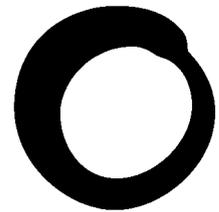


August 2009



**Friends of
the Earth**

Briefing

Pathways to 40% cuts in local CO₂ emissions

Getting Serious About CO₂

This briefing explains the main findings of research carried out by Carbon Descent for Friends of the Earth. The research examines a mix of exemplar policy measures to enable local authorities to reach at least 40% cuts in carbon dioxide emissions by 2020, using three different local authority case studies.

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1. Background to the research

Two hundred thousand people backed Friends of the Earth's pioneering climate change campaign, The Big Ask, as a result of which the UK passed the world's first law which commits it to cutting carbon emissions by 80 percent by 2050.

What matters now is seeing this transformed into action. Friends of the Earth's Get Serious About CO₂ campaign recognises the key role that local councils must play in reducing emissions in their area. It aims to deliver a step change in local authority action and calls on councils to cut CO₂ emissions by at least 40% by 2020.

Local government has a crucial role to play in driving the changes that will create real benefits for local people while helping keep our climate safe. Councils have a major influence on how we heat and power our homes and how we travel locally. They also have influence over businesses, and have a key role as community leaders.

Each local authority must find the package of measures that best delivers in its communities. Reductions must be made across the sectors of housing, energy and transport - three of the biggest contributors of carbon dioxide emissions in the UK. Friends of the Earth's publication 'Getting Serious about Climate Change' sets out six example policy measures to illustrate how a local authority could reduce CO₂ across these sectors.

To show the extent to which these policies could deliver big carbon cuts for local authorities, Friends of the Earth commissioned research from independent consultants Carbon Descent. Their report, 'Pathways to 40% Carbon Reductions by 2020' models the impact of our policies in the three very different authorities of Middlesbrough, Hampshire and Tower Hamlets. It explores whether the policies can combine to cut emissions by 40% by 2020 in the three authorities, as well as the cost-effectiveness of the different policy scenarios it outlines.

Its conclusion is that these reductions are entirely possible in all three authorities, given sufficient will. This briefing summarises the conclusions.

Carbon Descent is an independent social enterprise and environmental trust. It creates strategies and delivers solutions that measurably reduce carbon footprints. It aims to create a sustainable and equitable future for all.

www.carbondescent.org.uk

The three example local authorities:

Three local authorities with differing characteristics were chosen as examples to paint a picture of the possibilities for CO₂ reduction in a range of local authorities across the country.

Tower Hamlets

- Inner city London Borough
- Labour controlled council
- High indicators of deprivation

Middlesbrough

- Unitary authority in the North East
- Labour controlled council
- High indicators of deprivation
- Industrial

Hampshire

- Rural county council in the South East
- Conservative controlled
- Low levels of deprivation

From the results demonstrated by modelling emissions reductions in these three councils we may extrapolate potential reductions achievable for other councils across the country.

Primary conclusions

- A 40% CO₂ cut on a 2006 baseline is feasible in all three local authority areas
- There is a marked variation in the relative contribution of different measures to the overall savings across the three areas, affirming the principle that each local authority needs a tailored response to climate change.
- Achieving 40% depends significantly on the on decarbonisation of the national grid which requires national action as well as local action to encourage renewables.

Which policy measures did we test?

Friends of the Earth suggested six example policy measures that councils could implement towards delivering cuts of 40 per cent by 2020. It should be noted that the modelling has been limited to these six policies as examples of what local authorities could achieve by 2020. There are a range of other policies councils could implement in addition to these example measures which would allow the deeper cuts in CO₂ that will be necessary in the run up to 2050, and which may be more effective and appropriate in different local authorities.

The six example policies are:

1. Housing: Free loft and cavity-wall insulation.
2. Housing: Retrofitting for renewable energy systems.
3. Energy: Energy Service Companies
4. Energy: Renewable energy planning policy
5. Transport: Plan to meet an ambitious target to cut car journeys
6. Transport: Increase use of greener vehicles.

For more information on these policies see the report '[Getting Serious About Climate Change](#)'¹. Technologies that reflected these policies were then chosen to be incorporated in modelling.

They were:

Domestic insulation

Domestic renewable technology (including solar thermal)

Photo voltaic (PV) panels

Ground-source heat pumps;

CHP including biomass CHP

Other larger scale renewable energy

Traffic reduction (including demand reduction, transfer to walking and cycling, transfer to bus and rail)

Low carbon vehicle shift.

Commercial energy efficiency was included but not prioritised because it is currently less amenable to local authority influence.

2. Assumptions and Methodology

Energy, Housing and Transport assumptions

To enable them to be modelled, these policies were converted into sets of assumptions about measures adopted. Assumptions made across housing, energy and transport may be found in the main report. Separate, indicative estimates were made about potential for larger scale renewable energy in each area which can be found in Appendix 1 of this briefing.

Other assumptions

The grid factor

The assumed carbon intensity of electricity from the national grid in 2020 has a significant impact on the results. If less carbon is used to generate electricity, then less CO₂ is attributed to the end user – and therefore the local authority area modelled. It was assumed that, to meet its obligations under the European Renewable Energy Directive to generate 15% of all energy from renewable sources by 2020, the government will achieve a level of 38% renewable electricity generation by 2020. This would dramatically reduce the carbon associated with generating each kilowatt-hour of electricity and hence the CO₂ attributed to the end user. Where electricity consumption counts for a large part

¹ http://www.foe.co.uk/resource/reports/getting_serious_about_climate_change.pdf

of the area's CO₂ emissions this makes a huge contribution to achieving the overall 40% reduction. In our three modelled areas, it delivers CO₂ reductions of approximately 16% to 25%.

Where are emissions reductions from renewable energy technologies counted?

Local Authorities report on their carbon emissions under National Indicator 186, which measures the CO₂ emissions in the local area. Local renewable electricity generation fed into the grid is not currently attributable to individual local authorities under the accounting framework that NI 186 uses, so potential emissions savings from large scale renewables was calculated separately from other local CO₂ reduction measures.

It was assumed in the model that all electricity generated from non-domestic renewable technologies would be fed into the national grid. This means that in the results section for each authority area any local renewable electricity generation is assumed as already counted under decarbonisation of the grid, and is not counted again.

An exception was made for domestic scale PV panels as it was assumed all the electricity would be consumed on site, and therefore not fed into the grid.

Methodology

How does Carbon Descent's methodology work?

The software

Carbon Descent modelled the chosen scenarios using VantagePoint, a software system that has been developed for this purpose and which has been used by a number of local authorities, such as the London Borough of Camden.

The Energy Saving Trust and Carbon Descent are now working together to make this modelling available to all local authorities in the future. This will be helpful to Friends of the Earth groups running the Get Serious About CO₂ campaign.

Data used

VantagePoint contains data about CO₂ emissions from domestic and commercial buildings and land transport in every local authority area, supplied by DEFRA². It is derived primarily from postcoded consumption data from gas and electric companies; and traffic data extrapolated downwards from national figures. This allocates CO₂ emissions from power stations and gas consumption to the end-user. This data is used by local authorities to report on [National Indicator 186](#)³, which measures CO₂ emissions from the local authority area.

VantagePoint contains a list of possible carbon reduction measures and technologies including energy efficiency, renewable energy and traffic reduction, with figures for how much carbon these measures would save, the cost of these measures, and the saving in fuel bills over time.

² <http://www.defra.gov.uk/environment/statistics/globalatmos/galocalghg.htm>

³ <http://www.defra.gov.uk/environment/localgovindicators/ni186.htm>

It is conservative in that it assumes – unless directed otherwise – that there is no significant behaviour change by people in their use of energy at home and work, and that savings in these areas are only delivered by installing physical measures.

For each local authority area modelled, the following data are used:

- The number of homes, the expected amount of population growth, demolition and new build.
- The number of homes with inadequate loft insulation and unfilled cavity walls.
- The amount (by square metres of floor space) of industry (excluding heavy industry in the European Trading Scheme), offices, retail and warehousing.
- Traffic data.
- Any existing plans for insulation, renewable energy installation and traffic reduction.
- Any existing plans for reducing emissions from the council's own estate and activities.
- Assumption about the carbon intensity of the electricity supply as detailed above.
- Assumptions about the price of fuel (gas, electricity, road fuel)

The technologies and measures listed above (see page four) were modelled using the data above for each scenario. For example, the number of cavity wall treatments is limited by the number of unfilled cavity walls present in the area. The software then calculates the CO₂ reductions that each measure will deliver and the total reduction.

Additional factors measured

The software also calculates the total capital cost of installation for each measure and the expected saving in energy bills. This allows it to assess whether the investment will pay for itself over time, referred to as the Net Present Value. A positive value indicates that the initial investment has been more than recouped.

3. Results

Pathways to 40% carbon emissions cuts.

The table below details the most cost effective way the three local authority areas modelled can reach a 40% cut in CO₂ emissions, measured on a 2006 baseline, using the illustrative policy measures. It should be noted that there are a range of other policy measures out with the 6 tested that could take the other two authorities modelled to deeper levels of emissions cuts.

Table 3: Pathways to 40%

Measure

	Domestic energy efficiency	Domestic renewables	Traffic reduction/eco-	Improved vehicle efficiency	Conversion of district heating schemes to CHP including biomass (e.g. through ESCOs)	Overall de-carbonisation of the electricity grid (including more local approval of renewable energy)	More efficient commercial lighting	Total reduction in CO ₂ (%)
Local Authority Areas Tower Hamlets	2.9	0.15	1.6	2.7	7.5	24.3	1	40.1
Middlesbrough	5.6	0	2.4	7.0	2.9	22.2	0	40.1
Hampshire	6.2	1.5	5.0	7.2	3.7	16.5	0	40.1

The table shows that Middlesbrough and Hampshire can reach a 40% CO₂ cut using the policies set out, and that Tower Hamlets can with the addition of more efficient commercial lighting.

Differing results of measures in areas modelled

The results showed that the same measures can deliver a lesser or greater CO₂ depending on the make-up of the local authority area. Some of these effects are detailed below.

Why does the effect on CO₂ of decarbonising the national grid vary?

In areas with denser housing, gas consumption tends to be lower, and therefore electricity contributes to a higher proportion of emissions. Reduction of carbon intensity of the grid through renewable energy programmes delivers a bigger CO₂ reduction in those areas than others.

Why does the effect on CO₂ of domestic energy efficiency vary?

Where housing is detached or semi-detached the same scale? of insulation measures can have a greater impact on reducing emissions?.

Why does the effect on CO₂ of traffic reduction vary?

In areas with a greater proportion of journeys by car, or where car journeys are longer, the same measure of traffic reduction delivers a greater impact on CO₂.

Additional summary conclusions

In addition to the primary conclusions listed on page three, the following conclusions can be made.

- In two of the areas modelled -Middlesbrough and Tower Hamlets - the measures pay for themselves by 2030.
- In the third, Hampshire, while the net present value (pay back) is negative, 3567 local jobs could be created by following the pathway to 40% CO₂ cuts. This is owing to higher reliance on domestic renewables and efficiency measures on hard-to-treat properties which are more expensive, but have a higher expenditure and labour intensity.
- The most appropriate mix of measures varies greatly between local authority types:

In denser urban areas traffic reduction and large-scale CHP are able to deliver greater benefits. While in rural areas with more detached houses and longer journeys, domestic scale renewables play a larger part in achieving a 40% CO₂ cut.

In all scenarios, improved vehicle efficiency has a significant role to play.

Combined Heat and Power (CHP), domestic energy efficiency and local transport measures contribute more than a quarter of the 40% carbon savings in all three areas.

- Reducing CO₂ by forty percent has a mixed effect on fuel poverty.

For some of those in fuel poverty (defined as spending more than 10% of income on heating) with very energy inefficient homes the energy efficiency measures modelled would be enough to lift them from fuel poverty.

However, others would need additional measures such as domestic renewable energy technologies. For more information on fuel poverty and energy efficiency see the Friends of the Earth report, Home Truths⁴.

4. A note on cost effectiveness

Does reducing carbon pay for itself ?

The Net Present Value (NPV) is calculated for each measure to create an overall NPV for each scenario – this tells us whether cutting CO₂ by 40% pays for itself over time. For details on how the NPV was calculated please see the main report.

In Tower Hamlets and Middlesbrough, the pathway to 40% scenario detailed above more than pays for itself by 2030. This is because of savings from reduced fuel bills, and money earned from selling energy back to the National Grid. In Hampshire, the scenario costs more than it saves as it currently modelled. This is partly due to the larger number of ‘hard to treat’ properties in rural areas.

However, it should be noted that this has been calculated on the basis of current fuel prices and without a feed-in tariff (see below). Any increase in fuel prices in future would therefore make energy saving measures more cost effective.

⁴ http://www.foe.co.uk/resource/reports/home_truths.pdf

Cost effectiveness of renewables

The introduction of feed-in tariffs from April 2010 will make renewable energy more cost effective.

A feed-in tariff allows people (including households, businesses and other organisations) who generate their own renewable energy to be paid a set, above market rate price, for the energy they generate and export to the grid. The rate is guaranteed for a period of time (usually 20 years) to allow security of investment.

As the rates the tariff pays are still under consultation its effect could not be modelled. The Government is soon to consult on a renewable heat incentive, a similar measure to incentivise renewable heat technologies that would similarly affect their cost effectiveness.

This has affected the measures chosen in the Pathways to 40% modelling, which was based on the most cost effective measures currently. For example, no domestic renewables are used in the Middlesbrough scenario because a combination of other policies reach a 40% carbon reduction more cost-effectively.

It can be assumed however that rising fuel prices and the introduction of feed-in tariffs would change this. It should also be noted that, even if renewable technologies in some situations are not the most cost effective way of meeting 40%, they will be necessary to meet the 80% CO₂ cuts required by 2050. Cost effectiveness to 2050 can be saved by encouraging take-up now, especially in new developments and refurbishments. There are also potential synergies; for example if scaffolding is being erected for other measures, such as to fit external wall insulation, costs can be saved by fitting renewables at the same time.

5. Funding

The research does not address the issue of funding for the measures, or distribution of benefits (such as lower fuel bills).

However, Friends of the Earth is commissioning research into the best models – that are not only the most effective and efficient at cutting emissions but also are most socially just.

Funding these policy measures in the future

Friends of the Earth is committed to opening up and driving that debate and also contributing to it. We are looking at:

- Options for changing the way in which local authorities raise money – such as allowing local authorities to vary National Non Domestic Rates (NNDR) to provide an incentive to businesses to make low-carbon investments, greater freedom to incur capital expenditure through borrowing for low-carbon investment, new charges – of which the Local Government Association are supportive, Tax Increment Financing (TIF) schemes - borrowing against future increase in tax take due to investment, and green bonds.

- Options for changing the ways in which local authorities can be obliged to spend money – such as reforming of capital grants and Private Finance Initiative (PFI) credits to direct more money at low-carbon investment.
- National programmes of investment.

The most important of all national programmes that aim to cut emissions is a programme of investment to increase energy efficiency in homes and businesses, and the increase in the generation and use of renewable power and heat. These measures including the funding for them, should be delivered through local authorities as they are best placed to deliver such programmes in a way that fits local circumstances.

Friends of the Earth is part of a growing coalition of organisations that are calling on the Government to deliver a step change in investment in energy efficiency and renewables through proposals such as establishing a national Green Development Bank. This would provide project finance to expand and, crucially, speed up of a whole-house approach to increasing domestic energy efficiency that is delivered through local authorities.

6. Conclusion

Local government has a crucial role to play in driving the changes that will create real benefits for local people while helping keep our climate safe. Councils have a major influence on how we heat and power our homes and how we travel locally. They also have influence over businesses, and have a key role as community leaders.

This research suggests that both urban and rural authorities can reach a 40% CO₂ reduction target by 2020. In large part they will be responsible for leading emissions reductions but this also underlines that they need Government help. In particular this research hinges on grid decarbonisation and ambitious improvements in vehicle technology.

However, there must be a mutually supportive role between national and local government, where the support of local authorities to push Government to play their part is crucial. This will require clear evidence of local authorities leading by example and doing all they can with current powers and funding to cut their emissions.

As the research shows the most appropriate package of measures varies between local authorities. While councils must implement measures in all 3 areas, they must also tailor the package to suit their needs based on a strong evidence base of where their emissions are coming from locally, and what can best be done to reduce them.

Action on climate change is vital for the future of the planet but is also makes good business, social and political sense. Local communities should be at the heart of building a low-carbon economy that offers a fair and sustainable life for all.

This research shows that the vision of a low-carbon community is not a long-term aspiration but a real and pragmatic solution to existing problems available now. Realising this vision is no longer a matter of technical barriers; it is a matter of personal and political will to deliver change.

7. Further Reading

Full Report:

Pathways to 40% reductions in CO₂ by 2020, Carbon Descent (insert link)

Supporting reports and briefings by Friends of the Earth :

[Getting Serious About Climate Change: How local government can cut carbon, create jobs and save cash⁵](#)

[Delivering a local low carbon vision⁶](#)

⁵ http://www.foe.co.uk/resource/reports/getting_serious_about_climate_change.pdf

⁶ http://www.foe.co.uk/resource/briefings/delivering_a_local_low_carbon_vision.pdf

Appendix 1: Assumed renewable energy potential per area

The research made assumptions on the potential for larger, non domestic renewable electricity generation. Wind power estimates are based on existing studies of potential, which are themselves derived with reference to current regional and sub regional targets contained in Regional Spatial Strategies. It should be noted that renewables targets in Regional Spatial Strategies are likely to be significantly revised upwards in order to meet the UK's new 2020 commitment to generate 15% of total energy from renewables, and estimates used as detailed in the table below therefore should be regarded as conservative.

Study Area	Potential for large scale wind (MW)	Share of national wind ⁷ (%)	CO ₂ savings from wind (ktpa)	NPV of large wind to 2030 (£k)
Hampshire	49	0.35	56	95,424
Middlesbrough	21	0.15	24	40,896
Tower Hamlets	1	0.01	1	1,947

Table 1 Large wind potential within the areas studied

Study Area	Potential for non-domestic PV (MW)	Share of national PV ⁸ (%)	CO ₂ savings from large PV (ktpa)	NPV of large PV to 2030 (£k)
Hampshire	58	2.6	25.7	-151,044.0
Middlesbrough	18	0.8	8.0	-46,875.7
Tower Hamlets	21	0.9	9.3	-54,688.3

Table 2 Large PV potential within the areas

⁷ National potential for onshore wind of 14 GW taken from modelling carried out for the UK Renewable Energy Strategy, 2008.

⁸ National PV potential based on the energy output of the "deemed tariff" policy scenario for non-domestic PV in The growth potential for Microgeneration in England, Wales & Scotland report, www.berr.gov.uk/files/file46003.pdf. The capacity is derived from the energy output assuming a figure of 800 MWh/MWp