

## **Core City and Combined Authority Climate Change & Low Carbon Economy Good Practice**

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## Report information

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### About Sustainability West Midlands

We are the sustainability adviser for the leaders of the West Midlands. We are also the regional sustainability champion body for the West Midlands, designated by government. We are a not-for-profit company that works with our members in the business, public and voluntary sectors. Our Board is private sector led and has cross-sector representation; they are supported by our team of staff and associates.

Our vision is that by 2020 businesses and communities are thriving in a West Midlands that is environmentally sustainable and socially just.

Our role is to act as a catalyst for change through our advice to leaders, to develop practical solutions with our members and share success through our communications.

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## Executive Summary

This report aims to:

- Promote the benefits of integrating climate change and low carbon economy issues into local authority and combined authority (CA) working.
- Demonstrate how doing so can strengthen the economy as well as contribute towards low carbon targets.
- Identify the challenges of embedding climate change and low carbon economy issues into local authority working and ways that these challenges might be overcome.
- Share good practice showing how local authorities can embrace the agenda and learn from other comparable European cities.

The ten Core Cities are Birmingham, Bristol, Cardiff, Glasgow, Leeds, Liverpool, Manchester, Newcastle, Nottingham and Sheffield.

Sustainability West Midlands (SWM) undertook benchmarking of the Core Cities and combined authorities in relation to their low carbon and energy activity. Progress was reviewed against delivery of a number of activities to include Sustainable Energy Action Plans (SEAPs) submitted under the 2020 Covenant of Mayors (CoM), local energy devolution and City Deals. The report quantifies progress based on evidence of commitments and projects detailed in publicly available information and via interviews that relate to:

1. Climate change mitigation
2. Support for the low carbon economy
3. Adaptation and resilience to climate change

The report provides good practice examples where Core Cities and CAs are performing well and recommendations on how they can improve. A series of recommendations are set out for the different audiences of this report.

**National** – For organisations such as the Department for Business, Energy and Industrial Strategy (BEIS), the Environment Agency, Natural England, Energy Systems Catapult, DCLG and Defra, along with those that either provide national or local support to LEPs such as the Local Adaptation Advisory Panel (LAAP):

- There should be transparency around how the government intends to replace the low carbon and climate change aspects of EU funding post-Brexit. There is a huge opportunity to provide more flexible and easier-to-access funding to strengthen this agenda.
- The model for funding and support provided by the Heat Networks Delivery Unit and Heat Networks Investment Project for local authorities delivering heat networks should be learned from. Many of the Core Cities cited this as an excellent source of support.

- With devolution deals should be the requirement for CAs to define carbon emissions targets and provide annual reporting on progress.

**Local** – For combined authorities and their supporting working groups that are tasked to specifically progress climate change and low carbon issues:

- Having an elected Mayor can help drive CA low carbon priorities building on strong corporate commitments already in place through local partnerships and strategies.

**Local** – For local authorities and their supporting working groups that are tasked to specifically progress climate change and low carbon issues, and those who manage external funding sources in local authorities on behalf of the LEP:

### **Climate change mitigation**

- A commitment to carbon management and reduction should be expressed at a senior level with a cabinet member having overall responsibility and ownership.
- A visionary carbon reduction plan should be in place for at least the next five years with evidence based targets, costed and prioritised opportunities for reduction and a clear implementation plan including roles, responsibilities and measures. Manchester City Council is working with the LEP and combined authority and this year will host a Mayor's Green Summit to declare a new, accelerated ambition for Greater Manchester to achieve carbon neutrality, in advance of their existing commitment for 80-90% reduction by 2050.
- Where possible, targets should be set at both organisational level, so that internal processes and their impact can be monitored, as well as at LEP level, working with other local authorities and organisations to drive down emissions on a larger scale. The latter approach will also help to open up more opportunities for funding and provide greater attraction to investors.
- From an organisational perspective, carbon management should be identified as a priority embedded within corporate strategies and relevant corporate plans. There should be an understanding of what this means across all functions and efficiencies and cost savings are recognised. Mitigation should be a priority consideration within delivery across all key service areas.
- Financing low carbon projects can be challenging and could become even more difficult as European funding disappears over the next few years. As such, local authorities will need to consider new funding options. For instance, Birmingham City Council is hoping to work with the West Midlands Combined Authority to develop district heating networks using the Housing Infrastructure Fund.
- A detailed carbon footprint should be regularly calculated and published.

- Clear policies and site-specific targets should be developed where possible for design standards and different low carbon technologies, linked to regional and national targets. Supplementary guidance with low carbon design assistance should be provided more systematically by the council's team.
- Innovation should be taken in developing staff engagement and training. This should include active participatory approaches to target setting, delivery of opportunities and measurement and reporting of success.
- Detailed advice should be available to all local business and other organisations in relation to carbon mitigation and can be supported by the LEP level Growth Hubs.

### **Supporting the low carbon economy**

- All councils are moving more towards supporting their local economies, therefore embedded opportunities and consideration of the low carbon economy should be included in all council plans and decision-making. The promotion of the low carbon economy should be seen as priority by executives with an identified cabinet member and/or reporting committee to champion the agenda.
- Analysis of local businesses and social enterprises should be undertaken to identify those able to provide low carbon goods and services. There should be a strategy and action plan in place which clearly identifies low carbon economy opportunities and requirements relating to key sectors of the local economy and how this relates to the council's individual departments, services, plans, operations and partnerships. This would benefit from being embedded within the publication of a low carbon plan that covers the council's operations and the LEP area.
- Local networks for 'green' businesses can be supported by the local authority and an excellent means of supporting growth of low carbon sectors. Bristol City Council supported the establishment of several local networks such as Low Carbon South West which have now gone on to be self-financing. Low Carbon South West is a membership organisation and sector partnership between businesses, academia, investors, local authorities and both regional and national agencies promoting the growth of the environmental sector and low carbon industries.
- There should be active engagement with residents, business, retailers, schools and community groups about how they can make positive changes in their purchasing behaviour and consumption. Council procurement policies should include consideration of sustainability criteria and potential bidders should be supported to allow them to best address these issues.
- The council should have an ongoing approach to identify the gaps and actions required for skills, training, specific funding and partnerships to help achieve a low carbon economy and carbon reduction targets.

## Adaptation

- Adaptation should be identified as a priority within corporate strategies and relevant corporate plans, with impacts and response of key service delivery areas included. A nominated cabinet member should be responsible for adaptation with identified lines of responsibility to service delivery officers.
- Adaptation must be a priority consideration within the delivery across all service areas and a key issue within planning policy and associated decision-making. Risks and opportunities for current and future scenarios should be prioritised for council services, partners and community stakeholders, to prevent future extreme weather events from negatively affecting service delivery and resulting in costs.
- Liverpool City Council had a good score in relation to adaptation for a number of reasons. One reason was the recent publication of 'Building Climate Resilience - Good Practice Case Studies in Liverpool City Region.' The council worked with various partners to develop the document which showcases thirteen good practice examples of climate resilience that have emerged in the City Region over the last few years.
- An adaptation plan should be developed to cover all risks, opportunities and responses based on a local climate impact assessment. Implementation of actions should then be ongoing and proactive across all services and sectors. Monitoring mechanisms provide evidence of impacts and value of delivered schemes. Detailed information should be communicated both internally and externally about drivers, strategies, targets, reduction plans and achievements.
- Residents and community groups should have a central role in identification of adaptation risks and opportunities and the local authority should work with them and partners to help improve their resilience. Moreover, local authority officers should work with flood risk teams – a mandatory top-tier council function – civil contingencies officers and emergency planners to instil a greater resilience into both local authority operations and the wider communities in which they serve.

## Contents

<b>Executive Summary.....</b>	<b>3</b>
<b>1. Introduction.....</b>	<b>8</b>
1.1 Core City Benchmark.....	8
1.2 Sustainable Energy Action Plans and Covenant of Mayors .....	9
1.3 Local energy devolution.....	9
<b>2. Methodologies.....</b>	<b>11</b>
2.1 Core City Benchmark.....	11
2.2 Sustainable Energy Action Plans .....	11
2.3 Local energy devolution.....	11
<b>3. Results: Core Cities Benchmark.....</b>	<b>13</b>
<b>4. Results: Sustainable Energy Action Plan Progress .....</b>	<b>16</b>
<b>5. Results: Local Energy Devolution .....</b>	<b>51</b>
<b>6. Good practice examples .....</b>	<b>56</b>
6.1 Carbon emissions and the Greater Manchester Combined Authority .....	56
6.2 One Planet Cardiff: Cardiff City Council .....	57
6.3 Bristol Resilience Strategy: Bristol City Council .....	58
6.4 Green bonds: the City of Gothenburg.....	59
<b>7. Recommendations .....</b>	<b>61</b>
<b>Appendix 1: Core City Benchmark Methodology .....</b>	<b>65</b>

## 1. Introduction

This report aims to:

- Promote the benefits of integrating climate change and low carbon economy issues into local authority and combined authority (CA) working.
- Demonstrate how doing so can strengthen the economy as well as contribute towards low carbon targets.
- Identify the challenges of embedding climate change and low carbon economy issues into local authority working and ways that these challenges might be overcome.
- Share good practice showing how local authorities can embrace the agenda and learn from other comparable European cities.

Core Cities UK is a group of the UK's major cities that work together for a united voice to promote the role of cities in creating a stronger fairer economy and society. The ten Core Cities are:

1. Birmingham
2. Bristol
3. Cardiff
4. Glasgow
5. Leeds
6. Liverpool
7. Manchester
8. Newcastle
9. Nottingham
10. Sheffield

### 1.1 Core City Benchmark

As specified by BEIS, SWM undertook benchmarking of the Core Cities in relation to their low carbon and energy activity. Progress was reviewed against delivery of a number of activities to include:

- a) Sustainable Energy Action Plans (SEAPs) submitted under the 2020 Covenant of Mayors (CoM).
- b) Local energy devolution.
- c) City Deals. As the City Deals relate to activity at a LEP scale this was reviewed as part of a separate LEP Benchmarking Exercise with the results being available in the *Fit for the Future II* report located on the same webpage as this report.

The report quantifies progress based on evidence of commitments and projects detailed in publicly available information and via interviews that relate to:

- Climate adaptation (preparing for the impacts of extreme weather, including flood risk and green infrastructure provision).



- Mitigation (reduction of carbon dioxide and other greenhouse gases).
- The low carbon economy (support for the production and application of energy efficient products and services and low carbon business support).

Using this analysis, the report provides good practice examples where Core Cities and CAs are performing well and recommendations on how they can improve.

## 1.2 Sustainable Energy Action Plans and Covenant of Mayors



Coordination of regional and local governments' energy efficiency in Europe is mainly achieved through the Covenant of Mayors (CoM), an initiative launched by the European Commission (DG Energy). The Covenant is the main European movement, involving local and regional authorities voluntarily committing to increasing energy efficiency and use of renewable energy sources on their territories.

The 6,878 Covenant signatories aim to reduce their greenhouse gas (GHG) emissions by at least 20% by 2020. New signatories now pledge to 40% reduction in CO<sub>2</sub> emissions by 2030 and to adopt an integrated approach to tackling mitigation and adaptation to climate change. The Brussels based secretariat provides assistance to European cities when developing their Sustainable Energy Action Plans (SEAPs) that outline the activities for CO<sub>2</sub> reduction. The secretariat also provides Benchmarks of Excellence, i.e. best practices of cities or regions that inspire local action. The process is as follows:

- Signing up for the Covenant of Mayors.
- Creation of adequate administrative structures.
- Development of a Baseline Emission Inventory, Risk and Vulnerability Assessment, and a SEAP.
- Submission of SEAP.
- Sharing experience and promoting local actions.
- Regular submission of implementation reports.

The SEAPs developed by the Core Cities were reviewed for their outputs and impact. Of the ten Core Cities, all have signed up to the CoM other than Sheffield City Council.

The UK SEAPs were compared to those of nine European cities selected on the basis of similar population sizes and general economic profile to their UK counterparts. The purpose of comparing the UK SEAPs to the European SEAPs and presentation of case studies is to identify good and innovative practice in the European cities that could be transferred and adopted in the UK.

## 1.3 Local energy devolution

This analysis looked at the nine combined authorities (CAs) in England and the low carbon priorities set out in their accompanying devolution deals and strategic documents.

*“A combined authority (CA) is a legal body set up using national legislation that enables a group of two or more councils to collaborate and take collective decisions across council boundaries. It is far more robust than an informal partnership or even a joint committee. The creation of a CA means that member councils can be more ambitious in their joint working and can take advantage of powers and resources devolved to them from national government. While established by Parliament, CAs are locally owned and have to be initiated and supported by the councils involved.”* Local Government Association.<sup>1</sup>

In the UK, there are nine combined authorities (CAs), all in England. In the case of Greater Manchester CA this consists of ten councils that have been working together for over twenty-five years. Many other CAs have only been formed over the last five years with the incentive of devolved powers and resources from the Government, often on the condition to have a directly elected Mayor for the area. Some CAs have agreed to these conditions and received ‘devolution deals,’ while others have refused but continued to work together locally to realise the benefits of joint local council working over issues such as transport, planning, skills and economic development.

As of September 2017, there have been nine agreed devolution deals that include most of the CAs, along with Cornwall and London.

As a result, England has CAs covering many large urban areas outside London. Some of these have directly elected Mayors chairing a board of elected leaders from local councils, and some form of devolution deal of extra resources and powers. Others have no Mayor or devolution deal, but a board of elected leaders working within their current resources and powers to plan and act strategically for their area.

Whatever form they take, CAs are usually the ultimate local strategic decision-making body for an area in England. For example, they would often have representatives from the LEP reporting to the CA Board and City Region initiatives have often been transferred or report into to the new CA structures.

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<sup>1</sup> The Local Government Association has a list of the current Combined Authorities and a Devolution Register of the current devolution deals - <https://www.local.gov.uk/topics/devolution>

## 2. Methodologies

### 2.1 Core City Benchmark

The main element of this research consisted of a desk-based exercise to build a solid evidence base showing each Core City's climate change and low carbon economy credentials. The literature review was supplemented by interviews with local authority officers to get a more in depth and up to date understanding of progress being made that may not be reflected in publicly available information. This information was used to benchmark the Core Cities.

A summary of the information gained for each Core City is summarised below.

Core City	Review of publicly available information	Interview
Birmingham	✓	✓
Bristol	✓	✓
Cardiff	✓	
Glasgow	✓	
Leeds	✓	✓
Liverpool	✓	✓
Manchester	✓	✓ <sup>2</sup>
Newcastle	✓	
Nottingham	✓	✓
Sheffield	✓	✓

When interviewing the local authorities, additional questions related to the type and effectiveness of support provided by BEIS were asked. A detailed methodology is provided in Appendix 1.

### 2.2 Sustainable Energy Action Plans

SEAPs developed by the Core Cities were reviewed for their outputs and impact. The UK SEAPs were then be compared to those of nine European cities selected on the basis of similar population sizes and general economic profile (type of businesses, industry etc.) to their UK counterparts. The approach adopted when reviewing the nine UK and nine European SEAPs was the same. The initial SEAPs were reviewed along with any progress and monitoring reports submitted to the Brussels based secretariat. The purpose of this activity was to identify spending and outputs achieved and to compare these against targets and milestones to gauge progress. To provide a more in-depth view of the European SEAP a number of case studies have been identified and presented in the report.

### 2.3 Local energy devolution

The way that low carbon issues are being addressed within the strategic structures and plans of the CAs is a strong indicator of local support and direction.

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<sup>2</sup> Response provided by email

There have been a range of recent studies reviewing the different aspects of the CAs and sustainability and low carbon.<sup>3</sup>

SWM has also undertaken an independent sustainability benchmark for CAs to identify good practice and measure annual improvements. A set of criteria was developed based on our previous benchmarking research for local authorities, LEPs, Energy Systems Catapult and CAs. The review covered CA:

- Websites
- Annual review
- Overarching strategy such as a Strategic Economic Plan
- Supporting strategies such as transport
- Local Science and Innovation Audits of key local strengths
- Devolution deal (if agreed)
- Mayoral Manifesto (if available)

The CAs that were reviewed were:

- Cambridge and Peterborough
- Greater Manchester
- Liverpool City Region
- North East
- Sheffield City Region
- Tees Valley
- West of England
- West Midlands

The results of this national benchmark were first reported to the West Midlands Combined Authority Board in September 2017.<sup>4</sup> We then conducted a detailed review of the assessment results to identify key low carbon aspects for this study, such as:

- Mayoral manifesto low carbon priorities
- Devolution deals low carbon aspects
- Carbon reduction target
- Overarching Strategy and other Strategies low carbon priorities

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<sup>3</sup> See for example Greening the City Regions, Green Alliance, May 2017 [http://green-alliance.org.uk/greening\\_the\\_city\\_regions.php](http://green-alliance.org.uk/greening_the_city_regions.php), Benchmarking of Combined Authorities Sustainability Metrics, Sustainability West Midlands, July 2017 <http://www.sustainabilitywestmidlands.org.uk/resources/combined-authority-sustainability-benchmarking-technical-report-analysis-of-metrics/>

<sup>4</sup> See <http://www.sustainabilitywestmidlands.org.uk/resources/wmca-environmental-priorities/>

### 3. Results: Core Cities Benchmark

The following tables show how each Core City performed following the approach outlined in Appendix 1. These show an average score across all 24 criteria overall.

**Table 1: Overall Core City commitment to climate adaptation, mitigation and the low carbon economy**

0% - 16.5% Minimal Evidence	16.5% - 49.9% Some evidence	50.0% - 83.0% Good evidence	83.1% - 100% Leading evidence
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	Core City	Overall Score (%)
1	Manchester	70.8
2	Bristol	63.9
3	Glasgow	62.1
4	Liverpool	60.9
5	Leeds	59.7
6	Nottingham	59.7
7	Cardiff	47.0
8	Birmingham	44.4
9	Sheffield	41.7
10	Newcastle	34.7

**Table 2: Core City commitments to climate mitigation / carbon reduction only**

0% - 16.5% Minimal Evidence	16.5% - 49.9% Some evidence	50.0% - 83.0% Good evidence	83.1% - 100% Leading evidence
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	Core City	Mitigation (%)
1	Manchester	74
2	Glasgow	69
3	Nottingham	69
4	Bristol	64
5	Cardiff	64
6	Liverpool	62
7	Leeds	56
8	Newcastle	44
9	Birmingham	41
10	Sheffield	41

**Table 3: Core City commitments to the low carbon economy only**

0% - 16.5% Minimal Evidence	16.5% - 49.9% Some evidence	50.0% - 83.0% Good evidence	83.1% - 100% Leading evidence
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	Core City	Low Carbon Economy (%)
1	Manchester	70
2	Nottingham	67
3	Bristol	61
4	Liverpool	61
5	Glasgow	57
6	Leeds	55
7	Sheffield	48
8	Cardiff	40
9	Birmingham	39
10	Newcastle	21

**Table 4: Core City commitment to climate adaptation only**

0% - 16.5% Minimal Evidence	16.5% - 49.9% Some evidence	50.0% - 83.0% Good evidence	83.1% - 100% Leading evidence
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	Core City	Adaptation
1	Liverpool	67
2	Glasgow	64
3	Leeds	59
4	Manchester	58
5	Bristol	56
6	Nottingham	50
7	Birmingham	42
8	Cardiff	40
9	Newcastle	39
10	Sheffield	33

All the Core Cities were considered to demonstrate good or some evidence of their commitment to all three areas of climate change mitigation, adaptation and the low carbon economy. Manchester City Council scored highly overall, largely as a result of their extensive and integrated approach to these three areas at local authority, LEP and combined authority level.

Overall, individual Core Cities reported some excellent examples of measures to address climate change and these are highlighted later in the report. Those Core Cities showing the highest scoring results demonstrated that sustainability principles are embedded throughout the organisation and considered as ‘business as usual.’ Those Core Cities where an individual and supporting team have responsibility for climate change mitigation, adaptation and the low carbon economy scored highly.

The availability, depth and of publicly available information on Core City activity on climate change mitigation, adaptation and the low carbon economy varies hugely. Some authorities have extensive and up to date information available on their websites. Others have very little giving the impression of a lack of activity. When interviewing individuals from the Core Cities it often became apparent that a huge amount of activity at both strategic and delivery level is taking place in relation to climate change mitigation, adaptation and the low carbon economy that is simply not publicised.

Along with the rankings, the figures show that scores for climate adaptation are slightly lower than those for mitigation and the low carbon economy. The average score for adaptation is 50.5%, whereas the average mitigation score is 58.5% and low carbon economy is 51.8%. This could be due to less perceived tangible economic gains that can be made by investing in adaptation measures compared to investing in mitigation measures and the low carbon economy.

The evidence for the scoring is available in the spreadsheet that contains the detailed evidence base. Each Core City can gain access to its individual tab within this spreadsheet by contacting [enquiries@swm.org.uk](mailto:enquiries@swm.org.uk).

## 4. Results: Sustainable Energy Action Plan Progress

### Birmingham compared with Brussels

	Birmingham	Brussels
Population	1.1 million	1.13 million
Signed up to the Covenant of Mayors	12 January 2009	6 December 2008
Action Plan Accepted	17 March 2011	30 March 2010
Overall CO <sub>2</sub> emission reduction target	32% (2005) from 6.8 to 4.6 tonnes per capita	20% (1990) from 3.76 to 3.01 Mtonnes
CO <sub>2</sub> emission level 2011	5.1 tonnes per capita	
CO <sub>2</sub> emission level 2015	4.1 tonnes per capita	
Expenditure	€320 million	€46 million

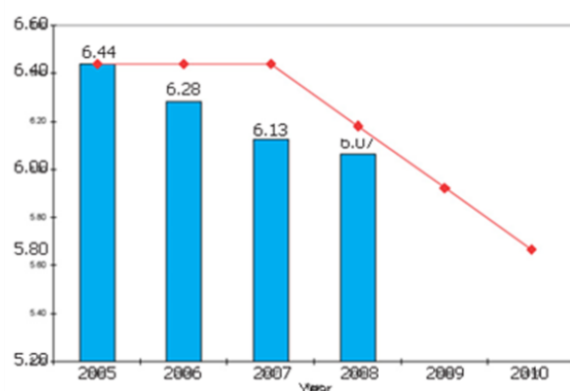
Historically, both cities have been centres of industry and manufacturing, but its importance has been in decline since the 1970s. Manufacturing is still present, particularly high-performance engineering, but there is now more emphasis on innovation and research. Both cities have redefined themselves as service centres, particularly Brussels with its concentration of European Commission offices. Consequently, both cities have a concentration of offices and office blocks, as well as repurposed industrial buildings. Each city has a mixture of housing stock, much of it ageing, with pressure on space. In terms of transport both cities are at the centre of major road, motorway and public transport networks.

### Birmingham



In 2005, 75% of Birmingham's energy was consumed by buildings (council assets 2%, commercial 5%, domestic 37%, industry 30%), equipment (0.2% street lighting) and 25% by transport. The majority of this energy was produced outside the boundaries of the city.

### CO<sub>2</sub> Emissions (t per capita) 2005-10



The SEAP submitted by the council focused on the following areas to deliver the target for energy reduction:

- Improving the energy efficiency of Birmingham's homes and buildings.
- Reducing the city's reliance on unsustainable energy by generating more electricity, heat and cooling locally.
- Reducing the city's impact on non-renewable resources by improved management.
- Taking action to impact Birmingham's mobility needs through low carbon transport.
- Engaging with citizens and businesses in terms of awareness campaigns.

The SEAP recognised that fundamental change can only be achieved over the long term and therefore focused on a 40 year delivery plan, linking to the UK national target of 80% reduction in CO<sub>2</sub> emissions by 2050. To achieve this, the council has adopted a hybrid approach using multiple strategies and activities to achieve reductions in energy



consumption. The main thrust was energy efficiency, micro-generation, demand management, and more efficient use of waste heat and power through district heating and waste to energy schemes. The target was to deliver the infrastructure through a mixture of public and private funding.

**Improvement of domestic housing stock:** The Birmingham Energy Savers Scheme was launched in 2012 with the target of providing grants to assist with the retrofitting of 60,000 domestic and 1,000 non-domestic properties. This programme, which was part of the government's green energy savers scheme, was scrapped in 2015 after providing support to 3,000 properties.

**Street Lighting:** Birmingham has around 95,000 street lights. In 2009 these street lights generated emissions of 175,000 tonnes of CO<sub>2</sub>. By the beginning of 2014 the city had spent €160 million on replacing 50% of the street lights with low energy LED lighting, saving 5,171 tonnes of CO<sub>2</sub> per year.

**Waste to energy:** The main source of waste to energy in Birmingham is the Tyseley Energy from Waste (EfW) plant which is operated by Veolia under contract to the council. In 2010 this facility had a peak capacity of 28 MWe of which 25 MWe was exported to the grid. The SEAP estimated that the plant could deliver 140,000 MWh each year of locally generated electricity which would reduce emissions by around 73,220 t CO<sub>2</sub>. £47.8 million was invested in 2015 to develop a Waste Wood Advanced Thermal Technology Biomass Power Station. This plant processes 72,000 tonnes of waste timber to produce 10.4 MWe electricity. Nine MWe electricity is exported to the national grid.

**Combined Heat & Power and District Heating:** Birmingham commissioned its district energy scheme in 2007, establishing the Birmingham District Energy Company. The network now incorporates three sources of heat and energy and supplies public and commercial buildings in the central business district. The scheme makes extensive use of Combined Heat and Power (CHP) technologies. Each system generates 56 GWh of heat, 51 GWh of electricity, eight GWh of chilled water and saves more than 15,000 tonnes of CO<sub>2</sub> emissions per year. By 2017, €76.35 million had been spent on expanding the district heating system and €8 million on local energy generation. In total the scheme has cost €170 million.

**Progress to achieving CoM target:** The city achieved its emissions reduction target in 2015 through a mixture of low carbon project implementation, particularly local energy generation and the introduction of efficient street lighting, but also because of the recession the UK experienced in 2008 and the decarbonisation of the national grid. Birmingham City Council will submit a revised SEAP to the secretariat of CoM in early 2018 which will include an integrated approach to activities to reduce the city's carbon emissions.

## Brussels

In 1990, the majority of CO<sub>2</sub> emissions, 1.714 Mtonnes (45.5%), came from residential sources, whilst tertiary generated 0.897 Mtonnes (24%), transport 0.749 Mtonnes (20%) and industry 0.173 Mtonnes (4.5%).

Rather than investing in a series of large scale projects to deliver the 20% reduction in CO<sub>2</sub> emissions, the city of Brussels opted for smaller scale projects and policies that encouraged a bottom up response to energy efficiency. As well encouraging wider public participation, it also avoided large scale public expenditure. This approach had its roots in the development of the environmental strategy for the city in 2004. The purpose of the scheme was to encourage individual citizens to become aware of and act to support energy conservation. This was achieved through financial aid, specialised technical support, training and information and the creation of professional networks and associations. The SEAP focused on travel into the city, innovative low energy buildings and energy management.

**Mobility Workplace Plans (MWP):** The Brussels region has a working population of 680,000. In 2004, 57% of these workers travelled to their place of employment by car, with the majority travelling alone. From July 2004, the Brussels government introduced compulsory MWPs. The purpose of these plans was to encourage a more sustainable, less car based approach to travelling to work. Initially targeting public and private businesses with more than 200 employees, the MWPs consisted of three phases; analysis, implementation and follow-up. The city provided support and tools allowing businesses to:

- Analyse how employees, visitors and goods reached business premises.
- Identify whether past measures to change travel behaviour had worked.
- Encourage the use of modes of transport other than the car (car free work days, bicycle parking etc.).

From 2004 to 2007, MWPs were developed by 255 companies on 280 sites, employing 240,000 workers, or 35% of the working population. During this period, there was a 4.8% point decrease (43.1% to 38.3%) in the use of cars in the modal split for commuters. From 2008 the programme was extended to include businesses with between 100-200 employees and all schools. Since its introduction the activity has saved 25,000 tonnes of CO<sub>2</sub> emissions per annum.

**P.L.A.G.E (Local Action Plan in Energy Management):** Based on a detailed analysis of actors, buildings, uses and energy consumption, the PLAGE approach specifies actions to be implemented and tracks the results through energy accounting. It offers a series of guides and tools to allow reductions in energy consumption in buildings, without undertaking major investment.

The process is delivered by designating an Energy Manager, who is responsible for undertaking an energy audit, developing a baseline and then identifying actions, using information provided by PLAGE, to deliver energy savings over a three to four year period. The tools and information available include good practice studies, through to a calculator that analyses the comparative profitability of energy-saving investments (photovoltaic panels, condensing boilers etc.).

Since its launch in 2006 the programme has been adopted in 15 communes, five hospitals, eleven collective housing companies and more than 100 schools. These properties have a

combined square meterage of 2.5 million and have delivered a 17% reduction in fuel consumption. PLAGE is presently delivering savings of 25,000 tonnes of CO<sub>2</sub> per annum.

**Exemplary Buildings:** From 2007 to 2014, the Brussels-Capital Region offered funding through an annual call for exemplary building projects that scored high in terms of their

#### Two passive duplex housing units

Rue Wauters, 17 - Schaerbeek

Inès Camacho, arch., [www.inescamacho.com](http://www.inescamacho.com)

Inès Camacho, architect and contracting client :  
*'I understood that my project was close to the passive criteria, even if it had never been designed as such. I submitted my file, and then I spent six months transforming my specifications file. It was a bit through naïveté, through innocence, that I went into this adventure. But now I think that I could no longer do anything other than low energy or passive designs, because I no longer have a motivation to use old techniques. Old smelly things no longer interest me [1]'*

This project has now been awarded several architectural prizes.

energy efficiency and their environmental sustainability. The overall objective of this programme was to encourage the building sector to produce more sustainable buildings. At a more practical level it resulted in the eco-construction of new buildings and the refurbishment of existing buildings with high levels of energy efficiency and environmental sustainability. The buildings supported were technically replicable and financially feasible, serving as examples for the future.

In order to stimulate participation, the city provided support in three ways:

1. Financial help (100€ /m<sup>2</sup>) for the conception and realisation of exemplary buildings.
2. Technical assistance to help project designers reach the quality objectives.
3. Public visibility for the buildings and their designers.

Each project passed through a technical analysis conducted by external experts before being presented to a jury which then selected projects on the basis of energy efficiency, environmental quality (water management, the use of ecological materials, etc.), technical replicability, economic viability or profitability and architectural quality. The project cost €46 million and has led to CO<sub>2</sub> savings of 40,000 tonnes per annum.

## Bristol and Gothenburg

	Bristol	Gothenburg
Population	454,000	491,000
Signed up to the Covenant of Mayors	3 February 2009	3 September 2008
Action Plan Accepted	3 November 2015	4 September 2014
Overall CO <sub>2</sub> emission reduction target	40% (2005) from 2.38 to 1.42 Mtonnes	40% (1990) from 3.69 to 2.21 Mtonnes
CO <sub>2</sub> emission level 2014		2.5 Mtonnes
CO <sub>2</sub> emission level 2015	1.73 M tonnes	
Expenditure	€570 million	

Bristol and Gothenburg have long histories as mercantile centres and ports. Both remain major ports and therefore are centres of freight and freight movements. Both cities are also centres of academia having internationally recognised universities and have a strong focus on research, technology development and innovation with strong links to advanced manufacturing (Volvo and BAS). Both cities have a strong reputation for their approaches to sustainability and greening urban environments.

**Bristol**

In 2005, tertiary accounted for 0.937 Mtonnes (39%) of CO<sub>2</sub> emissions, residential for 0.909 Mtonnes (38%), transport for 0.470 Mtonnes (20%), municipal for 0.05 Mtonnes (2%) and street lighting for 0.01 Mtonnes (less than 1%) of CO<sub>2</sub> emissions in Bristol. On the basis of the energy consumed by the city, the SEAP focused on reducing energy consumption in domestic housing, businesses and in local road transport. To achieve reductions in these areas the city divided its actions into three categories:

**Direct action by the council**

- Domestic Properties: The council planned to provide funding of £45 million to support the introduction of energy efficiency measures (Warmer Houses) in 3,100 council owned homes and £40 million (Warmer Bristol) to support energy efficiency in private properties. The target was to deliver CO<sub>2</sub> savings of 17,900 tonnes per annum.
- District Heating: The council planned to establish an ESCO and develop a district heating network at a cost of £14.5 million, to provide heating/cooling and hot water to a number of public and private buildings across Bristol.
- Transport: the focus was on the development of three new metro bus lines, the expansion of the city's cycle network and the reopening of a number of rail lines (Metrowest). The programme was expected to cost £363 million.
- Renewables: The council planned to secure funding to deliver solar photovoltaic on council land and buildings. The annual budget for this was estimated to £5.9 million

**Enabling Others**

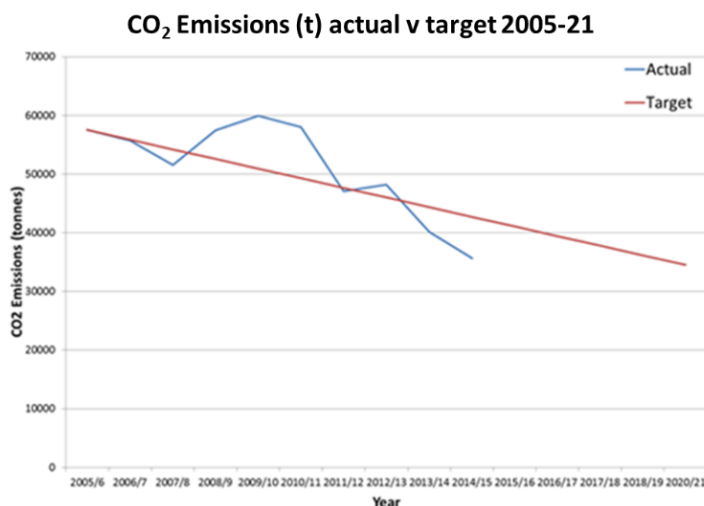
Bristol City Council planned to collaborate, empower and enable a range of public and private organisations to deliver energy conservation. This would include the establishment of car clubs, a low carbon enterprise zone, supporting community owned renewable installations and the delivery of the Bristol Community Strategy for Energy.

**Exploring opportunities for future action**

This included developing a low emissions transport programme, expanding the district heating network and strategic energy and transport planning.

**Progress to achieving CoM target**

Businesses, public bodies, NGOs and citizens have undertaken a range of interventions to help the city become more sustainable. This combined with grid decarbonisation and other external factors, such as the 2008 recession, has significantly reduced energy demand and CO<sub>2</sub> emissions in the City. This reduction has been achieved in the context of a growing population.



However, based on the last available figures from 2013 the city will only achieve the 40% reduction required by 2022 rather than 2020. In order to achieve the 40% target by 2020, a further 22.6% reduction is required, equating to a year on year reduction of approximately 4.5%.

The city council undertook a study which identified that to achieve a further 12% reduction beyond what was expected by 2025 would

require an investment of £580 million with savings £175 million a year resulting in a four year payback. To achieve an additional 17% reduction would require £2.26 billion of investment, delivering £250 million annual savings with a payback period of ten years.

By 2013, Bristol consumed 6,602 GWh of energy, 27% of which was consumed in the transport sector, 32% in non-domestic and 41% in the domestic sector. The City of Bristol used more gas than electricity, with gas accounting for approximately 40% and electricity for approximately 28% of all fuel consumed. Gas was the dominant energy source for the domestic sector accounting for 72% of the all energy consumed, whilst electricity was the dominant energy source for the non-domestic sector accounting for 63% of all energy consumed. In terms of transport, approximately 130 thousand tonnes of fuel were consumed in 2013 of which 40% was petrol and 60% diesel. Total energy consumption for transport declined by 9% over 2005-2013. Within this, personal transport declined by 13%, while freight transport increased by 2%. Of Bristol's CO<sub>2</sub> emissions, 22% were from the transport sector, 38% from non-domestic and 40% from the domestic sector. The majority of energy consumed was generated outside of the city, although in 2015 it had a total installed generation capacity of renewable electricity of 60.5MW and an installed renewable heat capacity of 20MW.

## Gothenburg

In 1990, buildings, equipment and industry accounted for 2.833 Mtonnes (77%) of CO<sub>2</sub> emissions and transport accounted for 0.855 Mtonnes (23%). The SEAP focused on achieving the required 40% reduction through a 99% reduction in emissions from the city's district heating/cooling network and 1% from greening transport.

### District Heating

Construction of the district heating network started in the 1950s and it is now over 1,000 km long. The network is run by Göteborg Energi, the city's ESCO. The system provides heating to more than 90% of apartment buildings and commercial premises in the city.





In 2010 80% of the energy to heat the system came from waste industrial and power production heat and the incineration of waste. The remaining 20% was from biofuels and natural gas. The target is to ensure that by 2030 all energy used is derived from sustainable sources. It is hoped to reach this target without costly investment in new facilities. Energy efficiency and the investment being made to utilise the buildings' thermal inertia in the system will reduce demand at peak load times.

Large-scale storage of heat across seasonal boundaries also has the potential to create a more emission-efficient system. In 2010 the waste generated from the maintaining urban green spaces in the city was integrated into the energy from waste stream, generating 50 GWh per year and by 2015 this had increased to 300 GWh. During the summer months, the system also provides cooling and this is supplemented by using the Göta River as a free source of cooling.

### Transport

- Gothenburg Port:** One of the largest consumers of energy is the port which is owned by the city. The city has been working to transfer containers from road to rail. In 2000, 22% of the shipping containers went by train, this had risen to 50% by 2009, saving 50,000 tonnes of CO<sub>2</sub> per annum. The city has worked with rail companies, manufacturers, forwarding agents, shipping lines and the National Rail Administration to develop a rail shuttle service. 27 shuttles depart daily to 25 Swedish and Norwegian cities/towns.
- Public Transport:** Gothenburg suffers from urban sprawl and its population is more reliant on car use than other major cities in Sweden. To address this issue the city has developed a planning strategy where new housing developments take place around public transport hubs. New developments are mixed, combining housing, commercial and industry, to reduce the need to travel. Public transport is now a priority and the city has set a target of million public transport trips per day by 2025. In 2005 the figure was 450,000. The city is expanding its cycle paths, has implemented a hire scheme and has increased the use of green transport. 90% of city's own fleet is green, many running on biogas produced by the city's biogas plant Gasendal.



### Housing

The city has created a series of incentives as well as providing information, education and advice to home owners to build and renovate with energy conservation in mind. For new developments on land owned by the city, it is now a requirement that all properties must not exceed 60 kWh/m<sup>2</sup> for heating, hot water and building electricity. The national limit is

set at 110 kWh/m<sup>2</sup>. The city has also been using its own housing company, Älvstranden Utveckling, to build with energy conservation as a priority.

### Progress to achieving CoM target

Gothenburg is on target to achieve the 40% reduction in CO<sub>2</sub> emissions by 2020.

### Cardiff and Tallinn

	Cardiff	Tallinn
Population	341,000	413,000
Signed up to the Covenant of Mayors	8 April 2010	5 February 2009
Action Plan Accepted	8 April 2010	10 March 2011
Overall CO <sub>2</sub> emission reduction target	26% (2005) from 8.49 to 6.28 tonnes per capita	20% (2007) from 3.93 to 3.14 Mtonnes
CO <sub>2</sub> emission level 2010	6.8 tonnes per capita	
CO <sub>2</sub> emission level 2011		3.52 Mtonnes
CO <sub>2</sub> emission level 2015	4.91 tonnes per capita	
Expenditure	€162 million (100%)	By 2015: €34.7 million (20% of €142 million)

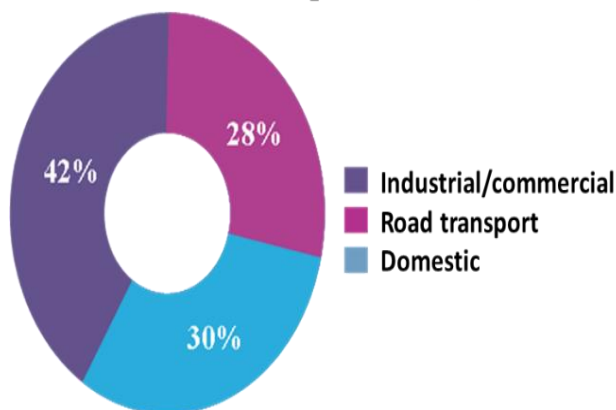
Historically, Cardiff was a busy port and was a centre of steel and coal production. With the rapid decline of its heavy industry through the 1980's the city has refocused on becoming a centre for retail, finance, media and tourism. Since gaining its independence in 1991, Estonia has pursued a pro-western free market economic model. Tallinn, the country's capital city, has been at the heart of this. It has a strong telecommunications and electronics sectors which have developed ties with Finland and Sweden and strengthened. The city is also a centre for services and its port is one of the busiest in the Baltics. Both Cardiff and Tallinn have undergone dramatic economic changes in the last 30 years that have a profound impact on the development of both cities.



### Cardiff

In 2005 Cardiff's CO<sub>2</sub> emissions totalled 2.699 Mtonnes, with 1.961 Mtonnes (73%) being generated by buildings, equipment and industry, with the remaining 0.738 Mtonnes (27%) coming from transport. By 2007 this total had dropped to 2.45 Mtonnes, with per capita emissions standing at 7.6 tonnes. The majority of emissions (1.03 Mtonnes - 42%), came from the industrial and commercial sector, with 0.72 Mtonnes (30%) from transport and 0.69 Mtonnes (28%) from domestic sources.

**2007 CO<sub>2</sub> Emissions by sector**



The Council had participated in the Carbon Trust's Local Authority Carbon Management Programme since 2006. A Carbon Management Strategy and Implementation Plan was approved in 2008 committing the Council to achieving a 60% reduction in emissions from Council buildings (excluding housing), street lighting and waste by 2018. The SEAP was based on this plan and focused on sustainable energy generation, energy conservation in municipal buildings and housing and sustainable transport.

### **Energy Generation**

The Cardiff Energy Recovery Facility (ERF) is the largest in Wales, treating waste from local authorities and business. The facility, which has been operational since 2014, handles 350,000 tonnes of residual waste (non-recyclable) waste per year. It diverts at least 95% of South Wales' residual waste away from landfill and generates 30MW of electricity for the national grid, enough to power around 50,000 households. The city has also invested in solar with a large scheme at a landfill site generating 6MW of electricity.

### **Energy Conservation**

The city supported the retrofit of 1,000 homes and helped deliver the Affordable Warmth Strategy for Cardiff, to reduce the number of households in fuel poverty and increase health and wellbeing. One of the key aims of the strategy was to improve the energy efficiency of domestic dwellings through cavity wall, loft and external wall insulation and energy efficiency advice. By 2010 this had resulted in a 12.51% reduction in CO<sub>2</sub> emissions based on 1997 levels.

### **Sustainable Transport**

The council focused on a journey sharing scheme, expanded park and ride facilities and an improved bus network to make journeys more efficient, more reliable and more accessible to all. The strategy focused on reducing congestion and pollution, improving road safety and accessibility to services and facilities. Action to date includes the development of a Walking Strategy alongside the Walking for Health Scheme, the development of a Cycling Strategy and the production of the Cardiff Cycling Map.

### **Progress to achieving CoM target**

By 2015, the city had already surpassed its 2020 per capita target of 6.28 tonnes achieving 4.91 tonnes per capita. As with other UK cities this is due to a number of factors, including measures taken by the council, businesses and individuals as well as national grid decarbonisation and the 2008 recession.





In 2007, Tallinn's largest CO<sub>2</sub> emissions, 1.01 Mtonnes (26%), were generated by transport, residential generated one Mtonnes (25%), industry 0.97 Mtonnes (25%) and tertiary 0.94 Mtonnes (24%). In terms of the source of energy, excluding transport, 56% came from natural gas, 23% in the form of heat from the Iru Power Station, 7% from wood fuel and 6% from wood chips and pellets.

Although the city had a district heating system which provided 36% of heating, the majority, 41%, came from individual boiler-houses spread across the city. The remaining 23% of heat was generated by individual properties. The SEAP focused on four areas: advice and guidance, energy saving measures in the electricity sector, heat supply to buildings and technical improvements. This report will consider the last three areas.

### **Energy saving measures in the electricity sector**

As well as beginning to replace inefficient street lighting with more low energy options, the city also began to invest in more effect control systems. Between 2007 and 2009 savings of 10% were achieved through new control systems. At a more fundamental level the city began to renovate its electricity distribution network to reduce losses. By 2013 city expenditure on electricity had been reduced by 10-20%.

### **Heat supply to buildings**

The city supported a programme of energy audits and renovation of existing private housing stock, with owners being given support in the form of low interest loans. Beyond the retrofitting of existing properties and buildings and the introduction of higher energy specifications for new buildings, the greatest opportunity for reducing consumption were improvements to and the extension of the district heating system. In 2013 there were 420km of piping of which only 25% were pre-insulated. A programme of replacing 10-12km of older pipes per year at a cost of up to €9 million per annum was started. The network was also expanded and connectivity improved with other existing networks.

### **Technical improvements**

In 2008 a new power station generating heat and electricity from wood and peat came on line. This produces 8-10% of the power consumed in Tallinn, as well as a quarter of the heat supplied to the city's district heating networks. The boiler house network was also renovated and improved with newer more efficient boilers being used. There was also a push to replace this network by linking it to the main district heating system, thereby reducing energy consumption.

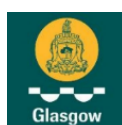
## Glasgow and Helsinki

	Glasgow	Helsinki
Population	600,000	616,000
Signed up to the Covenant of Mayors	28 August 2009	7 January 2009
Action Plan Accepted	2 February 2015	1 December 2010
Overall CO <sub>2</sub> emission reduction target	30% (2006) from 4.18 to 2.93 Mtonnes	20% (1990) from 6.67 to 5.34 tonnes per capita
CO <sub>2</sub> emission level 2013		4.32 tonnes per capita
CO <sub>2</sub> emission level 2015	2.791 Mtonnes	

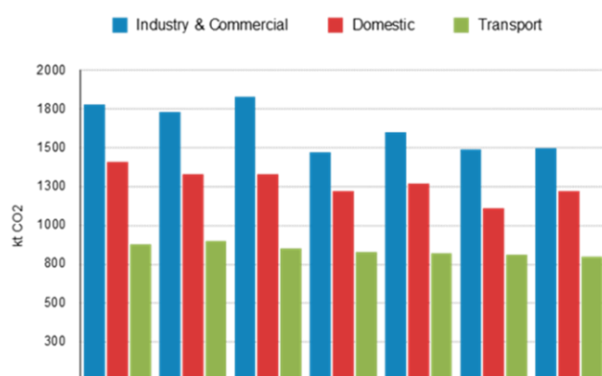
From being a global manufacturing centre, Glasgow is now home to nearly 40% of all jobs in the financial services and aerospace, defence and marine sectors in Scotland and around one in three of all jobs in the tourism, food and drink and construction sectors. The city continues to be a centre for manufacturing. Shipbuilding remains important along with engineering, construction, chemicals and textiles. The city is also focusing on developing its profile as a centre for green technology optoelectronics, software development and biotechnology.

The economy of Helsinki is primarily service-based, having gradually moved away from heavy industry. However, it still has strong paper, textiles and shipbuilding sectors. Most large Finnish companies have their head offices in the Helsinki metropolitan area. It is also the location of choice for the regional headquarters of international companies operating in the country. Information technology and financial sectors form the backbone of Helsinki's economy.

### Glasgow



#### CO<sub>2</sub> emissions by sector (2006-2012)



In 2006 Glasgow's consumption profile was 42% industrial/commercial, 34% domestic, 20% transport and 4% oil and coal, with 45% of domestic and industrial being electric, 31% gas and 20% petroleum products. In terms of CO<sub>2</sub> emissions, buildings, equipment and industry generated 3.387 Mtonnes (81%) and transport 0.798 Mtonnes (19%).

The main thrust of Glasgow's SEAP was to improve energy management and develop

new integrated low carbon energy systems for the city. The integrated systems focused on providing energy links between new and existing developments (offices, hotels, housing estates and hospitals), to allow green energy solutions to be implemented. The SEAP was given an added dimension with the publishing of the City's Energy & Carbon Masterplan in 2012. The SEAP identified that the 30% reduction in CO<sub>2</sub> emissions required by the CoM would be delivered by the following elements:

- Combined Heat and Power/District Heating 9%

- Biomass 2%
- Biogas and energy from waste 6%
- Other renewable energy systems 3%
- Sustainable transport systems 3%
- Fuel switching 3%
- Energy management systems 6%

### Street Lighting

The main focus of the SEAP to 2015 was the replacement of street lighting across the city. This has seen CO<sub>2</sub> emissions drop from 11,000 tonnes per annum in 2012 to 7,000 tonnes in 2015. The city has been investing heavily in LED intelligent lighting and secured a £6.3m loan from the Green Investment Bank to install 10,000 LED lights. The target is to replace all 70,000 of the city's street lights with LEDs.

### District Heating

The plan was to develop and link existing commercial and residential networks, although a lot of work still needs to be done to achieve the targets set in the SEAP. A number of smaller schemes have been successfully delivered. The Wyndford Estate was established in 2012 in the North West of Glasgow. It is a partnership between Cube Housing, Scottish and Southern Energy (SSE) and British Gas. The district heating provides heat and hot water to 1,500 homes and runs from a gas fired CHP engine, three gas boilers and a thermal store at the heart of the estate. It saves up to 7,000 tonnes of CO<sub>2</sub> emissions a year.

### Commonwealth Games Athletes' village



The Athletes' Village, in the East End of Glasgow, was built for the Commonwealth Games in 2014. The district heating scheme contains 700 homes, a 120 bed care home, the Emirates Arena and a velodrome. The CHP engines within the energy centre generate power that is sold back to the grid.

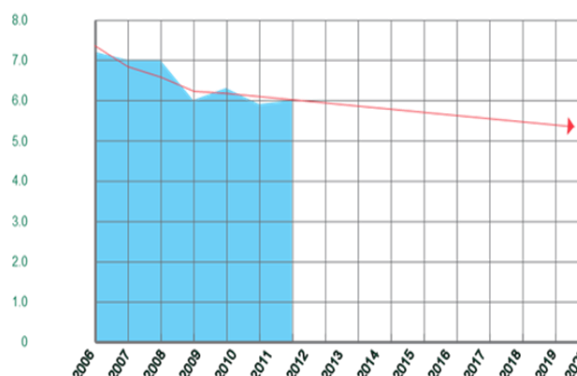
### Local energy generation

The Glasgow Recycling and Renewable Energy Centre, which has yet to open, is at the heart of the city's intention to generate energy from waste and anaerobic digestion. The plan is to generate energy for 22,000 homes through a district heating system. The Cathkin wind turbine has been more successful and is generating energy for 700 households. The city is still hoping to establish an ESCO to more effectively coordinate the generation of local energy.

### Progress to achieving CoM target

By 2012 industrial consumption was down to 40% with domestic and transport up respectively to 35% and 25%. The most dramatic change between 2006 and 2012 was the rapid increase in gas consumption which increased by 48%, petroleum products were up to 27% and electricity dropped to 25%. Energy generated from coal and oil had been eliminated entirely. This trend to gas consumption that has been repeated across the UK helped to reduce CO<sub>2</sub> emissions in Glasgow by 17% from 2006-12 and allowed the city to reach its CoM target in 2015.

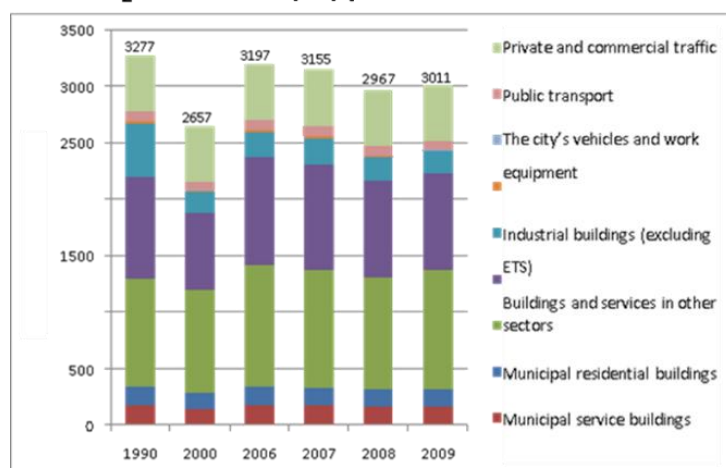
### CO<sub>2</sub> emissions tonnes per capita from 2006-12 and predicted trends to 2020



### Helsinki



### CO<sub>2</sub> emissions (Kt) per sector 1990-2009



In 1990 the city was emitting 3.28 Mtonnes of CO<sub>2</sub> per annum. By 2013 this had dropped to 2.65 million tonnes. In terms of the sources, in 1990 29% was residential, 28% tertiary, 18% transport, 15% industry and the rest municipal.

The major change by 2013 was the massive reduction in CO<sub>2</sub> emissions from industry with this sector only contributing 6%. Otherwise the profile was similar

to 1990 with residential remaining the largest contributor at 35%, tertiary 26%, transport 20% and municipal 11%.

This massive reduction in the contribution from industry between 1990 and 2013 is more to do with the changing nature of the industrial profile of Finland and Helsinki than activities related to a SEAP. In fact, in 2009 when the city signed up to the CoM Helsinki had already seen a 9% drop in CO<sub>2</sub> to 3.01 million tonnes from the 1990 figure even with the population and energy consumption of the city growing by more 17%.

As with other cities, it was clear to Helsinki that although their municipal CO<sub>2</sub> emissions were significant, reductions of 20% would only have reduced overall emissions by 3%. Therefore, through the SEAP, the city sought to encourage the implementation of measures

in other sectors primarily through advice, planning controls financial incentives, partnership programmes as well as by its own actions.

### Street Lighting

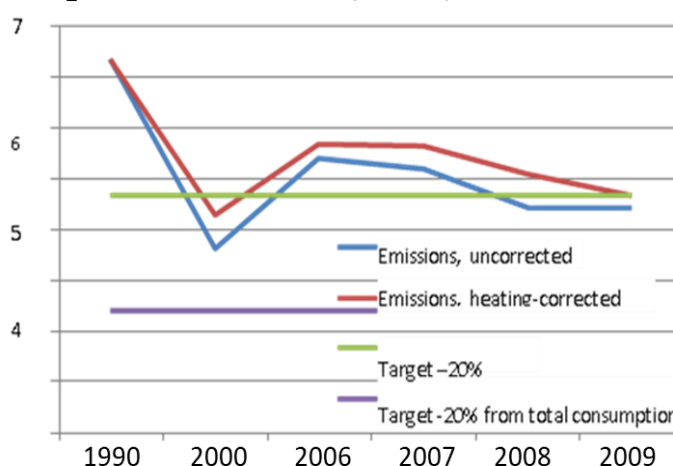
To 2015 the city had replaced 35,000 of the 50,000 street lights targeted in its SEAP. The total cost of this programme was €25 million and had saved the city 1,400 tonnes of CO<sub>2</sub> per annum.

### Municipal buildings

Since 2009, over 40 public buildings have been energy audited and as result dozens of energy efficiency actions and investments have been implemented.

Helsinki has invested in small-scale renewable energy production in two schools, an office building and nature centre. By 2015 the local authority had introduced demand controlled ventilation in twelve large buildings. This activity cost €350K and is delivering emission reductions of 247 tonnes per annum.

**CO<sub>2</sub> emissions tonnes per capita 1990-2009**



The municipal authority has also have been active in developing guidance for the construction of low, passive and nearly-zero energy buildings. As an exemplar in 2011, it constructed Viikki Environment House, an office block with nearly zero energy consumption. As well as being very efficient the building is equipped with solar panels, ground source cooling and micro wind turbines and is heated with district heating. The project cost €600K and saves 65 tonnes of CO<sub>2</sub> emissions a year.

### Energy Generation

Helen Oy is the city's ESCO and supplies approximately 90% of Helsinki's domestic properties with energy through its district heating network. The company has a number of CHP facilities to generate energy. These use a mixture of sources including natural gas, coal, wood pellets, a heat pump at Katri Vala (the largest facility in the world), solar, hydroelectric and nuclear. In 2015 30% of the company's energy was generated from fossil fuels, 25% from renewable sources and the rest from nuclear. The target is for the company to be carbon neutral from 2020. The company is also engaged in a programme to upgrade and improve the efficiency of its district heating network.

**Heat pump at Katri Vala**





## Progress to achieving CoM target

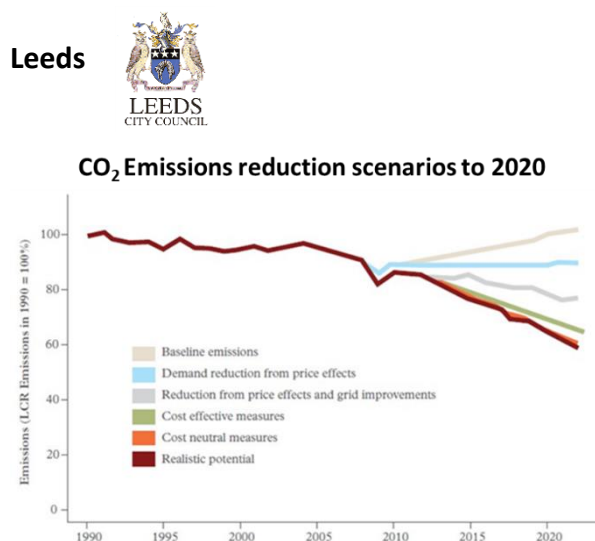
The city delivered on its CoM commitments in 2013.

## Leeds and Riga

	Leeds	Riga
Population	781,000	640,000
Signed up to the Covenant of Mayors	18 July 2012	30 September 2008
Action Plan Accepted	16 December 2015	8 July 2014
Overall CO <sub>2</sub> emission reduction target	40% (2005) 4.912 to 2.947 Mtonnes	55% (1990) 4.107 to 1.848 Mtonnes
CO <sub>2</sub> emission level 2012	4.959 Mtonnes	2.068 Mtonnes
CO <sub>2</sub> emission level 2014		1.870 Mtonnes
CO <sub>2</sub> emission level 2015	4.093 Mtonnes	
Expenditure	€29.7M	

As with the other UK Core Cities, up until the 1980's Leeds was a centre of manufacturing and industrial production. Since then the city has focused on promoting itself as a financial and legal services centre and is now largest provider outside of London. This activity has also led to the development of a large service sector. Manufacturing (engineering, food and drink, chemicals and medical technology) continues to play a significant role in the local economy. In recent years Leeds has experienced an economic boom with the city growing faster than any other in the UK.

Since the collapse of the Soviet Union and gaining its independence in 1991, Latvia has pursued a pro-western free market economic model. Riga, the country's capital city, has been at the heart of this push. Riga is the largest city in the Baltic States and has the largest economy in the region. The economy of the city is dominated by its port and the financial services sector. 28% of total GVA was accounted for by business services in 2016.



The 2005 profile of CO<sub>2</sub> emissions for Leeds was dominated by tertiary at 1.863 Mtonnes (38%) and residential at 1.813 Mtonnes (37%). Transport contributed 1.104 Mtonnes (22.5%) and municipal 0.111 Mtonnes (0.5%). 75% of the energy consumed was electric and the remaining 25% was fossil fuels.

The SEAP plan focused on achieving the 40% cut in emissions through a 63% reduction in tertiary supply, a 20%

reduction in residential consumption, 14% reduction from district heating and 2% in local electricity generation.

### Domestic Properties

By 2015, the council had delivered 4,114 major energy efficiency improvements to 2,594 households and issued over £500,000 of loan funding for whole house energy efficiency packages. In addition, they have supported 1,067 vulnerable households to have new heating systems installed or boilers replaced/repaired. This capital work was worth £14.5m in total.

To 2017 the council delivered a 1,000 home solar PV project and district heating for over 2,500 council flats. The council also signed an eight year partnership with Keepmoat and Willmott Dixon to deliver energy efficiency improvements across the Leeds City Region. It should be noted that due to changes to government policy much of the future work around the renovation and retrofit domestic properties was abandoned by the city council.

### Recycling and Energy Recovery Facility

Veolia open a recovery and recycling facility in 2017 with the support of the local authority. Presently, the energy generated by the facility is being sold back to the grid, however there are plans to establish a district heating system for 22,000 properties.

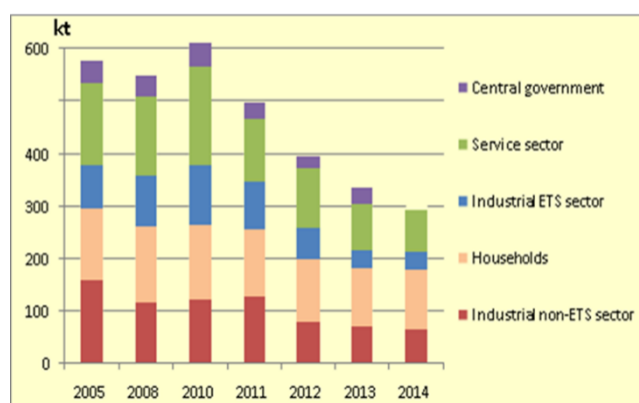
### Progress to achieving CoM target

Based on the figure from 2015 it is unlikely that the city will achieve the CoM target by 2020.

### Riga



CO<sub>2</sub> (Kt) emissions by end-user 2005-14



In 1990, the CO<sub>2</sub> emission profile for the city was dominated by industry, with 1.813 Mtonnes (44%), residential 1.177 Mtonnes (28%) and transport 0.63 Mtonnes (15%); municipal accounted for 0.255 Mtonnes (6%) and tertiary for 0.228 Mtonnes (5%).

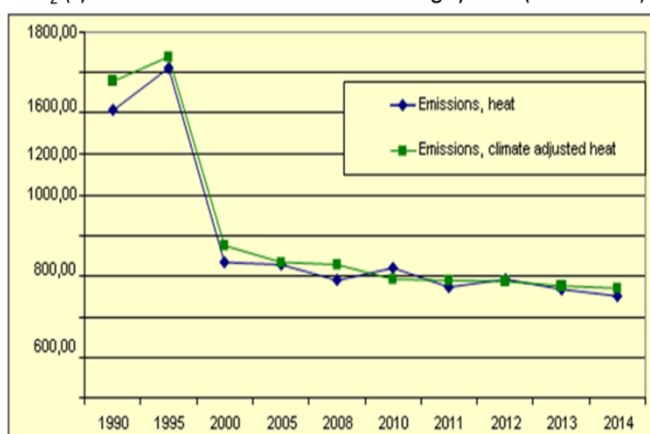
To achieve the 55% CoM reduction target, the SEAP proposed a 37% reduction in district heating emissions, 27% in residential, 20% in transport, 8% in municipal, 5% in industrial and a 3% reduction in tertiary.

By 2014 the amount of emissions from transport had increased to 40% and 29% from district heating.

### District Heating

76% of heat consumed by the city is provided by district heating with natural gas and wood-chips used as fuel. In 2011/2012, approximately 69% of the heat was produced by two large upgraded state owned cogeneration plants. The remaining 31% came from five heat plants and 38 automated boiler houses. Over 90% of the volume of centrally consumed heat in Riga was produced in the highly efficient cogeneration mode.

CO<sub>2</sub> (t) emissions from the district heating system (1990-2014)



Emissions from the district heating system have decreased significantly between 2000 and 2012. In 2012, emissions were by 23.5 percentage points lower than in 2000, with heat consumption down by 12.4% during the same period. This reduction has been in main driven by energy efficiency measures introduction by end users. By 2014 heat consumption and emissions were down respectively by 13.2% and 28.4 % compared to 2000. The key factors contributing to this reduction were the upgrading of heat sources, the introduction of more effective technologies and the reduction of losses. From 2000 to 2010 the reduction was mainly related to measures targeting the higher efficiency of heat generation equipment and lower heat losses, whereas from 2011 to 2014 it was replacement of fossil fuels with biomass. In 2010 the share of wood biomass accounted for 4.6% of the heat generated; by 2014 it was 36%. Consequently, the consumption of gas has declined considerably and by 2014 has shrunk to 44%. The city's district heating company has also invested in advanced heat pump technology.

### Residential Housing Stock

The majority of the apartment blocks, particularly those built during the post-war period, some 6,000 buildings, were in urgent need of renovation. To 2013, only 56 buildings with the total area of 145,043m<sup>2</sup> or 1.2% of the total housing stock had been renovated.

### Municipal Buildings

There are more than 400 municipal buildings in the city. In 2014, 66 educational establishments had undergone comprehensive renovation and 72 had undergone some renovation. This programme was due to be completed by 2018.

### Progress to achieving CoM target

By 2014 the city was already close to achieving the 55% CoM reduction.



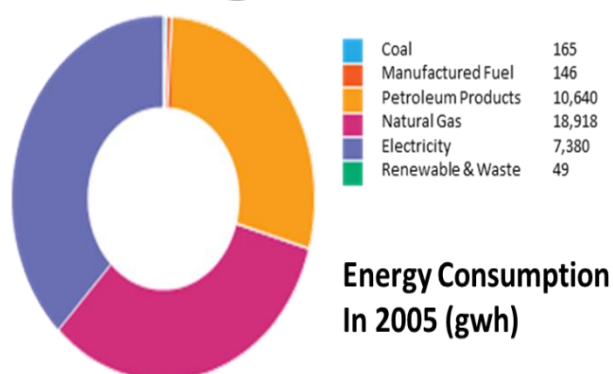
## Liverpool and Dublin

	Liverpool	Dublin
Population	484,000	527,000
Signed up to the Covenant of Mayors	28 October 2011	2 March 2009
Action Plan Accepted	19 November 2012	6 December 2010
Overall CO <sub>2</sub> emission reduction target	20% (2005) 3.277 to 2.621 Mtonnes	20% (2006) 10.37 to 8.298 tonnes per capita
CO <sub>2</sub> emission level 2009	2.499 Mtonnes	
CO <sub>2</sub> emission level 2011		5.554 tonnes per capita
CO <sub>2</sub> emission level 2015	1.974 Mtonnes	
Expenditure by 2011		€1.312 million

During the 19<sup>th</sup> century Liverpool was the largest port in the British Empire and regarded as the second city of the Empire. It has had a long mercantile and manufacturing history and the port remains a key part of its economy. However, in common with most UK cities, during the 1980's Liverpool saw a dramatic decline in its industrial base. Although manufacturing remains important the city's economy is now dominated by service industries (public sector and banking and finance) and the knowledge economy.

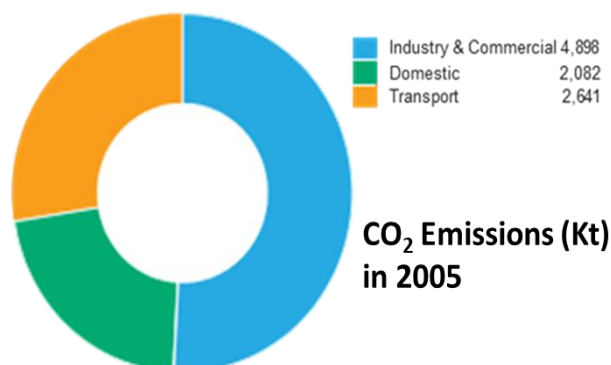
Although a port city, Dublin did not feel the full effects and economic benefits of industrialisation that Liverpool experienced in the 19<sup>th</sup> and 20<sup>th</sup> Centuries. From the 1990s, Dublin has become a financial and IT centre with a number of high profile businesses (including Google and Microsoft) locating their European head offices in the city.

### Liverpool



In 2005, the CO<sub>2</sub> emission profile of the city was dominated by industry at 1.389 Mtonnes (42%), residential 1.175 Mtonnes (36%) and transport 0.712 Mtonnes (22%). The majority of the energy came from electricity (38%), 33% gas, 28% petroleum products and 1% from renewable, waste, coal and manufactured solid fuels. In 2005, the City Region consumed over 37,000 GWh.

The SEAP was seen by the city as an opportunity to transform itself into a low carbon economy in which future economic growth was decoupled from the consumption of fossil fuels. The SEAP proposed a series of reviews and practical activities to deliver this objective. The SEAP included some of the following activities:



- Development of a domestic, industrial and commercial retrofit programme.
- Delivery of a programme of behavioural change measures.
- Development of the City Region's energy sector supply chain.
- Support the development of CHP and heat networks.
- Support the identification of new opportunities for wind generation.
- Support the development of the Mersey Tidal Project.
- Support the delivery of building integrated solar photovoltaics and solar hot water.
- Support the delivery of building integrated ground and air source heat pumps.

### **Building retrofit programme**

Established in 2011, REECH is designed to test the benefits, scalability and sustainability of retrofitting 14 green technologies in social housing. The programme targets both domestic and business properties; 40 SMEs were provided with free energy efficiency assessments and grants for green retrofitting and vehicle charging points. REECH has retrofitted some 4,000 homes with various combinations of carbon-reduction technologies, saving 22,000 tonnes of CO<sub>2</sub>. The programme invested €57million, €19.4m of European Regional Development funding (ERDF); €19.4m from national and private match-funding; and €18.2m from other national and private funds.

### **Street Lighting**

The city council agreed to a phased replacement of the city's street lights with LED lighting in 2014 at a total cost of £7m. In the first phase 12,000 LED lights have been installed in 1,800 streets. This has produced energy savings of £585,000 to date and carbon savings of approximately 1,500 tonnes. A second phase began in 2016 with a further 9,380 street lights replaced at a cost of £4m, creating savings of another 1,300 tonnes of CO<sub>2</sub> emissions.

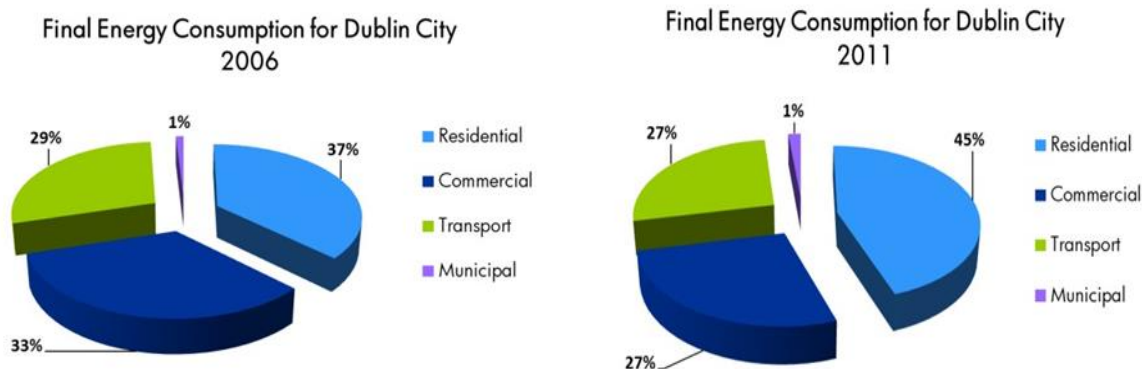
### **Progress to achieving CoM target**

By 2009, energy consumption has reduced by 19% and CO<sub>2</sub> emissions by 16%. As with other UK cities this reduction was a function of the decarbonisation of the electricity supply, improvements in energy efficiency and the 2008 recession. Consequently, by 2009 Liverpool had already reached its CoM target.

### **Dublin**



In 2006 the CO<sub>2</sub> emissions profile for the city was as follows: residential 1.724 Mtonnes (33%), tertiary 1.131 Mtonnes (21.5%), transport 1.182 Mtonnes (22.5%), industrial/commercial 1.028 Mtonnes (19.5%), non-energy 0.132 Mtonnes and municipal 0.04 Mtonnes. In terms of energy consumption, residential dominated at 37%, with industrial/commercial at 33%, transport at 29% and municipal at 1%. By 2011 residential had increased to 45%, transport and industrial/commercial were at 27% each and municipal remained at 1%. The SEAP focused on four areas.



### Residential and Commercial Buildings

Residential and commercial buildings represented the biggest possible opportunity for CO<sub>2</sub> reduction in Dublin. The per capita emissions for Dublin's buildings were 5.36 tCO<sub>2</sub>/capita/year, which was high when compared with other cities in a similar climate. Therefore, action was encouraged to improve insulation, replace boilers and CFL light bulbs to save 6.5 Mtonnes CO<sub>2</sub> over a twelve year period. To aid this process the council specified high energy standards in all new residential and commercial building developments in the City Development Plan.

The Greener Energy Homes grant scheme led to the installation of over 2,750 renewable energy systems in Dublin from 2006 to 2011 providing over 23,000 MWh of heat per year. 33,000 applications were made to the Better Energy Homes scheme. This scheme provided grants for home owners to make improvements to their heating systems and insulation to increase energy efficiency for space heating requirements. The overall energy savings from such initiatives have had a substantial impact on the energy consumed in the residential sector.

### Awareness Raising

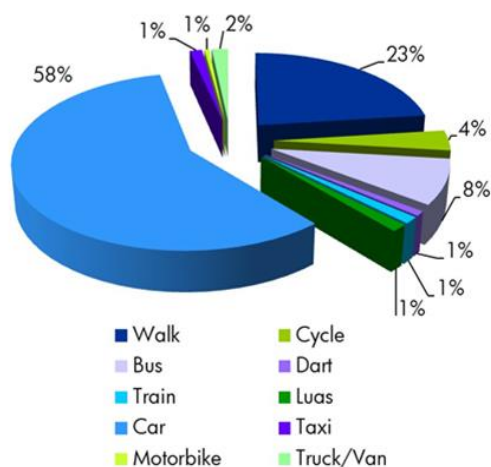
The council sought to change the behaviour of the general public when using energy in the home, at work and commuting. The council hoped to save up to 20% of total energy consumption. Promotional campaigns to encourage citizens to use energy more efficiently and where possible use more sustainable forms of transport were delivered.

### District Heating

In order to meet the tough long-term emissions targets, deeper cuts in carbon emissions required major infrastructure developments. The council identified renewable energy, smart electricity grid and metering, district heating and cooling and additional rail-based public transport as the priorities. Of these, district heating was the main priority. While initial capital costs were high at €40 million for Phase 1 of the proposed Dublin District Heating project, the savings and other benefits would continue over the long term. The council estimated that an extensive network had the potential to reduce the consumption of primary energy in buildings in Dublin by up to 30%.

## Transport

### Passenger journeys by mode of travel (2011)



The decrease in energy use in the transport sector can be attributed largely to the decrease in freight traffic in the city, but was also affected by the increased uptake of cycling and walking. The transport sector in the city has seen a significant modal shift; although the overall number of passenger journeys has not increased significantly, commuters have moved away from the use of public transport and towards independent travel (driving, walking and cycling).

The Cycle to Work scheme introduced by the government in 2009 resulted in over

90,000 bicycles bought in its first 2 years. The DublinBikes rental scheme was launched by Dublin City Council in 2009 with 44 bike stations in the city. By 2011 it had over 31,000 active long-term subscribers and five million journeys have been made. In 2011, 1.5 million journeys were made on DublinBikes, an increase of 26.7% compared to 2010.

There were extensions of the LUAS tram system, with the red line extending by 5km and the green line by nearly 8km from 2006-2011, but with electricity usage reduced by 15.3% from 2010 to 2011. There was also an increase in pedestrian journeys, from 95 to 108 million.

### Progress to achieving CoM target

Between 2006 and 2011 there was a substantial decrease in the overall energy consumption and emissions for Dublin, dropping to 5.554 tonnes per capita. This decrease was due to numerous factors, including energy awareness, increased energy efficiency, economic recession, increased regulation and reduced CO<sub>2</sub> levels in the electricity supply. Each energy consuming sector saw a decrease in energy consumption. Consequently, the city was able to reach its CoM in 2011.

### Manchester and Amsterdam

	Manchester	Amsterdam
Population	541,000	731,000
Signed up to the Covenant of Mayors	27 May 2009	6 January 2009
Action Plan Accepted	18 November 2009	11 March 2015
Overall CO <sub>2</sub> emission reduction target	41% (2005) from 3.271 to 1.93 Mtonnes	40% (2008) 4.732 to 2.839 Mtonnes
CO <sub>2</sub> emission level 2009	2.878 Mtonnes	
CO <sub>2</sub> emission level 2009		4.437 Mtonnes
CO <sub>2</sub> emission level 2016	2.200 Mtonnes	

Manchester was at the heart of the UK industrial revolution and the world's first industrialised city. Following the de-industrialisation experienced by Manchester and the majority of UK cities in 1970-80s, the city's prosperity is now largely based on the financial

and professional services sector. Manchester has a high proportion of people working in education, administration and support services. Science is strong within the city due to the cluster of large universities and research businesses. Media and creative industries are also strong.

Amsterdam has a long history as a commercial and financial centre. The profile of the city remains resolutely commercial and is now dominated by business support and professional services, particularly linked to the banking sector. Amsterdam also has a large creative sector linked to media and advertising. There are also two academic hospitals that have a large biotech cluster and research community.

## Manchester



In 2005, the major source of CO<sub>2</sub> emissions was the industrial/commercial sector at 1.528 Mtonnes (47%), domestic emissions were at 908 Mtonnes (30%) and road transport at 716 Mtonnes (22%).

To achieve the required 41% reduction by 2020 the city identified the decarbonisation of the national grid (30%), improvements to its existing buildings and energy efficient new build (31%), local renewable energy generation (22%) and greening transport (15%) as the ways in which it would be able to deliver on this target. The Manchester SEAP focused on the following areas.

### Domestic properties

The city set itself a target of reducing the energy bills in 100,000 properties by 2020, saving 350,000 tonnes of CO<sub>2</sub> through retrofit and educational programmes. Some work had already been done in 2009 through the council's Northward Housing. 12,500 properties had benefited from retrofitting (new central heating boilers, insulation and windows) and solar panels. By 2016 the following had been delivered:

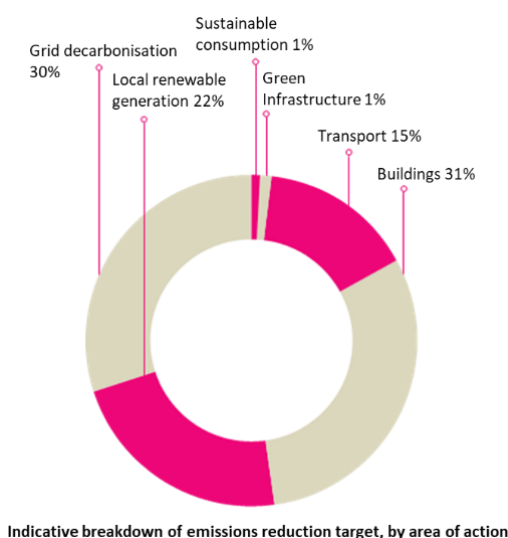
- The Green Deal Communities programme supported 300 fuel-poor households who received a range of retrofit measures.
- Manchester had installed over 30,066 retrofit measures through the Greater Manchester ECO programme.
- Northwards carried out a range of energy efficiency improvements to homes through their £300m Home Improvement Programme, including external and/or internal insulation to almost 2,500 'hard to treat' homes, Solar Photovoltaic (PV) panels onto 2,334 houses and 21 blocks of flats, solar thermal panels onto seven block of flats, ground source heat pumps at five locations serving 90 flats, air source heat pumps to 153 properties, two communal combined heat and power units serving 213 flats, eight micro combined heat and power units to eight homes and soft measures such as low energy lighting.

### Commercial/Municipal

The council created a portfolio of substantial commercial and public sector retrofit projects which pilot innovation, exemplify best practice and used these exemplars to develop a long-

term programme for retrofitting public and commercial buildings across the city. By 2016 the following had been delivered:

- Parrs Wood High School solar roof completed, hosting 1,000 solar panels, generating more than 200,000 kWh of power per year.
- The Coop Group's NOMA, a 20-acre mixed use development powered by a biodiesel cogeneration plant, using natural resources including passive solar gain for heat and natural ventilation, adiabatic cooling, rainwater harvesting and waste heat recycling.



### Transport

The focus was improving public transport across the city, more cycling and the use of electric vehicles. The city would invest in active transport such as a city centre network of cycle centres; pedestrian and cycle routes; and interchange and storage facilities at public transport and cycling destinations. Bus services and infrastructure would be improved and investment would be made in rail and tram networks, including the expansion of Metrolink.

New initiatives would be launched to increase the take up of electric vehicles and there would be investment in a future electric vehicle network

and city-wide car clubs. In 2007 all the power used in the Metrolink tram network was generated from renewable sources. The city established a car club and low emissions vehicles were available for hire. The council also launched a scheme (Get on Board) to encourage its employees to use public transport or to cycle to work. By 2016 the following had been delivered:

- There were 159 electric vehicle charging points in the city and over 2,500 Greater Manchester registered e-vehicles.
- Between 2005 and 2015 the number of people cycling into the city centre had increased by 317% during the morning rush-hour.
- Ongoing expansion of the Metrolink and the development of Quality Bus Partnerships to increase the connectivity across the city.
- Converting 41 yellow school buses, out of a fleet of 93, to green energy.

### Local Energy Generation

The target was to create a number of local networks for sharing heat and power in parts of the city and develop a city-wide smart grid. Local generation would be increased with an emphasis on biomass, CHP, solar or geothermal energy. By 2016 the following had been delivered:

- The three-year £20m NEDO project (New Energy and Industrial Technology Development Organisation) was completed in 2017 with over 550 ICT linked air source heat pumps installed.

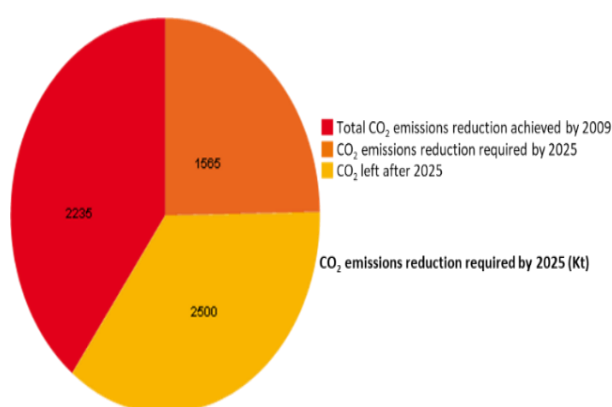


- Completion of European Commission funded research District Information Modelling and Management of Energy Reduction (DIMMER) programme across Greater Manchester.

### Progress to achieving CoM target

By 2016 the city's industrial/commercial CO<sub>2</sub> emissions had dropped to 0.864 Mtonnes, a 42% reduction from 2005, domestic emissions were at 0.664 Mtonnes, a 35% reduction and transport at 0.667 Mtonnes, a 15% reduction. Based on a 2016 review the city was projected to achieve a 37% reduction in CO<sub>2</sub> emissions by 2020.

### Amsterdam



In 2008, the major source of CO<sub>2</sub> emissions, 3.934 Mtonnes (83%), was from buildings; the remaining 27% or 0.798 Mtonnes were generated by transport. In 2007, the plan was for the city to be energy-neutral by 2015, but not enough money was allocated to retrofit the hundreds of city-owned buildings that produce 29% of municipal CO<sub>2</sub> emissions. The city also did not have enough budget to replace 110,000 streetlights with LEDs.

To deliver the SEAP the city is collaborating and seeking agreements with local industries, supply chain managers, real estate developers, as well as its bus and taxi companies. It has also established a revolving sustainability fund of almost €50 million in addition to its existing €40 million Climate and Energy Fund. The SEAP focused on the following:

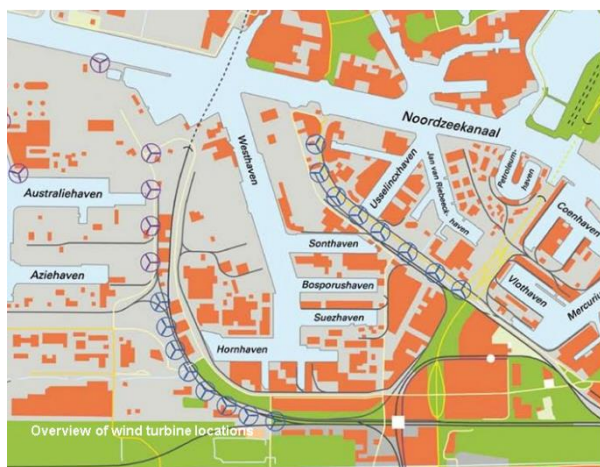
### Buildings

In the period leading up to 2015, all municipal buildings, both existing and new-build, would be made climate neutral. The existing schools in Amsterdam would be improved in terms of energy and interior climate. Pilot projects would be set up related to building new climate-neutral, houses, schools and offices. The city established €8m fund to support the retrofitting of 1,000 public housing association apartments by 2020 to a zero-net-energy standard.

### Clean transport

The target was to install charging stations for 10,000 electric cars (including 5,000 plug-in hybrids) and scooters. To stimulate electric vehicle demand, the city would increase the number of charging stations from 1,000 in 2013 to 4,000 by 2018. All taxis within the city will have to be electric by 2025. The use of electric bicycles would be increase because they can cover larger distances. Polluting cars would be discouraged from parking through differential parking charges. The municipal bus company will have all-electric bus transport citywide by 2025. Amsterdam would also increase the number of freight transfer hubs on its

outskirts. There, petrol and diesel-powered commercial vehicles will transfer cargo to low-emission or zero-emission vehicles to reduce the number of delivery trucks in the city.



### Port and Industry

In cooperation with the ICT sector, existing data centres would be made more energy efficient and new sustainable centres would be designed. The Port of Amsterdam would continue to work on its transition to a 'Green Energy Port.' In addition to cleaning up the energy transshipment companies in the port (coal and oil), energy use in the port would be made more sustainable. Old wind turbines in the port will be replaced by larger, more efficient turbines. Shore power

supply connections would be provided for inland shipping.

### Sustainable energy

The district heating network provided heat to approximately 45,000 houses. The Waste and Energy Company and the NUON power station in Diemen were the primary sources for the collective heating network. It has been decided to expand this network. Over the seven years from 2013 to 2020, the city intends to increase the number of participating homes to 102,000 and to increase the percentage of the city's separated solid waste to 65% in 2020. In situations where district heating and heat and cold storage are not possible, gas will be used to provide heating. Plans are being developed to expand the number of windmills in Amsterdam. The city is planning on an 18 MW increase in its installed wind power capacity by 2020, a 27% increase on 2015 levels. The city also had planned to increase its solar generating capacity to 25 MW by 2016, but only reached 16 MW. Similarly, per capita consumption was due to be down by 15% by 2016, however only a reduction of 6% was achieved.

### Progress to achieving CoM target

Progress toward the energy-neutrality goal has increased since 2015 and the municipality is now on track to reduce its emissions by 45% by 2025.

### Newcastle and Kaunas

	Newcastle	Kaunas
Population	296,000	299,000
Signed up to the Covenant of Mayors	15 January 2008	22 January 2009
Action Plan Accepted	24 February 2010	23 July 2010
Overall CO <sub>2</sub> emission reduction target	21% (2005) 1.916 to 1.513 Mtonnes	30% (1990) 2.716 to 1.901 Mtonnes
CO <sub>2</sub> emission level 2008	1.878 Mtonnes	
CO <sub>2</sub> emission level 2013		1.073 Mtonnes
CO <sub>2</sub> emission level 2015	1.410 Mtonnes	
Expenditure by 2015	€32 million of €132 million	€114.13 million



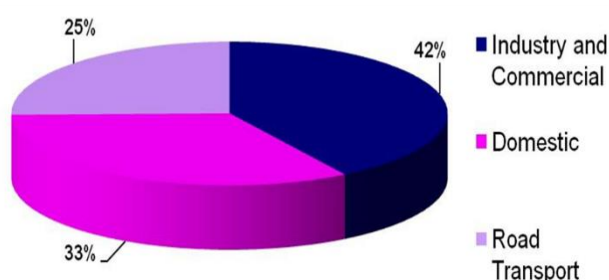
Newcastle was one of the main centres for ship building and engineering during the 19<sup>th</sup> and 20<sup>th</sup> centuries. The industrial decline that hit the UK in the 1970s and 80s had a dramatic impact on Newcastle. The city now focuses on business support and the service sector.

Kaunas, Lithuania's second city, has a mixed economy based on industry (food production, textiles, publishing and processing, pharmaceuticals and wood processing) and services.

## Newcastle



**Breakdown of CO<sub>2</sub> Emissions 2005**

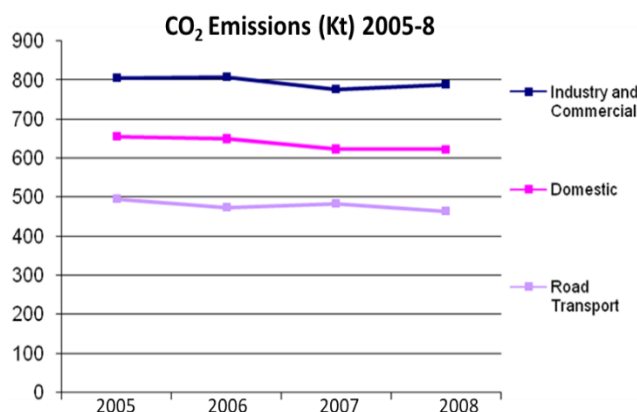


The SEAP produced by the council divided the sources of CO<sub>2</sub> emissions into three broad groups; industrial/commercial (42% or 0.788 Mtonnes), domestic (33% or 0.622 Mtonnes) and road transport (25% 0.463 Mtonnes).

The council was responsible for 3.9% of the overall emissions total of 1.878 Mtonnes. Therefore, to achieve the target set would require collaboration with a whole range of organisations and individuals. The SEAP highlighted the following approaches:

### Municipal

Work would continue on a whole range of energy saving measures including the fitting of automatic lighting controls, heating controls, voltage optimisation and automatic meter readers. This would be combined with staff awareness campaigns. The council would invest in energy efficient lighting (a PFI contract would replace 80% of the existing lighting with LEDs), building insulation and biomass boilers. To reduce emissions the council would also look to expand the use of electric vehicles and other equipment.



### Domestic Housing



By 2010, over 77,000 home energy efficiency/fuel poverty assessments had been delivered, 45,000 insulation measures had led to a reduction in CO<sub>2</sub> emissions of approximately 25,000 tonnes each year. These measures would continue targeting the 122,000 properties in the existing domestic housing stock. New developments would include energy conservation measures such as renewable and low carbon sources of energy, decentralised energy production and sustainable waste management. Warm Up North is

a regional project which began in 2013 to improve the energy efficiency of homes across the North East. Up to October 2016, WUN has delivered 292 measures in Newcastle homes, including cavity wall and loft insulation and gas boilers. The council and Young Homes Newcastle installed 1,034 PV systems and the total capacity of the systems installed to date is 3.34 MWp. The city has also received funding from the EC Intelligent Energy Programme (Newcastle Investment in Housing Retrofit project) to retrofit 20,000 properties to deliver 8,900 tonnes of CO<sub>2</sub> emissions savings per annum. The total cost of the programme is €120 million.

### Transport

Efforts would be directed at reducing the need to travel, providing lower carbon public transport, promoting the integration of transport modes, promoting other sustainable modes (walking, cycling), promoting change through better information, reducing CO<sub>2</sub> from business-related travel and the distribution of goods. The city has developed a programme, Go Zero, to encourage the use of more sustainable and greener form of transport across the city. As part of this programme the city has installed 80 charging points for electric vehicles.

### Business/Commercial

The focus would be on encouraging carbon emissions reductions as a way to increase competitiveness by reducing energy cost and stimulating the growth of low-carbon industries in the city.

### Progress to achieving CoM target

By 2014 the city had surpassed the CoM emission target of 1.513 Mtonnes. As with other UK cities this reduction was a function of the decarbonisation of the national grid, the 2008 recession as well as the delivery of elements of their SEAP.



### Kaunas

The CO<sub>2</sub> emissions from the 1990 were dominated by buildings and the industrial/commerce sector at 1.72 Mtonnes (63%), transport produced 0.454 Mtonnes (17%) and 0.542 Mtonnes (20%) came from non-energy sources. Before any actions were delivered under the SEAP substantial reductions in CO<sub>2</sub> emissions had already been achieved by 2008:

- Heat production reduced from 5,129.73 GWh to 1,479 GWh and CO<sub>2</sub> emissions reduced by 55%.
- Electricity consumption reduced from 2,383 GWh to 1,087 GWh and CO<sub>2</sub> emissions reduced by 46%.
- Natural gas consumption reduced from 133,700 to 115,200m<sup>3</sup>.
- 50% of the landfill gas was collected and used for energy production.

The only sector bucking this trend was transport with petrol consumption increased by approximately 62%, while diesel consumption increased by approximately 57%. The total increase of CO<sub>2</sub> emissions in the transport sector was 59%. The SEAP focused on three areas:

### Retrofit

Reducing energy consumption through the renovation of public buildings and domestic properties. The renovation of at least 50% multi-storey dwellings was planned by 2010. The target was to reduce CO<sub>2</sub> emissions by 45,910 tonnes.

### Transport

As this was an area of increased emissions, from 1990 the city planned to invest in public transport and bring emissions down by 37,028 tonnes. An additional 57,382 tonnes would be saved through the development of cycle paths and pedestrian routes.

### Green energy

The majority of power plants in the city were fuelled by natural gas. The target was to convert these facilities to biogas and increase the use of renewables, local energy sources and built an incinerator to generate energy from municipal waste and reduce emissions by 681,577 tonnes.

### Progress to achieving CoM target

The city had already surpassed the CoM target by 2013.

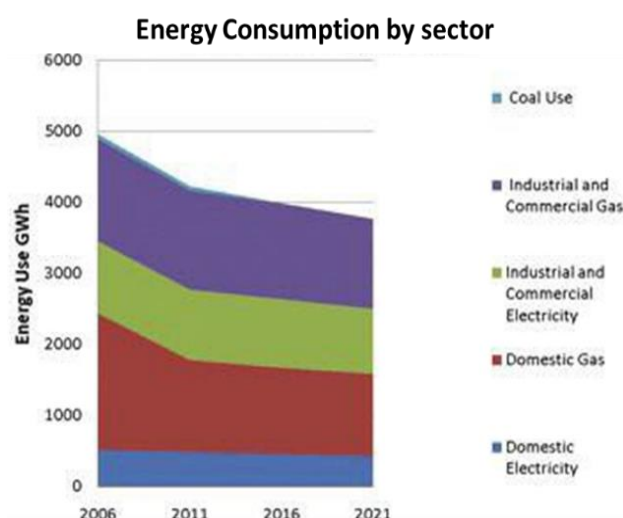
### Nottingham and Ostrava

	Nottingham	Ostrava
Population	325,000	294,000
Signed up to the Covenant of Mayors	8 December 2008	
Action Plan Accepted	13 October 2013	
Overall CO <sub>2</sub> emission reduction target	26% (2005) 1.849 to 1.368 Mtonnes	
CO <sub>2</sub> emission level 2008	1.850 Mtonnes	
CO <sub>2</sub> emission level 2015	1.275 Mtonnes	
Expenditure by 2020	£775 million	

As with most UK cities Nottingham saw a decline in its manufacturing base in the 1970s and 1980s, particularly in textiles. The city is now a centre for low-carbon technologies, digital media, life sciences, financial and business services and the latter forms a larger part of the economy than most UK cities. Manufacturing accounts for a relatively small proportion of Nottingham's economy, with food and drink being the largest manufacturing sector. There is also a pharmaceuticals cluster linked to the company Boots.

Ostrava, in the north-east of the Czech Republic, is the capital of the Moravian-Silesian Region and is the third largest city in the country. The city was formerly at the heart of a steel and coal area, however since the fall of the Soviet Union the city has undergone a dramatic economic change; the last coal mine closed in 1994. Ostrava is now a centre of automotive manufacturing, RTDI as well as business support services.

## Nottingham

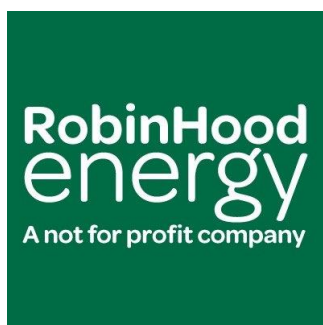


Nottingham's 2005 CO<sub>2</sub> emissions were dominated by a mixture of residential 0.705 Mtonnes (38%), industrial/commercial 0.478 Mtonnes (26%), transport 0.359 Mtonnes (20%), tertiary 0.245 Mtonnes (13%) and municipal 0.052 Mtonnes (3%). To achieve its CoM target the local authority was targeting a 24% reduction in transport emissions, 27% from district heating and 4% from local electricity generation. The remaining 44% reduction would come from other sources including municipal, domestic and industrial.

It should be noted that even before signing up to the CoM's target, the city was already very progressive in terms of sustainable energy generation. Through the Nottingham Energy Partnership (focusing on domestic energy reduction), EnviroEnergy (the city council's district heating operator) and in partnership with a number of larger local companies, domestic gas consumption in the city was already falling. In 2008, the UK as a whole generated 2.7% of non-transport energy from renewables and waste. In 2006, Nottingham generated just under 3% of non-transport energy consumption from renewables and waste. A further 39.2 GWh of electricity was exported to the national grid from the Beeston weir hydro scheme and the City's gas CHP heat station at Enviroenergy.



In 2006 the City's gas CHP plants generated an estimated 191 GWh of power and 372 GWh of heat; 11.45% of Nottingham's total energy consumption and 14.3% of total electricity consumption was generated within the City. The city also had the largest district heating network in the UK in 2006. To deliver its SEAP the following strategy was developed:



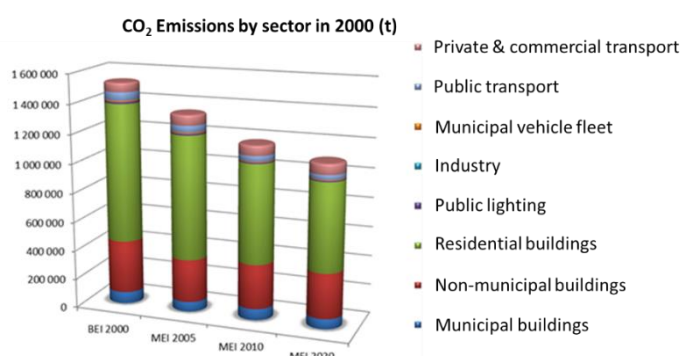
- To become a centre for sustainable energy and green tech business, innovation and growth.
- To continue to invest in the district heating network.
- To develop the City's installed low or zero carbon energy generation and distribution capacity.
- To reduce local authority, domestic and 'industrial and commercial' energy consumption.
- Ensure local planning policy and local authority capital procurement supported the timely delivery of the SEAP.

- To work closely with business, universities and technology partners to ensure Nottingham accelerated the process and maximises the impact of demand led innovation in energy technology and management within the city.
- Establish an ESCO, Robin Hood Energy.

### Progress to achieving CoM target

As a result of the activities undertaken by the city council, it was able to reach its CoM target by 2014. The district heating network now serves 5,000 homes and over 100 businesses with low carbon heat and power. This is powered by the waste incineration plant burning 180,000 tonnes of domestic and commercial waste per annum. In 2015 the city council established its ESCO, Robin Hood Energy.

### Ostrava



In 2000, the majority of CO<sub>2</sub> emissions, 0.946 million tonnes (63%), came from residential sources, 0.332 million tonnes (22%) from tertiary, 0.126 million tonnes (8%) from transport and 0.105 million tonnes (7%) from municipal sources. The SEAP focused on the following three areas:

### Buildings

In 2000, the majority of buildings, some 68%, were residential and owned by the municipality, 23% were in private hands or owned by businesses and the remaining 6% were municipal buildings (schools etc.). The target was the improvement of energy performance and the subsequent economic operation of buildings (including, e.g., the application of additional thermal insulation, replacement of windows, heating control systems, energy management, economic lighting).

### Transport

To encourage the shift of passengers from cars to public transport the highest support would be given to rail transport (trams, suburban and integrated railways). The municipality was planning to replace its diesel bus feet with electric buses.

### Local Energy Generation

The city was already making effective use of solar energy with solar panels installed on a range of municipal buildings and geothermal energy used in heating systems. The SEAP was seeking to increase the generation of electric power and heat from renewable energy sources by expanding wind, hydro and biogas CHP. The municipality was also seeking a move away from coal in domestic properties to use of wood pellets.

**Progress to achieving CoM target**

By 2015, the city had achieved its CoM target of a 25% reduction on 2000 CO<sub>2</sub> emission levels and had spent €34.18 million on transport, €17.33 million on municipal and €0.42 million on residential measures.



## SEAP analysis summary

Of the nine cities reviewed, six have already achieved their CoM 2020 targets by 2015. In fact, Nottingham achieved its target of a 26% reduction by 2014. Three cities: Bristol, Leeds and Manchester, have yet to reach their CoM targets. However, as their targets are substantially more onerous, a 40% reduction in CO<sub>2</sub> emissions based on a 2005 baseline, this is not surprising. Even these cities are on target to achieve their reductions. This success, however, seems to have been achieved in spite of and not necessary because of the SEAPs that the cities were required develop and deliver. The majority of plans were put in place in 2009-10 and revolved around the development of:

- District heating/cooling networks.
- Sustainable local energy generation (CHP, waste to energy, wind, solar, biomass, hydroelectric).
- Improving the energy performance of municipal and domestic properties.
- The introduction of energy efficient street lighting.
- Encouraging a reduction in car usage through public transport, cycling and walking.

Most local authorities were already working on some if not all of these objectives. Energy efficient lighting was being pursued using Salix funding and retro-fitting of existing housing and municipal building stock was being undertaken using loans from the Green Investment Bank and funding from Green Energy Savers Programme. SEAPs helped to crystallise this existing activity and to put ambitious additional targets in place.

However, if the targets and activities set out in the SEAPs in 2009-10 are followed through to 2017, it quickly becomes apparent that the majority have not been achieved. Much of this has been down to changes in government policy, the ending of the green energy vouchers scheme and the curtailing of support from the Green Investment Bank, all of which have had a chilling effect on a lot of what the local authorities hoped to achieve, particularly around retrofitting of domestic properties.

The continuing effects of the 2008 recession have meant that local authority resources, both financial and staff, have been reduced, limiting ability to deliver some of the more ambitious projects (district heating networks, local energy generation, ESCOs, sustainable transport, CHP) included in the SEAPs.

Those cities that have been able to deliver in these areas had already begun work on these schemes before the SEAPs were launched. For example, Birmingham and Nottingham have established extensive district heating networks supported by CHP and other forms of local energy generation.

The objective of integrating local energy sources into local support or district heating networks has stalled. In many cases energy generated locally is sold back to the grid rather than used locally because of the lack of connectivity, something that the SEAPs were planning to address.

Clearly, there are other trends at play that have helped deliver reductions in CO<sub>2</sub> emissions. The most significant of these is the continuing de-carbonisation of the national grid. Another key component is the changing nature of the British economy, with a continuing shift away from businesses that generate significant CO<sub>2</sub> emissions. It should also be noted that the recession of 2008 has also played its role, the reduction in economic activity and general squeeze on living standards resulting in less energy use in the business and domestic sectors. Other meta-trends have all helped to deliver the 20% CoM reductions, including improvements in energy efficiency driven by technology and innovation; a more widespread concern about the use of resources by the general public; and legislation imposing energy and resource efficiency. This suggests that with or without the SEAPs it is very likely that the 20% reductions by 2020 would have been achieved by the Core Cities. Essentially, the majority of CO<sub>2</sub> emissions reductions delivered in the Core Cities are linked to national trends, policies and legislation, rather than local actions.

It is clear that a large amount of the CO<sub>2</sub> emission reductions achieved in the nine European cities was also a result of similar meta-trends that had a positive effect on the UK cities. Again, national has trumped local activity, particularly for those cities using a 1990 baseline when energy generation was dominated by CO<sub>2</sub> heavy sources such as coal.

However, this does not mean that lessons cannot be taken from European cities, particularly in terms of how they have been able to effectively integrate a range of energy reduction activities into a coherent strategy, something that has been difficult to achieve in the UK. When comparing the nine UK and European cities this is the most obvious difference; UK cities have struggled to link many of their CO<sub>2</sub> emission reduction activities to achieve more of an impact and to create a convincing plan for future activities. Ultimately, what the comparison between the UK and European cities reveals is that local autonomy, the ability to access resources and to act independently of national government, is the more likely approach to deliver a coherent, structured and successful energy reduction strategy.

The European cities that have achieved the most, particularly Gothenburg, Helsinki, Tallinn and Brussels, have done so because they have been able to integrate activities and create a coherent plan and narrative for energy reduction strategies. They have been able to do this because they can exert local control over energy generation, supply, energy efficiency and the behaviour of residents and businesses. This allows the city authorities to develop an integrated approach to CO<sub>2</sub> emissions reduction that ultimately delivers better results. There are a number of common features that have helped to deliver CO<sub>2</sub> emission reductions; these are described below.

### **ESCOs**

The majority of the European cities reviewed have their own ESCOs allowing the cities to have real influence over the delivery and source of energy used locally. For example, Göteborg Energi has extended and upgraded the district heating network so it now covers 1,000km. The majority of energy presently comes from waste to energy sources, although the target is to have all energy generated from sustainable sources by 2030. This target can be set because the city has control over the existing sources of generation, the possible future sources and the delivery mechanism.

One of the most successful core cities in the UK in terms of the development of a coherent CO<sub>2</sub> emission reduction strategy has been Nottingham. This success is at least partly down to the city having its own ESCO, Robin Hood Energy. Other UK core cities have had ambitions to establish their own ESCOs.

### **District Heating/cooling**

One of the most efficient forms of energy delivery to commercial and domestic properties are district heating/cooling networks. These systems are particularly prevalent in Scandinavia and the former communist bloc countries. In the past they were not particularly efficient. However, in the last twenty years they have been upgraded and expanded. Their success is linked to the presence of an ESCO which owns the network and therefore can dictate the source of energy that powers the network. District heating/cooling networks have been established in the UK Core Cities, or have been expanded. Birmingham has developed a substantial network linking a number of municipal and commercial buildings with the energy coming from CHP. However because of the lack of an ESCO (the network is owned by a private company) attempts to link the system into more sustainable sources (biomass and waste from energy) have not been successful.

The nature of the UK energy market has also limited the use of district heating/cooling in domestic properties; Glasgow has had limited success but has been unable to connect the domestic schemes into one network.

### **Sustainable local energy generation**

Although several of the UK cities have been able to develop some sources of local energy generation (waste to energy, PV, hydroelectric etc.) they have been less successful integrating and using this energy locally. A number of cities have waste to energy facilities within or close to their city boundaries. However, they have been unable to exploit this energy and it is being sold back to the grid. Again, this lack of connectivity is a function of the structure of the private UK energy market

Many of the European cities reviewed have been much more effective at developing and integrating local energy generation into local energy supply. Again, much of this success comes back to the presence of an ESCO. This also allows more innovative sources of energy such a biogas and ground heat source pumps to be used.

### **Public transport**

The European cities reviewed have more influence and control at a local level and are able to impose restrictions, or encourage organisations to work together because many of the modes of transport are still in public ownership. This is particularly true of public transport, allowing decisions to be made on the basis of long term impact rather than the more short term timescales of shareholders. It also allows an integrated approach to be adopted which is particularly important if a city wishes to encourage the general public out of their cars and onto public transport. This is less likely to happen if buses, trams, trains etc. do not mesh effectively.

### **Logistics**

CO<sub>2</sub> emissions and overall levels of pollution are linked to the movement of goods. Again, a number of European cities have been able to implement the establishment of transfer centres on the edge of cities because of the local control they can exert over businesses. Amsterdam and Paris have established freight transfer hubs where petrol and diesel-powered commercial vehicles transfer cargo to low-emission or zero-emission vehicles to reduce the number of delivery trucks in the cities. Similarly, Gothenburg has been able to ensure its port transfers freight via rail rather than road.

### **Buildings**

The European cities have more flexibility and power to influence building regulations within the city limits for new and existing buildings. For example, in Gothenburg any buildings constructed on land owned by the city have energy consumption levels considerably lower than the Swedish national requirements. The city of Gothenburg also owns a house building company and therefore can control the type of properties built.

Brussels developed a different approach offering funding through an annual call for exemplary building projects that score high in terms of their energy efficiency and environmental sustainability. The overall objective of this programme was to encourage the building sector to produce more sustainable buildings. In terms of retrofit the European cities continue to offer grants, subsidies and loans to encourage homeowners to improve the energy performance of their properties; it should be noted that similar schemes were more widely available in the UK until government policy changed in 2015. Many of the European cities continue to own social housing and again retrofit is a more straightforward proposition.

### **Financing**

As many of the European cities are directly involved in energy generation and delivery through their ESCO, they also have more autonomy to take out loans or issue bonds to support the delivery of large scale energy emission reduction projects. UK Core Cities have much less scope and freedom to act when it comes to raising finance to deliver large projects.

## 5. Results: Local Energy Devolution

The below table provides a summary of the criteria and the ranking of each combined authority (CA) on sustainability. This uses broader social, environmental and economic criteria than our Core City and LEP benchmarking, however, there are many of the same low carbon and climate change metrics included within the assessment.

KEY	Poor evidence 0-15%	Some evidence 16-49%	Good practice & evidence 50-82%	Leading practice & evidence 83-100%
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**Table 5: Summary benchmarking of sustainability leadership, strategy and delivery activity reported across all CAs**

COMBINED AUTHORITIES	Sustainability Criteria for Combined Authorities (%)					Overall Score  (Ranking of CA)
	Social Health inequality, fuel poverty, air quality	Environment Carbon emissions, green infrastructure, biodiversity, natural capital, climate resilience	Business, Low carbon economy, business support, buildings, resource efficiency	Energy Energy systems, renewables, district heating, energy efficiency	Transport Public transport, cycling/ walking, low emission vehicles and infrastructure	
CAMBRIDGE & PETERBOROUGH	14	6	8	8	17	11 (9)
GREATER MANCHESTER	64	75	64	61	78	68 (1)
LIVERPOOL CITY REGION	44	42	44	58	60	49 (3)
NORTH EAST	19	7	23	41	50	28 (6)
SHEFFIELD CITY REGION	15	36	42	30	36	31 (5)
TEES VALLEY	11	25	39	33	19	27 (7)
WEST OF ENGLAND	11	8	19	14	19	14 (8)
WEST YORKSHIRE	39	45	33	36	52	41 (4)
WEST MIDLANDS	56	44	50	42	70	52 (2)

Greater Manchester CA is the highest performer, not just on overall sustainability, but also on the low carbon aspects with strong commitments across areas such as fuel poverty, carbon emissions, low carbon business support, renewables and low carbon transport. Other strong performers include the West Midlands CA, Liverpool City Region CA and West Yorkshire CA.

**Table 6: Summary of low carbon priorities across all CAs**

<b>COMBINED AUTHORITIES</b>	<b>Mayoral Manifesto – Low Carbon Priorities</b>	<b>Devolution Deals - Low Carbon Aspects (Deal date)</b>	<b>Carbon Reduction Target</b>	<b>Strategic Economic Plan / Overarching Plan &amp; Other Strategies - Low Carbon Priorities</b>
<b>CAMBRIDGE &amp; PETERBOROUGH</b>	Public transport	Government to support more local powers over public transport (June 2015)	No	Promoting local strengths in low carbon and clean-tech  Local public transport
<b>GREATER MANCHESTER</b>	Public transport, carbon reduction and exploring 'carbon neutrality', green economy	Government to support regional low carbon meetings to explore new ways of working (Nov 2014, July 2015)	Reduce carbon emissions by 48% by 2020 from 1990 levels.	Electrification of all local freight and passenger transport  Energy efficiency for all 1.1m homes – target of 25,000 retrofitted homes per year  Clean energy plan and Energy company to promote £200m pipeline of heat networks, street lighting, sustainable lifestyles, energy switching projects  Business and skills support for low carbon business e.g. construction & energy & resource efficiency
<b>LIVERPOOL CITY REGION</b>	Public transport, electric charging infrastructure, new buses low carbon by 2020, zero carbon by 2040, renewable energy company & fund, green building standards, green economy	Government to support more local powers over public transport, tidal power scheme, energy efficiency for housing, and improved local grid connections (Nov 2015, March 2016)	Zero carbon by 2040	Electric charging infrastructure and low carbon bus fleet  Renewable energy company and fund – tidal & solar power & district heating strategy  City sustainable housing strategy to drive up energy efficiency standards – building on UK's largest retrofit programme  Support green business growth (4.5 billion private investment over last 5 years) e.g. resource efficiency & remanufacturing, procurement, light-weighting of cars, 2 <sup>nd</sup> largest



COMBINED AUTHORITIES	Mayoral Manifesto – Low Carbon Priorities	Devolution Deals - Low Carbon Aspects (Deal date)	Carbon Reduction Target	Strategic Economic Plan / Overarching Plan & Other Strategies - Low Carbon Priorities
				concertation offshore wind in world, largest source of hydrogen fuel in Europe.
<b>NORTH EAST</b>	No Mayor	No Deal	No	Energy alliance to promote low carbon business strengths e.g. offshore wind, energy systems, electric vehicles (region produced 26% of all electric cars in Europe in 2015), sustainable manufacturing
<b>SHEFFIELD CITY REGION</b>	First Mayoral elections expected in 2018	Local public transport improvements, use of public estates land for energy generation (Dec 2014, Oct 2015)	No	Low carbon energy, waste, utilities plan to attract 12,000 jobs by 2025 e.g. energy from waste and local heat networks, energy business parks, electric car charging, light-weighting manufacturing
<b>TEES VALLEY</b>	Mayor – but no manifesto	Support for Carbon Capture & Storage Schemes, improved local grid connections (Oct 2015)	Reduce Carbon emissions by 25% not clear by when.	<p>Circular economy – foresight design, re-engineering, and super integrated industrial processes sites e.g. Wilton</p> <p>Decentralised energy networks and generation, use of waste industrial heat to tackle fuel poverty</p> <p>Decarbonising heavy industry and use of Carbon Capture and Storage.</p>
<b>WEST OF ENGLAND</b>	Mayor – but no manifesto	Support for local public transport and tidal power schemes (March 2016)	No	Promoting green business strengths of climate and environmental risk, and sustainable materials, fuel cells & hydrogen (25% of HQs of UK environmental research bodies, highest concentration of climate scientists in world)
<b>WEST YORKSHIRE</b>	No Mayor	No deal	Emissions reductions against programmes,	Energy efficient and healthy housing improvements to tackle fuel poverty

COMBINED AUTHORITIES	Mayoral Manifesto – Low Carbon Priorities	Devolution Deals - Low Carbon Aspects (Deal date)	Carbon Reduction Target	Strategic Economic Plan / Overarching Plan & Other Strategies - Low Carbon Priorities
			not clear on overall target	<p>Business support to improve business resource efficiency and new low carbon opportunities</p> <p>Set up municipal energy company to help with smart meter roll-out, energy switching and £300m pipeline of district energy and renewables projects.</p> <p>Promoting low carbon buses, cars, and car clubs.</p> <p>Large renewables energy production, bio-energy and hydrogen into gas grid</p>
<b>WEST MIDLANDS</b>	Public transport, electric charging infrastructure, low carbon buses & vehicles, greater energy efficiency standards for buildings, promoting green economy	Local transport (Nov 2015)	40% reduction from 2010 baseline by 2030	<p>Promotion of low carbon research and business strengths and support in cars, buildings and energy storage and networks (e.g. Energy capital initiative).</p> <p>Electric car charging network and promotion of low carbon public transport</p> <p>Energy efficient buildings and housing retrofit</p> <p>Local heat and energy networks</p> <p>Waste reuse programme for major businesses</p>

The results indicate that having an elected Mayor appears to help drive CA low carbon priorities, given that most of the Manifestos contain low carbon commitments. However, in many cases this is building on the strong corporate commitment already in place through local partnerships and strategies.

Where there are devolution deals, beyond devolving local transport planning and operations, the low carbon aspects often appear to be a commitment to the government and CA to explore particular regulation or delivery ideas together. Examples include local

grid connections, tidal power, use of surplus government land for energy use, or to be at the front of the queue to pilot new national housing retrofit schemes. As one interviewee commented, *“we don’t need a devolution deal to have permission to talk to Central Government.”*

It is surprising, given the strategic nature of CAs and the significant funds they are influencing, that only over half of CAs have a carbon reduction target.

The types of low carbon priorities for each CA often have strong similarities given the nature of low carbon delivery and geography. They tend to fall within these broad areas:

- Electrification of public and private road use and improved public transport.
- Promotion of key local strengths in low carbon research and the business base.
- Energy infrastructure improvements such as local grid connections, district energy and local energy generation.
- Improved energy efficiency building standards and the retrofit of existing housing.
- Business support to focus on energy and resource efficiency.
- Setting up specific investment and delivery vehicles such as municipal energy companies or partnerships such as the West Midlands Energy Capital.

## 6. Good practice examples

One of the aims of the research was to identify good practice from across the Core Cities, their European counterparts and the combined authorities that could inspire or be replicated elsewhere. Four examples have been selected from the research. They showcase best practice in terms of the approach to projects and commitments to strengthen climate change adaptation and mitigation performance and why they have decided to do so.

### 6.1 Carbon emissions and the Greater Manchester Combined Authority

<b>GMCA</b>	BOLTON	MANCHESTER	ROCHDALE	STOCKPORT	TRAFFORD
	BURY	OLDHAM	SALFORD	TAMESIDE	WIGAN

#### Leadership

The GMCA has strong leadership on carbon emissions with a clear existing target to reduce carbon emissions by 48% by 2020 from 1990 levels supported by the new Mayor Andy Burnham. In addition, the Mayor is driving for accelerated progress.

*"Within a year of the election, we will host a Mayor's Green Summit to declare a new, accelerated ambition for Greater Manchester on the green economy and carbon-neutrality"*  
 - Mayoral Manifesto.

This leadership is then clearly supported by a Board member, staffing and partnership structures.

*"Leader of Stockport Council Cllr Alex Ganotis will lead on Greater Manchester's efforts to improve and protect the environment, green spaces and air quality. He will also bring forward plans for a Green Summit, bringing together environmentalists, experts and others to set a new ambition for carbon neutrality across Greater Manchester"* - GMCA Website.

*"The CA's work is centred on our Low Carbon Hub, run by a board of public, private, voluntary, university and government representatives. The hub combines business innovation with a special interest in a green, sustainable environment. There are 16 members of the LCH Board, including senior representatives from LAs, Wildlife Trust, University, Housing association, BBC, Siemens, Viridor, EA, Arup, New Economy Manchester, Electricity NW. Staff contact: Mark Atherton, Director of Environment"* - GMCA Website.

#### Strategy

The GMCA has an overall strategy, '*Stronger Together*,' which sets out the carbon reduction target. This is then cascaded and referred to within a range of other supporting strategies such as the GMCA Growth and Reform Plan and the GM Climate Change and Low Emission Strategy. The GMCA has the largest number of supporting plans and strategies of any CA, with good integration in the delivery of the overall carbon reduction target within the plans, although the number of plans can sometimes be difficult to navigate.

## Delivery

There is also clear monitoring against the target in the annual review and across all activity.

*“The new plan indicates that, from a 2013 baseline, 2.5 million tonnes CO<sub>2</sub>e (carbon dioxide equivalents) of savings will be delivered by 2020 if all of the existing and planned actions of this plan are fully implemented. There will be a further 1.2 million tonnes of cuts associated with background (national) activities on grid supply decarbonisation, appliance and vehicle efficiencies. This leaves at least 0.5 million tonnes of savings to be identified between now and 2020 beyond the proposed programme” - Annual Review.*

*“The various targets around air pollution, renewable energy and in particular the overarching carbon targets ensures that all activity undertaken by the GMCA considers whether it will contribute to these wider sustainability objectives. The Low Carbon Hub is led by senior individuals within organisations that make up the GMCA; this can ensure sustainability aspects are dealt with across all programmes” - GMCA Website.*

GMCA is one of the few CA's that has an Annual Report which is very transparent about progress and provides a 'Red Amber Green' rating on whether projects have been delivered or not; this includes several low carbon and sustainability projects.

Within the devolution deal the Government has committed to working with GMCA to consider how the design and delivery of national climate/energy policies and programmes can be better aligned and integrated to support delivery of GMCA priorities. In addition, Government officials sit on the GM Low Carbon Hub Board, attend quarterly Board meetings to review progress, unblock barriers, identify future opportunities and enhance cooperation between national and local government. There are ongoing discussions about areas such as energy efficiency, community energy and business energy tax reform.



GREATER MANCHESTER  
LOW CARBON HUB

## 6.2 One Planet Cardiff: Cardiff City Council



Cardiff today is a three planet city. If everyone in the world consumed natural resources and generated carbon dioxide at the same rate as in Cardiff, we would need three planets to support us. This is not sustainable or equitable to everyone we share our planet with.

The local authority has an aspiration for Cardiff to be a one planet city by 2050. To achieve this they have developed a Vision and Delivery Plan focusing on the key impact areas of energy, waste, transport, food, water, place and people.

The Vision sets out the targets for the authority and also provides a summary of actions and achievements to date. Targets include:

- 26% reduction in per capita CO<sub>2</sub> emissions by 2020.
- Zero waste city by 2050.
- 50% of all journeys in Cardiff to be made by sustainable transport by 2026.

The Delivery Plan lists a series of objectives and an associated list of actions and timescales.

All documentation is available on a dedicated website<sup>5</sup> which is extremely attractive and easy to use.

Fact sheets are provided for each impact area and contact details are easily obtainable.



### 6.3 Bristol Resilience Strategy: Bristol City Council



The Bristol Resilience Strategy was released in December 2016 and is a vision for how Bristol could look 50 years from now. It provides a framework for action to protect the city against potential shocks and stresses it may encounter in the future.

The strategy aims to tackle some of Bristol's major issues, including, traffic congestion, affordable housing, poor air quality and child poverty.

It was drawn up with help from local stakeholders and complements the new Corporate Strategy 2017-2022.

The future implementation of the Resilience Strategy will be overseen by the new City Office, which brings key

stakeholders and organisations together from across the city to develop solutions to the issues that matter most.

By developing an ambitious, long-term direction for the city, Bristol joins other global cities in the 100 Resilient Cities Network, including Glasgow, Greater Manchester and London.

The Strategy includes various approaches to improving resilience and includes focus on community based adaptation where providing communities with the resources and capacity

<sup>5</sup> <http://www.oneplanetcardiff.co.uk/#/home>



to take action to deal with shocks means neighbourhoods are better able to respond and recover from events.

The strategy identifies that a climate change adaptation plan will be developed to future-proof the city by identifying the major climate hazards and their potential impact, a framework for adaptation and identification of strategies to build climate resilience. Consideration of the issues will be required at a city scale with actions targeted at a local scale with their benefits well communicated. Many other aspects such as managing future flood risk, greening neighbourhoods, protecting green space and the value of natural capital are also included.

This is a comprehensive and ambitious strategy which sets out a framework of activity which should allow the city to increase its resilience and be better prepared for future extremes of weather associated with climate change.

#### 6.4 Green bonds: the City of Gothenburg



Green bonds were developed to fund projects that have a positive environmental or climate change impact. The green bonds market has expanded dramatically recently. In 2016, the credit rating agency Fitch stated that green bonds totalling \$113bn had been issued.

In 2013 the City of Gothenburg became the first to issue green bonds working with the World Bank, the Nordic Bank SEB and a group of Swedish investors. Gothenburg has used the bonds to finance a range of environmental projects in renewable energy, public transport, water treatment, energy efficiency, smart grids, urban planning and waste management. They will help the city transition to a low CO<sub>2</sub> emissions state. Eligible projects can include those:

- Mitigating climate change, including investment in low-carbon and clean technologies such as energy efficiency and renewable energy sources.
- Adapting to climate change including investments in climate-friendly growth.
- Where up to 20% of the project is related to environmental sustainability rather than direct climate-related goals.

Eligible projects are selected jointly by the City of Gothenburg's finance department and the group's environmental managers. These are then reported to the investors. The selection criteria used are monitored and validated by the Centre for International Climate and Environmental Research, Norway's foremost institute for interdisciplinary climate research. Since 2013 the city has used green bonds to fund the following projects:

**Eco-cycle and Water Department:** The Lackarebäck water treatment plant and purification filter (SEK 150 million); total cost approximately SEK 700 million. Anticipated effects of the project are 40% increase in capacity, reduced disease outbreak and 1.4 million fewer hospital days.

**Göteborg Energi, GoBiGas:** Large-scale biogas production from forestry waste with high efficiency in production and recovery of waste heat for district heating and electricity (SEK 300 million). The project is a platform for development in industry and academia.



## 7. Recommendations

From the results of the research and good practice case studies, a series of recommendations are set out for the different audiences of this report.

**National** – For organisations such as BEIS, the Environment Agency, Natural England, Energy Systems Catapult, DCLG and Defra, along with those that provide national or local support to core cities and combined authorities:

- There should be transparency around how the government intends to replace the low carbon and climate change aspects of EU funding post-Brexit. There is a huge opportunity to provide more flexible and easier-to-access funding to strengthen this agenda.
- The model for funding and support provided by the Heat Networks Delivery Unit and Heat Networks Investment Project for local authorities delivering heat networks should be learned from. Many of the Core Cities cited this as an excellent source of support for the reasons that:
  - It was well communicated and expectations were clearly established.
  - Local support to local authority officers was available.
  - It is easy to contact the right individual at BEIS.
  - The scheduled approach to rounds of funding was useful.
  - Funding has been available for all stages of implementation from heat mapping, to energy masterplanning, techno-economic feasibility, detailed project development and early commercialisation, and capital investment.
- With devolution deals should be the requirement for CAs to define carbon emissions targets and provide annual reporting on progress.

**Local** – For combined authorities and their supporting working groups that are tasked to specifically progress climate change and low carbon issues:

- Having an elected Mayor can help drive CA low carbon priorities building on strong corporate commitments already in place through local partnerships and strategies.

**Local** – For local authorities and their supporting working groups that are tasked to specifically progress climate change and low carbon issues and those who manage external funding sources in local authorities on behalf of core cities or combined authorities:

### Climate change mitigation

- A commitment to carbon management and reduction should be expressed at a senior level with a cabinet member having overall responsibility and ownership.
- A visionary carbon reduction plan should be in place for at least the next five years with evidence based targets, costed and prioritised opportunities for reduction and a clear implementation plan including roles, responsibilities and measures. For example,

Manchester City Council is working with the LEP and combined authority and this year will host a Mayor's Green Summit to declare a new, accelerated ambition for Greater Manchester to achieve carbon neutrality, in advance of their existing commitment for 80-90% reduction by 2050.

- Where possible, targets should be set at both organisational level, so that internal processes and their impact can be monitored, as well as at LEP level, working with other local authorities and organisations to drive down emissions on a larger scale. The latter approach will also help to open up more opportunities for funding and provide greater attraction to investors.
- From an organisational perspective, carbon management should be identified as a priority embedded within corporate strategies and relevant corporate plans. There should be an understanding of what this means across all functions and efficiencies and cost savings are recognised. Mitigation should be a priority consideration within delivery across all key service areas.
- Financing low carbon projects can be challenging and could become even more difficult as European funding disappears over the next few years. As such, local authorities will need to consider a new funding options. For instance, Birmingham City Council is hoping to work with the West Midlands Combined Authority to develop district heating networks using the Housing Infrastructure Fund.
- A detailed carbon footprint should be regularly calculated and published.
- Clear policies and site-specific targets should be developed where possible for design standards and different low carbon technologies, both linked to regional and national targets. Supplementary guidance with low carbon design assistance should be provided more systematically by the council's team.
- Innovation should be taken in developing staff engagement and training. This should include active participatory approaches to target setting, delivery of opportunities and measurement and reporting of success.
- Detailed advice should be available to all local business and other organisations in relation to carbon mitigation and can be supported by the LEP level Growth Hubs.

### **Supporting the low carbon economy**

- All councils are moving more towards supporting their local economies, therefore embedded opportunities and consideration of the low carbon economy should be included in all council plans and decision-making. The promotion of the low carbon economy should be seen as priority by executives with an identified cabinet member and/or reporting committee to champion the agenda.
- Analysis of local business and social enterprises should be undertaken to identify those able to provide low carbon goods and services. There should be a strategy and

action plan in place which clearly identifies low carbon economy opportunities and requirements relating to key sectors of the local economy and how this relates to the council's individual departments, services, plans, operations and partnerships. This would benefit from being embedded within the publication of a low carbon plan that covers the council's operations and the LEP area.

- Local networks for 'green' businesses can be supported by the local authority as an excellent means of supporting growth of low carbon sectors. For example, Bristol City Council supported the establishment of several local networks such as Low Carbon South West which has now gone on to be self-financing. Low Carbon South West is a membership organisation and sector partnership between businesses, academia, investors, local authorities and both regional and national agencies promoting the growth of the environmental sector and low carbon industries.
- There should be active engagement with residents, businesses, retailers, schools and community groups about how they can make positive changes in their purchasing behaviour and consumption. Council procurement policies should include consideration of sustainability criteria and potential bidders should be supported to allow them to best address these issues.
- The council should have an ongoing approach to identify the gaps and actions required for skills, training, specific funding and partnerships to help achieve a low carbon economy and carbon reduction targets.

#### **Adaptation**

- Adaptation should be identified as a priority within corporate strategies and relevant corporate plans, with impacts and response of key service delivery areas included. A nominated cabinet member should be responsible for adaptation with identified lines of responsibility to service delivery officers.
- Adaptation must be a priority consideration within the delivery across all service areas and a key issue within planning policy and associated decision-making. Risks and opportunities for current and future scenarios should be prioritised for council services, partners and community stakeholders to prevent future extreme weather events from negatively affecting service delivery and resulting in costs.
- Liverpool City Council had a good score in relation to adaptation for a number of reasons. One reason was the recent publication of 'Building Climate Resilience - Good Practice Case Studies in Liverpool City Region.' The council worked with various partners to develop the document which showcases thirteen good practice examples of climate resilience that have emerged in the City Region over the last few years.
- An adaptation plan should be developed to cover all risks, opportunities and responses based on a local climate impact assessment. Implementation of actions should then be ongoing and proactive across all services and sectors. Monitoring mechanisms provide evidence of impacts and value of delivered schemes. Detailed

information should be communicated both internally and externally about drivers, strategies, targets, reduction plans and achievements.

- Residents and community groups should have a central role in identification of adaptation risks and opportunities and the local authority should work with them and partners to help improve their resilience. Moreover, local authority officers should work with flood risk teams – a mandatory top-tier council function – civil contingencies officers and emergency planners to instil a greater resilience into both local authority operations and the wider communities in which they serve.



## Appendix 1: Core City Benchmark Methodology

### Assessment criteria

To assess the extent to which each of the ten Core Cities are committed to addressing climate change and the low carbon economy, a set of criteria was developed by SWM that aimed to cover a range of parameters. This included the implementation of carbon targets, evidence of delivering projects relating to climate change and the low carbon economy and methods to ensure these issues are being considered across all local authority activity.

The criteria to identify good practice were based on SWM's sustainability benchmark for local authorities '*Local Authority Sustainability Benchmark 2016*',<sup>6</sup> which has been undertaken annually since 2010. Other national research was also reviewed to identify any additional review criteria. This included the first national benchmark of LEP low carbon activity by SWM in 2015, '*Fit for the Future? Local Enterprise Partnerships' Climate Ready and Low Carbon Economy Good Practice*',<sup>7</sup> and also '*Research to Survey Local Authority Action on Adaptation 2015*' for the Committee on Climate Change.<sup>8</sup>

A spreadsheet was then developed containing the final criteria and assigned a letter to determine whether the criteria referred to climate adaptation (A), mitigation (M) or the low carbon economy (LCE). We wanted to cover these broad categories so that a wide spectrum of progress on several issues could be analysed, the exercise could be repeated to benchmark performance and so that the questions were clear enough to indicate what action was required and that it is broadly consistent with previous specific assessments from the previous methodologies.

Overall, there are 24 criteria, 12 of which focus on adaptation, 13 on mitigation and 10 on the low carbon economy, with nine criteria overlapping across two or three of these themes. These were grouped around issues of leadership (nine criteria), strategy (seven criteria) and delivery (eight criteria). These are shown overleaf.

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<sup>6</sup> <http://bit.ly/2oD6lw2>

<sup>7</sup> <http://bit.ly/1Kp0c0A>

<sup>8</sup> <http://bit.ly/2u9OIGX>

### Leadership<sup>9</sup>:

<b>1a</b>	Is there evidence of the local authority providing strong leadership and communicating messages on why climate adaptation is important to the local economy, both now and in the future?	<b>A</b>
<b>1b</b>	Is there evidence of the local authority providing strong leadership and communicating messages on why climate change mitigation is important to the local economy, both now and in the future?	<b>M</b>
<b>1c</b>	Is there evidence of the local authority providing strong leadership and communicating messages on why stimulating the low carbon economy is important to the local area, both now and in the future?	<b>LCE</b>
<b>2a</b>	Is there evidence of an individual or team working at the local authority whose primary responsibility is to deliver climate adaptation activity?	<b>A</b>
<b>2b</b>	Is there evidence of an individual or team working at the local authority whose primary responsibility is to deliver low carbon activity and stimulate the low carbon economy?	<b>M</b> <b>LCE</b>
<b>3a</b>	Is there evidence of a portfolio holder who focuses partly or wholly on climate change adaptation?	<b>A</b>
<b>3b</b>	Is there evidence of a portfolio holder who focuses partly or wholly on carbon reduction or stimulating the low carbon economy?	<b>M</b> <b>LCE</b>
<b>4a</b>	Is there evidence that the local authority is involved with a LEP level working group that has a partial or full responsibility for identifying and developing actions with cross-sector partners to deliver climate adaptation actions?	<b>A</b>
<b>4b</b>	Is there evidence that the local authority is involved with a LEP level working group that has a partial or full responsibility for identifying and developing actions with cross-sector partners to deliver low carbon activity and stimulate the low carbon economy?	<b>M</b> <b>LCE</b>

### Strategy:

<b>5a</b>	Is there evidence of understanding the climate risks affecting critical elements of your economy (e.g. large businesses; industrial parks; key clusters and sectors)?	<b>A</b>
<b>5b</b>	Is there any evidence of analysing your authority's strengths and opportunities in producing adaptation goods and services, e.g. by mapping or developing a SWOT analysis?	<b>A</b> <b>LCE</b>
<b>5c</b>	Do residents and community groups have central role in identification of adaptation risks and opportunities. Clearly defined individual prioritised risk and response strategies have been developed.	<b>A</b>
<b>6a</b>	Has the local authority published a strategy that sets out how it will deliver activity related to one or all the themes of climate adaptation, local clean energy development, reducing environmental impacts and carbon emissions and/or stimulating a low carbon economy including targets?	<b>A</b> <b>M</b> <b>LCE</b>
<b>6b</b>	Is there evidence of the local authority measuring its impact on the environment, in particular in relation to the implementation of carbon reduction targets (scope 3 emissions)?	<b>M</b>
<b>7a</b>	Does the Local Plan make clear commitments and contain stretching targets and future plans for the development of a low carbon economy, adaptation, low carbon design and renewables including targets (such as district heating, renewable energy)?	<b>A</b> <b>M</b>
<b>7b</b>	Is there evidence of sufficient sites and premises in development for low carbon businesses to thrive (e.g. incubator sites, demonstrators, Enterprise Zones etc.)?	<b>LCE</b>

### Delivery:

<b>8a</b>	Are actions underway to strengthen the resilience of local businesses and supply chains to climate impacts (e.g. signposting to guidance, advice or training)?	<b>A</b>
<b>8a</b>	Are actions underway to strengthen local businesses and supply chains by reducing energy, carbon and/or waste costs (e.g. signposting to environmental networks or advice)?	<b>M</b>
<b>8c</b>	Are actions underway to strengthen local businesses and supply chains for low carbon technologies and services (e.g. meet the buyer events, networking between suppliers, raising awareness of low carbon opportunities amongst businesses)?	<b>LCE</b>
<b>9a</b>	Is there integration of a sustainable procurement policy and guidance across all departments and purchasing decisions. Active inclusion of whole life costing and identified priorities.	<b>M</b> <b>LCE</b>
<b>10a</b>	Is there evidence that mitigation and adaptation is a priority consideration across all service areas?	<b>A M</b>
<b>10b</b>	Is there evidence of innovation in staff engagement and training, including evidence of more active participatory approaches to target setting, delivery of the opportunities and measurement/reporting of success.	<b>M A LCE</b>
<b>11a</b>	Is there evidence of innovative measures to increase energy efficiency uptake in social and private housing?	<b>M</b>
<b>11b</b>	Is the local authority working in partnership with schools to reduce carbon emissions and energy costs	<b>M</b>

<sup>9</sup> Note that that criterion 4a and 4b are not applicable to Cardiff or Glasgow where the LEP structure is not in place.

### Publicly available information analysed

To establish the answer to the criteria described, we analysed publicly available information including:

- Local authority websites.
- Local strategies and policies relevant to the low carbon agenda (e.g. those focussing on sustainability, climate change, waste, transport, energy).
- Local Plan documentation.
- Supplementary planning guidance.
- Procurement information.
- Home Energy Conservation Act (1995) reports.
- Other reports including details of carbon emissions.

The availability of such documentation varies from authority to authority but a comprehensive list of 'key words' was used when searching for documents to ensure that a fair and consistent approach was taken to identifying sources of information.

### Interviews

The specific questions that were asked during the interviews relevant to this piece of work were as follows (A = Adaptation, M = Mitigation, LCE = Low Carbon Economy):

- Who leads on delivering projects focusing on low carbon/energy/climate change at the local authority? *[Leadership, A, M, LCE]*
- Is there a portfolio holder who champions the low carbon/energy/climate change agenda? *[Leadership, A, M, LCE]*
- Do you believe that the low carbon and green growth agenda in your area is robust against any future changes to policy or funding? Will you continue to invest in the agenda in future *[Leadership, M, LCE]*
- What funding do you currently use, and what future funding do you envisage utilising to support and invest in the low carbon agenda, in particular post-2019? *[Delivery, M, LCE]*
- Has the authority developed a low carbon/energy strategy that sets out how you will develop the low carbon/energy agenda? *[Strategy, M, LCE]*
- Has the authority set, or does it work towards, a carbon reduction or any other low carbon/energy related target(s) and how does it monitor these? *[Strategy, M]*
- Has the authority implemented a mechanism to signpost businesses to how they can become more energy efficient, access low carbon markets and/or become more resilient to climate impacts? *[Delivery, A, M, LCE]*
- What progress has the authority made towards understanding and addressing the key climate risks that your local economy will face? *[Strategy, A]*

- Do you have a list of current or pipeline projects you are developing which you could share related to low carbon, energy or climate change? *[Delivery, A, M, LCE]*
- Has the authority implemented any heat network schemes in your area and who have you worked with to achieve this? *[Delivery, M, LCE]*
- Who are the key stakeholders that the authority works with when developing low carbon and energy related projects? *[All, A, M, LCE]*

### Scoring

The approach used to score each of the criteria was the same as that used by SWM to benchmark local authorities and LEPs going back to 2010. The scoring system is shown below:

**Scoring system used for assessing progress against each criteria.**

0 - No evidence	1 - Some evidence	2 - Good evidence	3 - Leading evidence
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This approach was utilised for consistency and because of its simplicity. Each criteria was given a score and from these an average score was determined:

- Overall for each Core City.
- Overall for Adaptation, Mitigation and the Low Carbon Economy per Core City.
- Overall for each of the categories of Leadership, Strategy and Delivery per Core City.

This score was then converted to a percentage score for the purposes of this report. This was done by taking the awarded score (y) and the maximum possible score of 3 and using the following sum:

$$(y \div 3) \times 100$$

The scoring system, when converted to a percentage, is as follows:

**Scoring system used for assessing progress against each criteria, when converted to %.**

0% - 16.49% Minimal Evidence	16.5% - 49.9% Some evidence	50.0% - 83.0% Good evidence	83.1% - 100% Leading evidence
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This provided a useful overall comparison between each Core City on each of these key sub-sections and nationally. The scoring of the criteria was undertaken by SWM staff and then reviewed for consistency by the lead researcher.

### BEIS support questions

The specific questions that were asked during the interviews relevant to this piece of work were as follows:

- Which of the following support options (if any) did you take advantage of?
  - Provision of local and national policy and funding information.

- One-to-one support to identify opportunities, develop energy and low carbon strategies and access funding.
  - Facilitating engagement with local and national stakeholders.
  - Providing a platform for you to feed into the national energy and low carbon debate.
  - Other.
- Which aspect of the above BEIS support had the biggest impact for your organisation's delivery of energy and low carbon projects and why?
  - Are there any additional types of support that it would have been useful for BEIS to provide?
  - Are there any activities that BEIS should stop providing?
  - Has BEIS support impacted the energy and low carbon projects you have delivered<sup>10</sup>?
    - Identification of opportunities.
    - Identification of barriers to project plans.
    - Management of project delivery.
    - Level of ambition for energy and low carbon impacts.
    - Interaction and shared working with LEPs.
    - Other.
  - Has BEIS support impacted your energy and low carbon ERDF funding in the following areas<sup>10</sup>?
    - Awareness of funding opportunities.
    - Understanding of eligibility and other criteria.
    - Development of a strategic funding approach.
    - Quality of bids and success rates.
    - Overall funding income.
    - Access to match funding.
    - Level of ambition.

### Limitations and future improvements

There are a number of limitations to the research that may reduce the clarity and accuracy of the results.

- The benchmark scoring could be somewhat subjective based on the evidence interpreted by the review team. However, the principal researcher for all Core Cities is the same allowing for consistency when scoring.
- There can be a gap between stated intention and action on the ground. As such, we supplemented the literature review with interviews to gain more depth of occurring activity and an indication of reality.

**-END-**

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<sup>10</sup> Scored: 5= Improved significantly, 4= Improved slightly, 3= No impact, 2= Worsened slightly, 1= Worsened significantly