Carbon Accounts and the Scope for Low Carbon Development

St Albans

Introduction

Here we present information on past, present and future carbon emissions for your area. The information relates to real (measured) emissions and future (forecast/modelled) emissions.

It includes data on what are known as production-based (or territorial) emissions and consumption-based (or extra-territorial) emissions. Production-based emissions relate to all of the fuels that are consumed (e.g. gas, coal, oil) and emissions that are generated (e.g. from waste) as well as the emissions that come from all of the electricity that is consumed within the area. These emissions are also known as scope 1 and 2 emissions.

It also includes data on consumption-based emissions include all of the emissions associated with the goods and services that are consumed by a region, with allowance made for goods and services produced in the area and exported for consumption in other areas. These emissions therefore include (but are not equal to; see the readme download) scope 3 emissions.

Production-based emissions

The production-based baseline in Figure 1 takes into account projected economic and population growth in your area, as well as the impacts of a continuation of national trends in the carbon intensity of electricity generation and trends in energy consumption and energy efficiency. The forecast assumes that, over the next two decades, the decarbonisation of domestic, commercial, industrial and transport sectors in the area will follow national trends. In reality, future emissions pathways are highly uncertain and depend upon many factors, many of which are out of local administ rative control, e.g. the carbon intensity of the electricity supplied through the national grid.

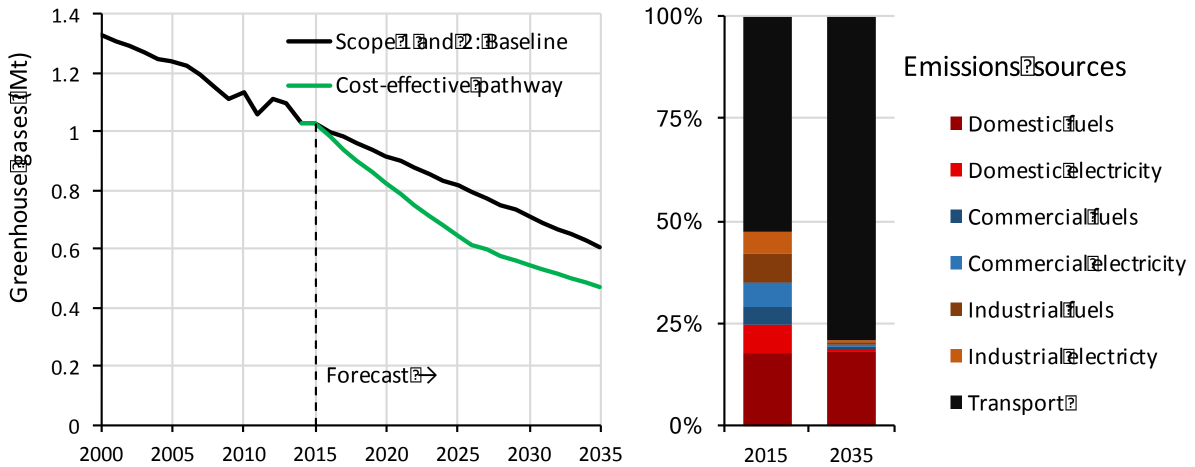

Figure 1: production-based emissions trajectories for the area in megatons of carbon emissions equivalent (left) and the percentage split of these emissions in 2015 and 2035 (right).

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The ‘cost-effective’ pathway in Figure 1 considers savings that could be achieved if all of the energy efficient and low carbon options that at least covered their costs (including purchase, installation, maintenance) over their life time were adopted. Estimates here are made based upon more detailed analysis we have undertaken for other major UK cities, combined with local emissions and population data. We consider domestic (housing), commercial (public and private non-residential buildings), industrial and in-area transport (excluding public transport) sectors. Far more significant savings could be made if investment was also made in other low carbon options that are not attractive from this direct, narrow, economic perspective. This analysis can be provided on request.

Consumption-based emissions

Consumption-based emissions, which are all the emissions associated with the goods and services that are consumed by a region, are more difficult to calculate than production-based emissions. For example, when an electronic device is purchased by a person, an estimate must be made of the emissions involved in mining the raw materials, manufacturing the device, and transporting it to the UK retailer, and these emissions must then be assigned to the area’s consumption-based emissions account. Rather than calculating this for every item, economic data is used that tracks all the transactions between different sectors of the economy and different countries. This leads to aggregate estimates of an area’s consumption-based carbon impact, as shown in Figure 2.

In this figure, the differences between consumption- and production-based emissions can be seen. In industrialised, or post-industrialising countries such as the UK (as opposed to industrialising, or pre-industrial, countries), consumption-based emissions are often two to three times larger than production-based emissions. Note also that Figure 2 should be viewed as illustrative: the forecast assumes a continuation of recent trends in the global carbon intensity of production and of recent (national and local) trends in spending and consumption. Further, the calculated breakdown of emissions shown here is for Birmingham. Local analysis can be provided on request.

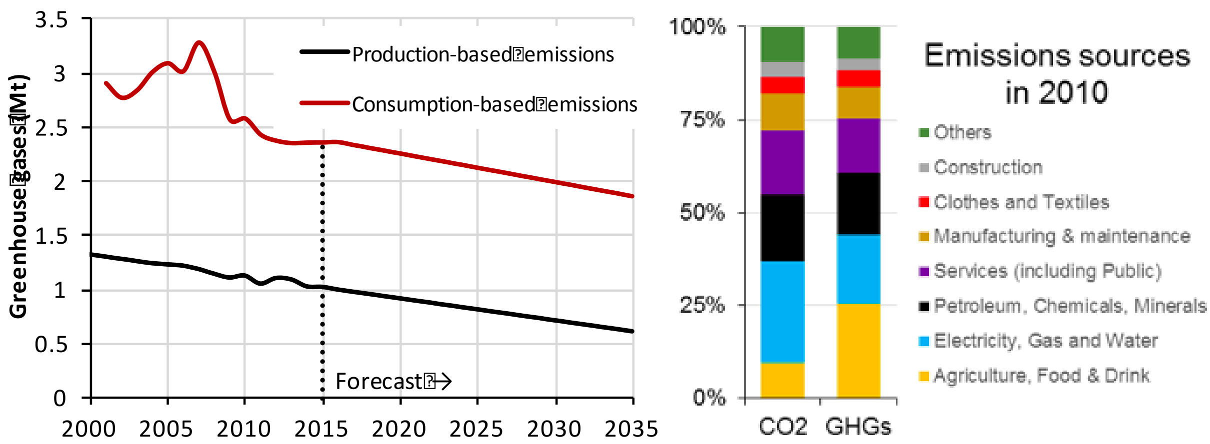

Figure 2: Consumption and production baselines, and an illustrative breakdown of consumption emissions.

Can-do Cities

The Most Cost and Carbon Effective Options

Below are tables of the potentially most carbon effective (Table 1) and cost-effective (Table 2) options available for reducing production-based emissions. These tables are based on data from a representative UK city of 1 million inhabitants, and include high-level categories such as 'domestic insulation', which includes an aggregate estimate of savings for various types of cost-effective insulation over the full area. More refined data specific to each local authority can be calculated on request, but such data is not presented here.

Table 1: The Most Carbon Effective Options, with scale of savings based on a typical UK city of 1 million inhabitants.

Carbon Effectiveness	Cumulative carbon savings over next decade	Measure	Sector
Highly effective	*1 to 5 Mt CO_2*	Heating *(boilers, heat pumps, controls)*	Domestic
		Insulation *(cost-effective insulation: cavity, loft and floor)*	Domestic
		Cooling in retail buildings	Commercial
		Boilers and Steam Piping *(cost-effective measures)*	Industrial
		Demand reduction *(minor; heating, lighting and appliances)*	Domestic
Very effective	*500 to 1000 kt CO_2*	Insulation *(cost-effective fabric improvements)*	Commercial
		Appliances *(refrigeration, cookers, TVs, washing machines)*	Domestic
		Lighting *(low energy)*	Domestic
		Pumps *(cost-effective measures)*	Industrial
Effective	*100 to 500 kt $CO2_2$*	Electric vehicles (cars, goods vehicles and buses)	Transport
		Compressed Air Systems *(cost-effective measures)*	Industrial

Table 2: The Most Cost Effective Options, with scale of savings based on a typical UK city of 1 million inhabitants.

Note: when calculating total area savings cash flows are discounted at 3%. Please see the readme document for more detail.

Cost Effectiveness	Total area cost savings over next decade	Measure	Sector
Highly effective	*£500 to £1000 million*	Cooling in retail buildings	Commercial
		Hybrid cars (diesel and petrol)	Transport
		Insulation *(cost-effective insulation: cavity, loft and floor)*	Domestic
Very effective	*£100 to £500 million*	Appliances *(refrigeration, cookers, TVs, washing machines)*	Domestic
		Demand reduction *(minor; heating, lighting and appliances)*	Domestic
		Heating *(boilers, heat pumps, controls)*	Domestic

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		Lighting *(low energy)*	Domestic
Effective	*£50 to £100 million*	Pumps *(cost-effective measures)*	Industrial
		Compressed Air Systems *(cost-effective measures)*	Industrial
		Fans *(cost-effective measures)*	Industrial
		Boilers and Steam Piping *(cost-effective measures)*	Industrial

Notes of Caution

All modelling and forecasting depends on the quality of the input data and on a series of assumptions, and all results include an element of uncertainty. These results are therefore presented for indicative purposes only. Further information on these issues is included in the 'Readme' document that accompanies this document and is available via the candocities.org web-site. None of the organisations involved in the funding, development or promotion of this research can accept any responsibility for decisions taken on the basis of the information provided here.

Further Information

For further information or data please contact info@candocities.org

Fuller datasets and reports on the economic case for low carbon development or on the costs and benefits of achieving different low carbon targets in a local authority, local enterprise partnership or city/region etc. can be provided. Depending on the amount of information or analysis required a fee may be charged.