.bis.gov.uk/greeninvestmentbank](http://www.bis.gov.uk/greeninvestmentbank)
- <sup>70</sup> See: [www.eib.org/projects/cycle/applying\\_loan/index.htm](http://www.eib.org/projects/cycle/applying_loan/index.htm)
- <sup>71</sup> See: [http://ec.europa.eu/energy/eepr/eeef/eeef\\_en.htm](http://ec.europa.eu/energy/eepr/eeef/eeef_en.htm)
- <sup>72</sup> See: [www.salixfinance.co.uk/home.html](http://www.salixfinance.co.uk/home.html)
- <sup>73</sup> See: [www.communities.gov.uk/documents/localgovernment/pdf/1969601.pdf](http://www.communities.gov.uk/documents/localgovernment/pdf/1969601.pdf)
- <sup>74</sup> See: [www.hm-treasury.gov.uk/press\\_47\\_10.htm](http://www.hm-treasury.gov.uk/press_47_10.htm)
- <sup>75</sup> See: [www.decc.gov.uk/en/content/cms/funding/funding\\_ops/cesp/cesp.aspx](http://www.decc.gov.uk/en/content/cms/funding/funding_ops/cesp/cesp.aspx)



