Technical Paper 2

Report on the impact of national policy and programmes on Birmingham's carbon dioxide (CO_2) emissions to 2027

March 2013

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1. Executive Summary

1.1 The lack of a decarbonisation target in the draft Energy Bill has been criticised for creating uncertainty amongst investors, and causing concern over the UK's ability to realise the decarbonisation scenarios set out in the Carbon Plan.

1.2 Birmingham's CO_2 emissions could decrease by approximately 32% by 2026 if national policy successfully leads to a maximum grid intensity of 100gCO_2/kWh by 2030[1].

1.3 This is the central assumption that government is currently working towards, although a higher scenario is presented in the Gas Strategy under which the electricity grid only reaches 200gCO_2/kWh by 2030. A decarbonisation target will not be formalised until 2016 when the fifth carbon budget is developed.

1.4 If, in 2016, a formalised decarbonisation target is projected to deliver grid intensity higher than 100gCO_2/kWh, then Birmingham will have to decide whether to:

a) maintain its 60% CO_2 reduction target by committing additional local investment and effort to decarbonise the electricity supply within Birmingham and/or reduce electricity demand; or

b) reduce Birmingham's ambitions in line with updated national policy/projections.

1.5 Another option could focus on specific CO_2 reductions called for from heating, energy efficiency and transport within the city. This would delineate local from exogenous contributions to the overarching target, and would bring success criteria within the control of the city. However this would require more sophisticated modelling that is not currently available at a local level.

1.6 On 5th February 2013, government tabled amendments to the Energy Bill proposing a duty for a decarbonisation target range. This will be set alongside the planning for the fifth carbon budget period, which will take place in 2016. However, the amendments do not commit government to deliver 100gCO_2/kWh and leaves open the possibility that higher scenarios for grid intensity would be set from 2016 onwards.[2]

1.7 Given this uncertainty, Birmingham must consider the opportunities and barriers to wider decarbonisation of the city's electricity through decentralised energy networks, for example through district heating networks, as part of its City Energy Plan and a Birmingham Carbon Roadmap.

1.8 Birmingham must systematically monitor and review progress of both local action and national plans. Maintaining the well-established relationship with DECC is of key importance to the ongoing understanding of Birmingham's CO_2 reduction activity.

[1] Based on a linear progression towards 2030.

[2] http://www.publications.parliament.uk/pa/bills/cbill/2012-2013/0100/amend/pbc1000502m.123-129.html

2. Introduction

2.1 In 2005, the Birmingham Strategic Partnership (BeBirmingham - the former Local Strategic Partnership) established a city-wide per capita carbon dioxide (CO_2) emissions reduction target of 60% by 2026 against a 1990 baseline.

2.2 The Birmingham Climate Change Strategy and Action Plan 2007 outlined the actions Birmingham should begin to undertake to commence work on the target.

2.3 In August 2012 the Department of Energy and Climate Change (DECC) completed a Birmingham Carbon Plan Analysis (BCPA) which suggested that as a result of national policy and projected technology improvements, in particular the electricity decarbonisation scenario set out in the UK Carbon Plan,[3] CO_2 emissions in Birmingham could reduce by upto 42% by 2026, broken down as:

- Electricity – 32%
- Gas – 5%
- Fuel – 5%

2.4 A large proportion of this, approximately 32%, will be delivered through CO_2 emissions reductions in Birmingham's electricity consumption, caused by decarbonisation of the national grid as set out in the Carbon Plan's 100gCO_2/kWh scenario.

2.4 Since the BCPA was completed there have been two key developments:

1. A comprehensive review of Birmingham's CO_2 baseline and target has been completed. An updated target of a 60% total CO_2 emissions reduction by 2027 against a 1990 baseline has been set.[4]

2. Since the production of the Carbon Plan which formed the basis on which the 42% reduction was estimated, there have been further developments in the Energy Bill and the provisions it puts in place for Electricity Market Reform (EMR).

2.5 Developments in the Energy Bill and EMR have generated a level of uncertainty over the government's timetable for decarbonising the national grid (although not on the overall ambition to reduce UK emissions by 80% by 2050). This brings into question the extent to which a 42% CO_2 reduction in 2026 from national policy and technology improvements can be relied on as a reasonable estimate for Birmingham to base its additional efforts on. Should action to decarbonise the national grid be delayed, the exogenous contribution to Birmingham's target could be significantly reduced.

[3] The Carbon Plan: Delivering our Low Carbon Future https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/47613/3702-the-carbon-plan-delivering-our-low-carbon-future.pdf

[4] Further information can be found in 'Technical Paper 1: Report on Birmingham's carbon dioxide (CO_2) emissions reduction target baseline,' February 2013,

2.6 This report considers the current uncertainties brought about by the latest developments in UK policy in order to raise awareness of any potential barriers to Birmingham achieving its target, and to explore contingencies in advance. By considering these uncertainties Birmingham hopes to understand how to achieve its 60% CO_2 reduction by producing a Birmingham Carbon Roadmap by autumn 2013.

3. Overview of Energy Bill and Electricity Market Reform

Energy Bill[5]

3.1 On Thursday, November 29th 2012, the Secretary of State for Energy and Climate Change confirmed the Introduction of the Energy Bill to the House of Commons alongside the Annual Energy Statement. The Annual Energy Statement sets out the government's progress made during the year, the action it is taking to implement its energy and climate change strategy and how it will develop its approach further, in particular:

- rebuilding the UK's energy infrastructure;
- putting householders and businesses in control of their energy bills;
- driving international action on climate change;
- managing energy legacy; and,
- ensuring delivery.

The Energy Bill is available to download online.[6]

3.2 The central aim of the Bill is to ensure that the UK is able to generate enough energy to meet its needs in the context of decarbonising power generation, decommissioning older plants and meeting rising demand for electricity. It puts in place a legislative framework to support this transition, using new, integrated schemes to deliver the £100 billion investment needed by the new infrastructure.

3.3 It includes provisions on:

- **Part 1: Electricity Market Reform (EMR)[7]**

3.4 The Energy Bill puts in place measures to attract the £110 billion investment which is needed to replace current generating capacity and upgrade the grid by 2020, and to cope with a rising demand for electricity.

3.5 The White Paper on the EMR sought to address the challenges to delivering secure, affordable and low-carbon electricity. It proposed a substantial reform of the electricity market in order to attract the billions of investment needed to replace current generating capacity and upgrading the national grid by 2020, and encourage a balanced mix of renewables, new nuclear energy and carbon capture and storage.

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[5] https://www.gov.uk/government/organisations/department-of-energy-climate-change/series/energy-bill

[6] http://services.parliament.uk/bills/2012-13/energy.html

[7] https://www.gov.uk/government/policies/maintaining-uk-energy-security--2/supporting-pages/electricity-market-reform

3.6 It includes the following chapters:

1.Key considerations for the Bill - the Climate Change Act 2008 carbon reduction targets of 34% by 2020 and 80% by 2050; the need for security in our electricity supply (including through a diversified energy mix); the cost to consumers; EU targets for 15% of UK energy to be supplied from renewable sources by 2020.

2. Contracts for Difference (CFD): long-term contracts to provide stable and predictable incentives for companies to invest in low-carbon generation;

3. Capacity Market: to ensure the security of electricity supply;

4. Conflicts of Interest and Contingency Arrangements: to ensure the institution which will deliver these schemes is fit for purpose;

5. Investment Contracts: long-term contracts to enable early investment in advance of the CFD regime coming into force in 2014;

6. Access to Markets: This includes Power Purchase Agreements (PPAs), to ensure the availability of long-term contracts for independent renewable generators, and liquidity measures to enable the government to take action to improve the liquidity of the electricity market, should it prove necessary;

7. Renewables Transitional: transition arrangements for investments under the Renewables Obligation scheme; and

8. Emissions Performance Standard (EPS): to limit carbon dioxide emissions from new fossil fuel power stations.

- **Part 2: Nuclear Regulation**

3.7 The Bill places the interim Office for Nuclear Regulation (ONR) on a statutory footing as the body to regulate the safety and security of the next generation of nuclear power plants. This includes setting out the ONR's purposes and functions.

- **Part 3: Government pipe-line and storage system**

3.8 The Bill includes provisions to enable the sale of the government Pipe-line and Storage System (GPSS). This includes providing for the rights of the Secretary of State in relation to the GPSS, registration of those rights, compensation in respect of the creation of new rights or their exercise, and for transferral of ownership, as well as powers to dissolve the Oil and Pipelines Agency by order.

- **Part 4: Strategy and policy statement**

3.8 The Bill improves regulatory certainty by ensuring that government and Ofgem are aligned at a strategic level through a Strategy and Policy Statement (SPS), as recommended in the Ofgem Review of July 2011.

4. Uncertainties

4.1 The Energy and Climate Change Select Committee report[8] has been used to provide an overview of the uncertainties caused by the Energy Bill.

4.2 These are their Report's own words. Words in brackets have been added by Responding to Climate Change[9].

4.3 Clear goals: The DECC stated objectives for reforming the electricity market (to move to a secure, more-efficient, low carbon energy system in a cost-effective way) are uncontentious but vacuous; very few people would seriously object to these aims. However, the lack of specific outcomes means that there is still uncertainty about what exactly the government is hoping to achieve through these reforms.

4.4 Not enough focus on energy efficiency: As with many aspects of energy policy, the government has fallen into the trap of focusing far too closely on the supply side of the energy system, while neglecting to consider the contribution that demand-side activities could make to security and climate change objectives. Thinking about the demand-side needs to be given a much higher priority in the Bill, not least because it is likely to deliver much more cost effective solutions than building ever greater levels of generating capacity.

(DECC released a report on how it could reduce consumer demand for electricity this month. UK electricity demand in 2010 was 328 TWh – in 2030 it is projected to rise to 411 TWh. 155TWh of demand reduction potential (40%) has already been identified)

4.5 Negative effect on independent producers: Witnesses told us that the EMR (Electricity Market Reform) proposals as they stand will in fact deliver the exact opposite of this ambition; they are likely to lead to greater levels of vertical integration and fewer independent players in the market. It will become a "big boys' game" that will not work for "little people".

The Coalition Agreement states that "We will encourage community-owned renewable energy schemes where local people benefit from the power produced". However, the Renewable Obligation has not delivered community-owned schemes and the proposed CfDs are also unlikely to work for community schemes. A simple Fixed Feed-in Tariff would be a more appropriate form of support.

(The Renewable Obligation was introduced in 2002. It places an obligation on UK electricity suppliers to source an increasing proportion of electricity they supply to customers from renewable sources.)

4.6 Emissions Performance Standard: The Emissions Performance Standard (a specified emissions threshold for new power stations) as currently proposed

[8] Energy and Climate Change - First Report Draft Energy Bill: Pre-legislative Scrutiny
http://www.publications.parliament.uk/pa/cm201213/cmselect/cmenergy/275/27502.htm

[9] **At a glance: Key criticisms of UK draft energy bill in Select Committee report, Responding to Climate Change,**
http://www.rtcc.org/at-a-glance-key-criticisms-of-uk-draft-energy-bill-in-select-committee-report/

would be at best pointless. At worst, the decision to grandfather (once a plant receives planning permission it will not be affected by subsequent changes to emissions rules for a certain period) the initial level until 2045 may undermine our ability to meet long-term carbon targets and so the length of the grandfathering period should be reduced.

4.7 Dash for gas warning: The government's intention to review the EPS in 2015 is another source of uncertainty for investors. It may even cause a "dash for gas" itself, if investors rush to build gas plant before the review. We are concerned that DECC's decision to grandfather the EPS until 2045 is not compatible with our long-term decarbonisation objectives.

If too much new unabated gas-fired plant comes forward under these arrangements, future governments could be faced with a tough decision either to miss the carbon budgets or to set an extremely high carbon price.

4.8 Time for policy certainty: It is right to prioritise the decarbonisation of the electricity system because this is likely to deliver the most cost effective route to meeting our 2050 climate change targets. Although statutory carbon reduction targets are set out in the Climate Change Act 2008, these are economy wide, rather than sector specific.

We conclude that providing greater clarity about the contribution that the power sector is expected to make towards meeting these targets would help to provide certainty to investors. The government should set a 2030 carbon intensity target for the electricity sector in secondary legislation based on the recommendation of the Committee on Climate Change.

4.9 What price Nuclear?: Since there is little competitive pressure or prospect of moving to auctions for new nuclear, we are concerned that the strike price for nuclear could be driven upwards. We hope that industry claims that the cost of nuclear is competitive with other forms of low-carbon energy will be reflected in the offers they put forward during strike price negotiations.

We do not believe that a nuclear strike price higher than that given to offshore wind would represent good value for money to the consumer. The Secretary of State should not agree to contracts of this nature.

4.10 Lack of cooperation from Treasury: The perceived conflict between DECC and HM Treasury on some aspects of EMR is also contributing to uncertainty among the investor community. We sincerely hope that these two departments can in future develop a better working relationship than they have demonstrated to us during the course of our inquiry. We hope that all departments will present a clear, consistent and united message as the Bill passes through the House.

5. The impact on Birmingham's carbon reduction target

5.1 The Birmingham Carbon Plan Analysis suggests that upto 42% of Birmingham's 60% CO_2 emissions reduction target[10] could be delivered by national policy and technology improvements.

5.2 This 42% is derived from the emissions of the three main fuel types used within the city, and represents a business as usual (BAU) baseline for future emissions from each fuel type. These assume no action is taken within Birmingham, but that national policy and projected technology improvements do take place. These figures therefore represent the exogenous contribution to Birmingham's CO2 reduction, the most significant of which is grid decarbonisation.

- Electricity – 32%
- Gas – 5%
- Fuel – 5%

5.4 The vast proportion of the possible 42% CO_2 reduction lies within decarbonisation of the national electricity grid which is predominantly set by central government policy. This will include large-scale shifts away from coal-fired generation towards natural gas, improved power station efficiencies and more renewable energy generation. A 32% reduction in overall emissions would represent a reduction in Birmingham's electricity-related emissions of 74% from 2214ktCO2 in 2010 to around 700ktCO_2 in 2027.

5.5 As EMR will provide the foundations for continued reductions in emissions and future deployment of low carbon generation, the uncertainties raised within the latest national development are directly applicable to the potential 32% reduction on Birmingham's CO_2 emissions from electricity.

5.6 Assumptions of the 32% CO_2 reduction estimate

- No action is taken within Birmingham, but national policy and projected technology improvements do take place.

- The 32% estimate would be delivered on the assumption that UK policy is successful and linear in achieving a reduction in the carbon intensity from 448gCO_2/kWh in 2009 to 100gCO2/kWh by 2030.

- Smart meters will likely provide additional abatement through demand reduction and facilitating smart grids but this has not been reflected in this analysis.

- Domestic emissions will gradually fall as lighting and appliances become more efficient.

[10] See Technical Paper 1 on updates to Birmingham's CO_2 emissions reduction target

- Commercial consumption may increase due to an assumed 1.5% average GDP growth. This is line with assumptions in the national 2050 pathway calculator.

5.7 Level of uncertainty

The absence of a decarbonisation target for electricity, as recommended by the Committee on Climate Change, has generated concern that UK electricity emissions will not decline as quickly as set out in the Carbon Plan.

5.7 DECC have announced that a final decision on the electricity sector target will be made as part of the setting for the fifth carbon budget in 2016, which covers the corresponding period (i.e. 2028-32), and falls within the overall framework of the Climate Change Act.

5.9 On 5th February 2013, government tabled amendments to the Energy Bill proposing a duty for a decarbonisation target range. This will be set alongside the planning for the fifth carbon budget period, which will take place in 2016. However, the amendments do not commit government to deliver 100gCO_2/kWh and leaves open the possibility that higher scenarios for grid intensity would be set from 2016 onwards.[11] There are three scenarios set out in the Gas Strategy which provide a further range of grid intensity scenarios:

- In the 37GW of gas scenario about forty new power stations might be constructed by 2030. Combined with a policy to expand production of power from renewables and nuclear. This scenario would reduce the emissions intensity of the power sector to 200gCO_2/kWh of electricity by 2030
- In the 19GW of gas scenario, the emissions intensity of the UK power sector is reduced to 50gCO_2/kWh - as the Committee on Climate Change advises as necessary.
- In the 26GW scenario, about 30 new gas power stations are built and the emissions intensity of the UK power sector falls to 100gCO_2/kWh by 2030.

5.10 The 200gCO_2/kWh Scenario

The UK only achieves a carbon intensity of the grid to a range of 200gCO_2/kWh.

This scenario would mean that Birmingham's carbon emissions from electricity would be reduced by approximately just 16% rather than 32% in 2026.

If we rely on grid decarbonisation to achieve a significant part of target the 200g scenario would mean an additional 16% would need to be required from Birmingham.

Until there is more certainty from national policy, Birmingham must be firmly aware of the implications of late grid decarbonisation on its carbon target.

[11] http://www.publications.parliament.uk/pa/bills/cbill/2012-2013/0100/amend/pbc1000502m.123-129.html

6. The Role of Local Authorities

6.1 The EMR will have an impact on local authorities given their traditional roles as estate managers, commissioners of local infrastructure and planning, procurers of electricity and civic leaders with carbon reduction plans.

6.2 Local authorities may want to press the government further on its plans to consider how local communities can benefit from large infrastructure projects, including new nuclear and onshore wind. New, and potential roles, include supplying electricity and investing in community renewables which have the potential to meet energy needs, support energy demand reduction, create jobs and boost the local economy. The Bill's provision in relation to small-scale and community-level generation is ambivalent. Those local authorities with ambitious energy policies may want to ensure that these opportunities are broadened as the Bill proceeds along its way.[12]

6.3 Through the development of a Birmingham Carbon Roadmap, Birmingham will assess how the Energy Bill will impact the CO_2 emissions that are within the local authorities influence. The Roadmap will be completed using Carbon Descent's Vantage Point tool that factors in the impact of the green grid amongst a range of other CO_2 reduction measures across domestic, transport and commercial and industry sectors.

6.4 Vantage Point models grid decarbonisation as a measure within Vantage Point and it is possible to model some land based renewables. This uses DECC projections for grid decarbonisation (which can be updated when new projections are confirmed) and projections for the mix of renewables that would make up that grid decarbonisation (obviously not all of the decarbonisation is made up of renewables, some is nuclear, CSS etc).

6.5 A separate spreadsheet for the tool allows users to select renewables that they would want to count locally and then adjusts the grid factor and the savings from grid decarbonisation so that they are not double counted in the savings from locally counted renewables.

[12] LGIU Policy Briefing – Energy Bill 2012, 8 January 2013

7. Managing uncertainty

7.1 Birmingham must ensure that it is able to respond to uncertainty by assessing additional opportunities and scheduling key review dates into its **Carbon Roadmap**.

7.2 The Birmingham Carbon Roadmap is being produced for autumn 2013 and will indicate the mix of programmes and initiatives that will be continued, developed and/or accelerated locally to best align with the most up to date information on national policy. It will draw some of its conclusions from the **City Energy Plan** which is being produced for summer 2013 and will outline the opportunities for district heating networks and renewable and low carbon generation within the city.

7.3 A scheduled approach to monitoring, reviewing and updating the Birmingham Carbon Roadmap at the end of each Carbon Budget Period should be developed in order to review Birmingham's carbon target if necessary. In addition, annual monitoring of progress should assess how new policy developments will or might have an impact on local progress.

7.4 If, in 2016, a formalised decarbonisation target is projected to deliver grid intensity higher than 100gCO_2/kWh, then Birmingham will have to decide whether to:

a) maintain its 60% CO_2 reduction target by committing additional local investment and effort to decarbonise the electricity supply within Birmingham and/or reduce electricity demand; or

b) reduce Birmingham's ambitions in line with updated national policy/projections.

7.5 Another option could focus on specific CO_2 reductions called for from heating, energy efficiency and transport within the city. This would delineate local from exogenous contributions to the overarching target, and would bring success criteria within the control of the city. However this would require more sophisticated modelling that is not currently available at a local level.

7.6 Maintaining the well-established relationship with DECC is of key importance to the ongoing success and understanding of Birmingham's CO_2 reduction activity and the shared effort from national policy.

8. Next Steps

8.1 Develop a **City Energy Plan** by completing energy mapping and feasibility studies of the city to determine areas of high demand and priorities for decentralised energy, for example district heating networks.

8.2 Run CO_2 reduction scenarios using the City Energy Plan findings for different green grid scenarios (grid decarbonisation) using Vantage Point.

8.3 Develop a **Birmingham Carbon Roadmap** based on the latest information provided by DECC.

Further Information

Energy Bill
http://services.parliament.uk/bills/2012-13/energy.html

Comments on draft Energy Bill: Pre-Legislative Scrutiny
http://www.parliament.uk/business/committees/committees-a-z/commons-select/energy-and-climate-change-committee/publications1/

LGIU Policy Briefing – Energy Bill 2012, 8 January 2013
http://www.lgiu.org.uk/briefing/energy-bill-2012/

Department of Energy and Climate Change
http://www.decc.gov.uk/