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# ENDING THE GREEN RIP-OFF Reforming climate change policy to reduce the burden on families Matthew Sinclair



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#### About the author

**Matthew Sinclair** is the Research Director at the TaxPayers' Alliance. Since joining the TPA in May 2007, he has produced major reports on government capital procurement, environmental policy, NHS performance, the dynamic effects of corporate tax cuts, the economic and social burden of crime and the effects of aid policy, among others. He frequently represents the TaxPayers' Alliance on the television and radio, particularly on economic matters.

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## **Executive Summary**

*Ending the Green Rip-Off* reveals the growing, excessive price that British families are paying for climate change policy:

The burden of green taxes and regulations, net of road spending, in 2008-09 was £26.4 billion.<sup>1</sup>

• That is **up £1.7 billion from £24.7 billion** in 2007-08. The rise is driven by an increasing price on emissions under the EU's Emissions Trading Scheme and an increase in the cost of the Renewables Obligation, both of which increase electricity prices.

• There are a number of different estimates of the **"social cost"** of a tonne of greenhouse gas emissions; this report uses estimates from senior academics and organisations like the IPCC and DEFRA. The 'per tonne' estimates in those reports suggest the total cost of Britain's emissions was between £2.8 billion and £16.2 billion in 2008, the estimate **under the IPCC social cost was £4.6 billion**. There was little change between 2007 and 2008 as falling emissions were balanced out by a rising social cost per tonne.

• Green taxes were therefore **excessive** by between £10.2 billion and £23.6 billion in 2008-09, the estimate **under the IPCC social cost was £21.8 billion**. Excessive green taxes and regulations therefore cost between £408 and £944 per household, the estimate **under the IPCC social cost was £872 per household**. Again, the extent to which the cost of climate change policies is excessive has risen from between £8.4 billion and £21.8 billion in 2007-08, and £20.1 billion under the IPCC social cost.

• Estimates for all UK local authority areas are provided. Those estimates show that the burden varies significantly, with rural areas like **Maldon** paying as much as £622 *per person* in excess green taxes and regulations in 2008/09 under the IPCC estimate of the social cost of carbon, and urban areas like **Camden** paying less, at £136 *per person*. Even under the highest estimate of the social cost of carbon used in this study, only 27 local authority areas out of 434 did not pay excessive green taxes.

There are a number of problems with current climate change policies that are imposing an excessive burden on ordinary families:

• Increases in energy prices are regressive, hitting the poor and elderly hardest, increasing poverty and benefit dependency. The poorest income decile spend three times as much, as a proportion of their income, on electricity as the richest. Over 75s spend twice as much on electricity as the under 30s.

<sup>&</sup>lt;sup>1</sup> Data relating to emissions and the operation of some regulations, such as the Emissions Trading Scheme, are given in calendar years. For that reason, 2008 and 2008/09 and 2007 and 2007/08 are used interchangeably in this report. That is not ideal but it is unavoidable and should not make any significant difference to the results obtained.



• Increases in energy costs undermine the competitiveness of British industry and cause emissions to be moved abroad instead of cut. Britain has among the highest tax components in petrol and the highest tax component in diesel prices in the EU15, pushing up transport costs. Climate change policies already constitute 21 per cent of average industrial bills. 1.5 million manufacturing jobs have been lost since 1999, and rising energy costs will have contributed to those job losses. That is leading to emissions being exported, Britain's consumer emissions, the amount produced supplying the British market, are now 132 Mt higher than the producer emissions total, the amount produced in Britain, and the gap is rising.

• There is not a level playing field between different sources of low carbon energy, pushing up the cost to consumers unnecessarily. New offshore wind development will receive around £90 per MWh in subsidy which is not provided to some other low carbon sources which are not included in the "renewable" category, and the most costly renewable energy sources receive the most subsidy.

• Short term targets encourage the deployment of inefficient technologies that increase costs in the long term. For example, nuclear power, carbon capture and storage and tidal power are all unlikely to be able to make a significant contribution before 2020. The targets will have to be met through wind power, and most of the new development will have to be very expensive offshore wind, which will lock in high costs to consumers.

For these reasons, and others, current policies are failing to deliver significant emissions reductions, while imposing a massive burden on ordinary families. A range of measures should be taken to improve the situation, particularly:

• Leave the Emissions Trading Scheme and replace the Renewables Obligation with a technology-neutral Low Carbon Obligation, which would allow lower cost, low carbon sources not classed as "renewable" to be used. This is likely to **cut** electricity bills by 10 per cent or more from their likely level under current policies by the end of the next Parliament, and as much as 50 per cent by 2030. The corollary of this is that the existing 2020 targets should be abandoned as unhelpful and counterproductive.

• **Invest in technological development** using money saved by cutting existing and ineffective climate change spending. This will help reduce emissions not just in Britain but also globally.

• Focus transport policy on delivering maximum capacity with scarce resources by focussing investment on the road network and commuter rail, which move the most passengers.



Adopting this, "realist" approach to climate change policy would mean better policy but is also a huge political opportunity:

• With the onset of the recession, the public are unconvinced of the need for and desirability of expensive climate change policies, and they will become aware of the price they are paying as it rises. The current strategy faces an "affordability crisis".

• International politics is unable to reliably deliver the global approach that present policies require to be effective.

• The burden of climate change policy is particularly heavy for suburban commuters and the elderly, both vital political constituencies.

Either party can enjoy a significant political advantage, and sweeten the bitter pill of measures to control public sector borrowing, by adopting the measures recommended in this report and thereby becoming the party of low energy prices.



## 1. Introduction

Efforts to reduce greenhouse gas emissions have been a priority for governments of both parties for a number of years. The Kyoto Protocol was adopted in 1998 but even before that policy was being put in place on the basis of Rio commitments made in 1992. The direction of policy over those 18 years has been fairly consistent: increasingly ambitious targets to cut emissions, an increasingly high price on emission through taxes or regulations and support for renewable energy.

In recent years, Britain has adopted extremely stringent policies along these lines. A new 80 per cent target for emissions cuts by 2050, including aviation and shipping, was adopted with the passage of the Climate Change Act. But extensive green taxes impose a substantial burden on families and businesses. BERR has reported that climate change policies already make up 14 per cent of average household electricity bills, and 21 per cent of industrial bills. Off-shore wind, if new developments continue to receive two credits under the "banding" of the Renewables Obligation, will receive as much as £100 per MWh of power generated.

The Copenhagen Summit marks a critical point in attempts to strengthen and extend this policy approach. If a deal is reached, then European countries have pledged to strengthen their target for emissions cuts by 2020 and pay significant amounts in aid, ostensibly to help developing countries adapt to climate change. Though even if a deal is agreed at the summit there may be difficulties in making it stick, as there were in the US after the Clinton administration signed in Kyoto but the treaty was blocked by the Senate. If a deal is not reached, then another attempt will be made in 2010 but serious doubt will be cast over the entire agenda, particularly if 'cap and trade' legislation fails to pass the Senate again.

Unfortunately, these policies are already imposing a huge, excessive burden on ordinary families and firms. That burden is falling particularly on those with low to middle incomes, as they spend the most as a share of their income on goods like electricity whose price is pushed up by green taxes and regulations. And, there is good reason to think that the entire approach of using subsidies, taxes and regulations to try and encourage or enforce the use of alternatives to fossil fuels may be failing.

The TaxPayers' Alliance (TPA) has been working in this area for a number of years. The reports *The Case against further Green Taxes* and *The Burden of Green Taxes* first showed that green taxes are being charged in excess of the social cost of Britain's greenhouse gas emissions. *The Case against an 80 per cent Mandatory Target for Emissions cuts* argued that the target could easily bind a Government to either disregard the law or reduce national income by more than three quarters. *The EU's Renewable Policy: official cost estimates to Britain*, by economist Ruth Lea, set out the expected cost



to the economy of adopting ambitious EU renewable energy targets. *The Expensive Failure of the European Union Emissions Trading Scheme* provided the first comprehensive costing of the scheme and argued that there were fundamental flaws in the emissions trading approach. Some of the methodology in these reports has been adopted by other organisations, and their findings, along with some criticisms of our earlier work, are discussed in **Appendix 1**.

This report builds on the TaxPayers' Alliance's earlier work in this area to present new, more comprehensive evidence that existing climate change policies are already imposing an excessive burden on British families and companies. It sets out an alternative strategy that, by focussing on technological development and being more flexible over how and when fossil fuel energy is replaced, could substantially cut the cost to taxpayers and consumers.

• **Section 2** sets out the existing price being placed on emitting activity, and how firms and households are facing a disproportionate burden.

- **Section 3** outlines the problems with current policy, why it is not proving effective and why the cost it imposes is unacceptable.
- **Section 4** proposes an alternative approach that would save money and increase the efficiency of policy interventions to reduce emissions.
- **Section 5** concludes the report, setting out the political opportunity for any party that embraces lower cost climate change policy.
- **Appendix 1** discusses some of the responses to previous TaxPayers' Alliance research on green taxes and describes how the methodology has since been adopted by government departments and other organisations.
- **Appendix 2** contains a full local table showing the burden of green taxes on local authority areas across the United Kingdom.



## 2. The existing price on emitting activity

#### 2.1 The theoretical justification for putting a price on emitting activity

Most of the subjects of green taxation also pay ordinary taxes. For example, motor fuel is subject to VAT as well as Fuel Duty. Green taxes therefore constitute a substantial premium on the rate of tax considered fair on other goods and services. That premium is justified on the basis that activities that lead to greenhouse gas emissions cause global warming which creates a range of social harms – or negative externalities – that are not reflected in the market price. Green taxes can therefore correct for otherwise ignored negative externalities associated with emitting greenhouse gases. Taxes that aim to correct for negative externalities are known as Pigovian taxes.

Whether it is right to to use Pigovian taxes to correct for externalities is open to debate. Economist Ronald Coase, in the Nobel Prize winning study "The Problem of Social Cost", described how Pigovian taxes would not be necessary to control externalities and produce the socially optimal result if the common assumptions in economics of zero transaction costs and properly defined property rights held.<sup>2</sup> State intervention would only improve the situation if it lowered transaction costs.

This implies that the proper comparison is not between some ideal government that compensates precisely for externalities and a market that ignores them but between the imperfect efforts of markets and governments to come to a socially optimal result. There are many good reasons to think that the problems of setting and implementing an efficient green tax are sufficient that a result closer to the social optimum will be obtained in the absence of green taxes.<sup>3</sup>

It is useful though, to set these concerns about Pigovian taxation to one side and assess British green tax policy on its own terms; to ask the question 'if we accept that green taxes should be in place to correct for externalities associated with greenhouse gas emissions, are they set at the right level?'

This report compares the social cost of Britain's greenhouse gas emissions with the amount that is charged in green taxes. That test establishes whether British green tax policy fits with the Pigovian logic and corrects for externalities proportionately. As is discussed in **Appendix 1**, a similar empirical approach has been taken by other reports including research for the Department for Transport.

<sup>&</sup>lt;sup>2</sup> Coase, R. H. 'The Problem of Social Cost', *Journal of Law and Economics*, October 1960

<sup>&</sup>lt;sup>3</sup> Manzi, J. 'Coase Club', *The American Scene*, 12 April 2007



#### **2.2 Previous reports**

The method in this report is a substantial expansion on that used by our previous research in this area, *The Case against further Green Taxes* and *The Burden of Green Taxes*, includes a wider range of green taxes and charges and uses more recent estimates of greenhouse gas emissions. In particular, it adds the price imposed by the European Union Emissions Trading Scheme (ETS). For that reason, this paper is not readily comparable with our earlier estimates. Instead separate estimates – based on the new methodology – for 2007/08 and 2008/09 are included to give some idea of the current trend.

#### 2.3 Taxes and regulations that put a price on emissions

There are a number of green taxes and regulations that impose a price on greenhouse gas emissions:

#### Fuel Duty and Vehicle Excise Duty

Fuel Duty is the biggest green tax, by revenue, at £24.9 billion in 2007-08; Vehicle Excise Duty added £5.6 billion to the cost of motoring in the same year.<sup>4</sup> VAT is also paid on motor fuel and the purchase of new cars so both Fuel Duty and Vehicle Excise Duty, in their entirety, constitute a premium on the level of taxation judged fair across a range of other products. Fuel Duty and Vehicle Excise Duty are therefore entirely green taxes except to the extent they compensate for other externalities such as the need for road building and maintenance.

These taxes have been explicitly aimed at reducing emissions. For example when the Fuel Duty escalator was introduced, it was described as a part of Britain's strategy to meet objectives agreed at the Rio Earth Summit:

"I have now decided to strengthen the March commitment by increasing road fuel duties on average by at least 5 per cent in real terms in future Budgets. This will complete Britain's strategy for meeting our Rio commitment." – Ken Clarke, Statement to the House of Commons, 1993

It has been suggested in earlier studies that Fuel Duty is not set arbitrarily high as it corrects for a number of other externalities, including noise and air pollution, road injuries and fatalities, and congestion, as well as greenhouse gas emissions. That approach has been used by the Department for Transport in assessing the external costs of various

<sup>&</sup>lt;sup>4</sup> HM Treasury, 'Budget 2008, Table C6, March 2008



forms of transport.<sup>5</sup> This table shows one account of the externalities associated with driving:

Externality	Low estimate	High estimate
Operating costs	0.42	0.54
Accidents	0.82	1.40
Air pollution	0.34	1.70
Noise	0.02	0.05
Climate change	0.15	0.62
Congestion	9.71	11.16

Table 2.3.1: Estimated marginal external road costs (pence/vehicle km), 1998<sup>6</sup>

This ignores the range of existing regulations designed to control these externalities:

• Noise and air pollution are created by a vast spectrum of industrial activity. They are controlled by regulation which limits acceptable levels of noise and particle emissions in different geographical areas. New roads are subject to stringent planning controls based on the amount of traffic they are likely to carry. Equally, regulatory standards and the requirement to fit catalytic converters control particle emissions.

- There is extensive regulation designed to control road traffic accidents: driving tests, speed limits, speed cameras and installations such as speed bumps. Many of these impose substantial costs on drivers and others are paid for as part of the process of building and maintaining roads.
- The costs of congestion, except for the costs of building and maintaining roads, are internalised within the body of road users and create an incentive to use other methods of travel or travel less. Fuel Duty is also probably not the best measure to correct for the externality of congestion. Evidence to the Institute for Fiscal Studies' Mirrlees review described it as a "very blunt instrument" for addressing the problem of congestion.<sup>7</sup>

Pigovian taxes and regulation are substitutes as different methods of achieving the common objective of controlling externalities. Putting regulations and taxes in place to correct for the same externality is clearly disproportionate.

Studies that aim to comprehensively assess the external costs of driving too often focus purely on the negative externalities and ignore the positive externalities that are also associated with driving. These positive externalities include the following:

• Most people do not live close enough to their place of work, or all the services they need to access, to be able to walk or cycle. That means that if they did not drive they

<sup>&</sup>lt;sup>5</sup> Department for Transport '*The NATA Refresh: Reviewing the New Approach to Appraisal*', October 2007, Table <sup>6</sup> Leicester, A. 'The UK Tax System and the Environment', *Institute for Fiscal Studies*, November 2006. http://www.ifs.org.uk/comms/r68.pdf, p. 25

<sup>&</sup>lt;sup>7</sup> Institute for Fiscal Studies, 'Don't expect much extra revenue from green taxes, says study prepared for the Mirrlees Review', July 2008



would need to use public transport. Many rail and bus services are already struggling to cope with demand, despite the fact that trains only account for 7 per cent of passenger travel and buses and coaches 6 per cent, against 85 per cent who travel by car and van.<sup>8</sup> By relieving congestion on public transport networks motorists do a significant public good.

Motorists also encourage the development of greater road transport infrastructure. Just as motorists may be inconvenienced by other drivers who create congestion on the roads, those other drivers also support a network of services that make all motorists' lives easier. If there were fewer motorists the broad network of service stations, roads, mechanics, driving instructors and other services that support driving would be less comprehensive. This kind of social benefit is known as a network effect in the economic literature.

• By driving people enable economic activity to be more geographically dispersed. That eases pressure on public services such as water and sewerage.

The net social cost of driving is likely to be significantly lower than that estimated by studies focussing purely on the negative externalities.

The only externality that we will account for, other than greenhouse gas emissions, is spending on roads. Driving necessitates public spending to build additional roads, in order to alleviate congestion, and repair wear and tear. That spending is an externality that motorists can reasonably expect to pay for. A similar analysis of the externalities associated with road transport has been used when forming policy:

"I firmly believe that motorists should bear the full costs of driving - not only wear and tear and congestion on the roads, but also the wider environmental costs. Even those of us who frequently have to drive can take steps to cut fuel consumption and we all ought to consider carefully the use of our cars." – Ken Clarke, Budget Speech, 1996

For those reasons, the only externality other than greenhouse gas emissions that this report will make allowances for is road spending, at  $\pounds$ 8.3 billion in 2007-08 and  $\pounds$ 9.5 billion in 2008-09. That will be subtracted from the total raised in Fuel Duty and Vehicle Excise Duty in our calculations of total green taxes.

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<sup>&</sup>lt;sup>8</sup> Department for Transport, 'Transport Statistics Great Britain: 2007 Edition', Table 1.1, 2007



#### The Climate Change Levy

The Climate Change Levy is a tax on industrial energy use that raised  $\pm 0.7$  billion in 2007/08.<sup>9</sup> Though the tax is flawed as it fails to provide for low carbon means of producing power like nuclear and large hydro-electric plants, it is explicitly targeted at reducing greenhouse gas emissions so there are no other externalities to account for.

#### The Renewables Obligation

The Renewables Obligation (the Obligation) forces energy companies to source a certain percentage of their energy from renewable sources, buy Renewables Obligation Certificates (ROCs) from renewable energy companies or pay 'buy out' fees (which are then redistributed to those who did present ROCs). It makes a substantial contribution to the price of energy and is clearly directed at reducing greenhouse gas emissions. The Obligation effectively places a price on emitting activity, in the form of fossil fuel-fired electricity generation, so it should be included in trying to assess whether polluters are paying what they should to correct for the externalities associated with greenhouse gas emissions.

The value of the Renewables Obligation can be estimated by multiplying the buyout price by the size of the obligation, both of which are provided by Ofgem.<sup>10</sup>

Year	Renewables Obligation, MWh	Buyout price, £	Obligation Value, £
2007-08	25,477,265	£34.30	£873,870,190
2008-09	28,975,678	£35.76	£1,036,170,245

#### Table 2.3.2: Renewables Obligation value, 2007-08 and 2008-09

#### Landfill Tax

The Landfill Tax is paid by businesses and local authorities who dispose of waste at landfill sites. In 2007-08 it raised £0.9 billion.<sup>11</sup> It is designed to encourage recycling and, thereby, reduce the emissions of greenhouse gases in the creation or extraction of raw materials. It should also correct for the emission of methane, a greenhouse gas included in our total, from landfill sites, although those emissions are also subject to regulation.

<sup>&</sup>lt;sup>9</sup> HM Treasury, 'Budget 2008', Table C6, March 2008

<sup>&</sup>lt;sup>10</sup> Ofgem '*Information Note*'5 October 2009; '*Renewables Obligation – Interim total obligation levels for 2007-08*', 5 August 2008

<sup>&</sup>lt;sup>11</sup> HM Treasury, 'Budget 2008', Table C6, March 2008



#### EU Emissions Trading Scheme

The ETS requires all large plants, around 11,500 across the EU, emitting greenhouse gas emissions to hold allowances for those emissions. The cost it has imposed in each year of operation, to the end of 2008, was estimated in the TPA report *The Expensive failure of the European Union's Emissions Trading Scheme*. There is a detailed discussion of the method used to produce the estimates in that report.

#### Table 2.3.3: Emissions Trading Scheme cost to consumers, 2007 and 2008

Year	Emissions Trading Scheme, €	Exchange rate, £:€	Emissions Trading Scheme, £
2007	€306,128,032.00	0.68493	£209,676,272.96
2008	€3,684,817,830.00	0.79682	£2,936,136,543.30

#### Net burden of green taxes and charges

The table below shows the net burden of green taxes and charges in 2007-08 and 2008-09.

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Green tax/charge	Revenue/Cost, 2007-08, £ billion	Revenue/Cost, 2008-09, £ billion
Fuel Duty	£24.9 billion	£24.6 billion
Vehicle Excise Duty	£5.4 billion	£5.6 billion
Landfill Tax	£0.9 billion	£1.0 billion
Climate Change Levy	£0.7 billion	£0.7 billion
EU ETS	£0.2 billion	£2.9 billion
Renewables Obligation	£0.9 billion	£1.0 billion
Sub-total	£33.0 billion	£35.8 billion
Less spending on roads	£8.3 billion	£9.5 billion
Total	£24.7 billion	£26.4 billion

#### 2.4 The social cost

The social cost of  $CO_2$  emissions represents the value of the harm done to the rest of the world, now and in the future, by emitting one tonne of  $CO_2$ . Green taxes can reduce the quantity of  $CO_2$  emitted in an economy by making activities that result in emissions more expensive. If a green tax is set at the true social cost then the socially optimum amount of carbon should be emitted, i.e. emissions will be cut until the costs of emitting less are equal to the environmental benefits.



In this way, the social cost can be used as a guide for an appropriate level of tax to correct for the negative externalities that  $CO_2$  emissions entail. The Intergovernmental Panel on Climate Change states that "if taxes were used, then they should be set equal to the SCC [social cost of carbon]".<sup>12</sup>

A number of academic and official estimates of the social cost of  $CO_2$  emissions exist. The most widely-quoted estimates are summarised below:



#### Nordhaus

William D Nordhaus is Stirling Professor of Economics at Yale University and a member of the National Academy of Sciences. He was a member of the Council of Economic Advisers to the Carter administration in the late 1970s. The *Economist* has described him as the "father of climate-change economics".<sup>13</sup> His 2007 study<sup>14</sup> is based upon a model which has been refined over more than 30 years.



Intergovernmental Panel on Climate Change (IPCC)

The IPCC is the United Nations body established in 1988 whose views are often described as the "scientific consensus" on climate change. Its estimate<sup>15</sup> of the social cost of  $CO_2$  is an average (mean) of over 100 peer-reviewed studies.



#### Tol

Richard Tol is Senior Research Officer at the Economic and Social Research Institute in Dublin, Principle Researcher at the Institute for Environmental Studies in Amsterdam and Adjunct Professor at the Department of Engineering and Public Policy of the Carnegie Mellon University in Pittsburgh. He is an author (contributing, lead, principle and convening) of Working Groups I, II and III of the Intergovernmental Panel on Climate Change. His estimate<sup>16</sup> of the social cost of  $CO_2$  is based on a survey of the peer-reviewed literature.

<sup>12</sup> Parry M.L., O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, Eds., 2007, *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change,* Cambridge University Press, Cambridge, UK.
<sup>13</sup> Economist '*How to value a grandchild*', December 2006

<sup>&</sup>lt;sup>14</sup> Nordhaus, W. '*The Challenge of Global Warming: Economic Models and Environmental Policy'*, July 2007, http://nordhaus.econ.yale.edu/dice\_mss\_072407\_all.pdf

<sup>&</sup>lt;sup>15</sup> Intergovernmental Panel on Climate Change, "*Climate Change 2007: Synthesis Report - Summary for Policymakers",* April 2007, <u>http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4\_syr\_spm.pdf</u>

<sup>&</sup>lt;sup>16</sup> Tol, R. S. J. 'The Economic Effects of Climate Change', *Journal of Economic Perspectives*, Volume 23, Number 2,





DEFRA

The Shadow Price of Carbon<sup>17</sup> estimated by researchers for DEFRA is based on an attempt to reach a particular emissions target, namely stabilising at 450-550 ppm of  $CO_2$ -equivalent in the atmosphere. This builds on the work of the Stern Review<sup>18</sup> and replaces the Review's estimate of the social cost of

carbon for the purposes of policy appraisal in the UK. This is necessary because the Stern Review otherwise produces the paradoxical result, in terms of policy appraisal, that the tighter your target for cutting emissions the lower your social cost should be.

The Nordhaus, Tol and IPCC estimates were produced for 2005 and expressed in dollars, they have been converted to pounds using the 2005 conversion rate of \$1.82 = £1.<sup>19</sup> The Tol estimate uses the social cost per tonne of carbon, which has been converted to the social cost per tonne of CO<sub>2</sub> by a ratio of 100:27.29 (1 tonne of CO<sub>2</sub> contains 0.2729 tonnes of carbon). The marginal damage and, hence, the social cost of carbon rises over time, so those 2005 estimates need to be adjusted to 2007 and 2008. The DEFRA report on the shadow price of carbon provides a table showing estimates for each year and the ratios between 2005, 2007 and 2008 have been used to scale up the estimates from 2005 for the years we are studying.<sup>20</sup>

	Year	\$ /t C	\$ /t CO <sub>2</sub>	£/tC	£ /t CO2	Cost, adjusted to 2007, £ /t CO2	Cost, adjusted to 2008, £ /t CO2
Nordhaus	2005	-	\$7.40	-	£4.07	£4.45	£4.54
IPCC	2005	-	\$12.00	-	£6.59	£7.22	£7.36
DEFRA	2007	-	-	-	£25.50	£25.50	£26.00
Tol	2005	\$50.00	-	£27.47	£7.50	£8.21	£8.37

#### Table 2.4.1: Academic and official social cost estimates

While the DEFRA Shadow Price of Carbon is an official estimate of the scale of tax needed to correct for the externalities associated with greenhouse gas emissions, it is based on the highly controversial Stern Review. A number of respected climate change economists have criticised the Stern Review's methodology, in particular Nordhaus and Tol, whose estimates of the social cost of carbon are used in this study.

http://www.measuringworth.org/exchangepound/

<sup>&</sup>lt;sup>17</sup> Price, R., Thornton, S. & Nelson, S. '*The Social Cost Of Carbon And The Shadow Price Of Carbon: What They Are, And How To Use Them In Economic Appraisal In The UK*', DEFRA, December 2007

<sup>&</sup>lt;sup>18</sup> Stern, N. et. al. 'Stern Review: The Economics of Climate Change', HM Treasury, 2006

<sup>&</sup>lt;sup>19</sup> Officer, L. H. 'Dollar-Pound Exchange Rate From 1791', *MeasuringWorth*, 2008,

<sup>&</sup>lt;sup>20</sup> Price, R., Thornton, S. & Nelson, S. '*The Social Cost Of Carbon And The Shadow Price Of Carbon: What They Are, And How To Use Them In Economic Appraisal In The UK*', DEFRA, December 2007



#### Nordhaus:<sup>21</sup>

• Nordhaus pointed out that the study's conclusions rely entirely upon a controversial ethical assumption, that utility should be treated as equally valuable across generations.

• This assumption appears not to be shared by ordinary people who discount utility over time when, for example, planning what to leave to their children.

• A majority of the harms described in Stern occur after 2800. Under the same logic of taking costly action to prevent uncertain harms far into the future, extreme positions could be justified in, for example, foreign policy.

#### **Tol:**<sup>22</sup>

• Tol, who is frequently cited within the Stern Review, called the study "alarmist and incompetent".

- The study takes no account of the potential of adaptation to minimise the harms of climate change.
- He also accused the report of "cherry-picking", always taking the most pessimistic estimates of potential damage from the reports it studied.

• Finally, he noted that Stern's social cost estimate is an outlier in the marginal damage cost literature and little explanation is given to justify such an extreme estimate.

For those reasons this report will, for the national estimates, use a range rather than accept the DEFRA Shadow Price or other government estimates based on the Stern review.

#### 2.5 Emissions and an excessive price on emissions

Figures for the UK's aggregate greenhouse gas emissions are obtained from DECC for 2007 and 2008.<sup>23</sup> The 2008 number is a provisional estimate but should provide a reasonable guide to actual emissions in 2007. Greenhouse gas emissions are reported in tons of carbon dioxide equivalent to account for the greater Global Warming Potential (GWP) of different greenhouse gases. These figures can be multiplied by the social cost of carbon estimates shown above to estimate the total social cost of UK emissions.

<sup>&</sup>lt;sup>21</sup> Nordhaus, W. 'The Stern Review on the Economics of Climate Change', May 2007

<sup>&</sup>lt;sup>22</sup> Tol, R. S. J. 'The Stern Review of the Economics of Climate Change: A Comment', November 2006,

http://www.fnu.zmaw.de/fileadmin/fnu-files/reports/sternreview.pdf

<sup>&</sup>lt;sup>23</sup> DECC '2008 UK greenhouse gas emissions, provisional figures', 26 March 2009



Comparing the social costs and the burden of green taxes and charges shows that they are already excessive:

	Nordhaus	IPCC	Tol	DEFRA
Social Cost of Carbon Dioxide (per ton), 2007, £	4.45	7.22	8.21	25.50
Social Cost of Carbon Dioxide (per ton), 2008, £	4.54	7.36	8.37	26.00
Emissions, 2007, Mt CO <sub>2</sub> -equivalent	636.6	636.6	636.6	636.6
Emissions, 2008, Mt CO <sub>2</sub> -equivalent	623.8	623.8	623.8	623.8
Social cost of UK emissions, 2007, £ billion	2.8	4.6	5.2	16.2
Social cost of UK emissions, 2008, £ billion	2.8	4.6	5.2	16.2
UK Green Taxes, 2007, £ billion	24.7	24.7	24.7	24.7
UK Green Taxes, 2008, £ billion	26.4	26.4	26.4	26.4
Excess Green Taxes, 2007, £ billion	21.8	20.1	19.4	8.4
Excess Green Taxes, 2008, £ billion	23.6	21.8	21.2	10.2
Excess Green Taxes, 2007, £ per household	872	804	776	336
Excess Green Taxes, 2008, £ per household	944	872	848	408

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Table 2.5.1: Excess	green taxes and	regulations	under various	Social Cost	t estimates

• In 2007-08, between £8.4 billion and £21.8 billion was charged in green taxes in excess of the social cost of Britain's greenhouse gas emissions. That is between £336 and £872 per household.

• In 2008-09, that rose to between £10.2 billion and £23.6 billion was charged in green taxes in excess of the social cost of Britain's greenhouse gas emissions. That is between £408 and £944 per household.

#### 2.6 Local estimates

**Appendix 2** contains our estimates of the social cost of carbon under the IPCC cost of carbon, green taxes, excessive green taxes and excessive green taxes per person in each UK local authority. More detailed figures, setting out how our estimates vary under different social costs of carbon and of the cost of individual green taxes in different local authorities, are available online at <u>www.taxpayersalliance.com/greentaxdata.xlsx</u>.

#### Emissions

Carbon dioxide emissions estimates by local authority have been produced by DECC for 2007.<sup>24</sup> They should provide a reasonable proxy for the pattern of greenhouse gas

<sup>&</sup>lt;sup>24</sup> The full figures are available for download from:

http://www.decc.gov.uk/media/viewfile.ashx?filepath=statistics/climate\_change/1\_20091109131400\_e\_@@\_localco2dat aset.xls&filetype=4



emissions across the country. To produce estimates for greenhouse gas emissions in 2007 and 2008, the 2007 emissions of carbon dioxide were scaled up to the total greenhouse gas emissions in those years as used for the national estimates. To avoid double counting, there are no estimates for county areas in England; district and unitary council areas are used.

These estimates can be combined with the estimates of social cost used in the last section to provide estimates of the total social cost of emissions in each local authority. This approach makes two key assumptions:

• The pattern of carbon dioxide emissions did not vary substantially between 2007 and 2008; (i.e. those parts of the country that emitted relatively large amounts of carbon dioxide in 2007 emitted relatively large amounts in 2008). It seems unlikely that the pattern has changed substantially in just a year, when the total amount of carbon dioxide emitted has been fairly stable, so this seems like a fair assumption.

• The pattern of carbon dioxide emissions is a good guide to the pattern of greenhouse gas emissions. This clearly creates some inaccuracy as, for example, areas that have a relatively large agricultural sector will often have high methane emissions but low carbon dioxide emissions from a relatively small industrial base. It should, however, only make a marginal difference as carbon dioxide constitutes around 85 per cent of greenhouse gas emissions and a significant portion of the remaining 15 per cent will be distributed in line with carbon dioxide emissions e.g. the nitrous oxide emissions from road transport.

These two assumptions should be borne in mind but there is little reason to believe they will unduly bias the final results.

#### Green taxes

The national totals for the various green taxes and charges described earlier are apportioned according to proxies for the emitting activities whose externalities they can correct for. None of these proxies are perfect but they provide a means of establishing a meaningful local breakdown and, so long as their limitations are kept in mind, should provide a good guide to the true burden of green taxes in each area.

#### Fuel Duty

The census records the number of people who drive to work in each local authority area and the average distance people in that area travel to work. Those statistics have been used to estimate the share of the total Fuel Duty bill that the residents of each local authority area pay:

• This should provide a reasonable proxy for the extent to which people pay fuel duty in their travel to work. Those who have a relatively long trip to work, and are relatively likely



to rely on their car to do so, we can reasonably expect to drive more outside the drive to work as well.

• The census data used is for 2001 so it is assumed that the relative pattern of travelling to work has remained stable in recent years. Changes in the costs of driving will affect all motorists equally and it seems implausible that new transport infrastructure since 2001 has significantly changed the balance between urban areas, where dense public transport networks and congestion on the roads make public transport an effective alternative to the car, and suburban and rural areas where public transport is not a practical alternative.

• The distance driven is not a perfect proxy for amount of fuel used. Fuel efficiency will vary with the model of car driven and, more importantly, the environment that the motorist is operating within. Driving in congested urban areas will generally use more fuel per mile. This has not been corrected for in this study and should be borne in mind; though it seems unlikely it will critically affect the final results.

#### Vehicle Excise Duty

As well as the distance and method of people's travel to work, the census also records the number of cars owned in each local authority area. This should provide a good proxy for the amount of Vehicle Excise Duty charged:

• Different cars are charged different amounts of Vehicle Excise Duty depending on the amount of carbon dioxide emissions they produce and the year in which they were registered. That is not accounted for in this study. However, it should only make a limited difference to the results, as car sizes are likely to average out considerably across a local authority area.

#### Climate Change Levy

The burden of the Climate Change Levy is distributed according to final energy consumption:

• The existence of Climate Change Agreements makes it impossible to construct a simple estimate of the burden of the Climate Change Levy in different areas. Final energy consumption will be an imperfect proxy as it fails to account for the use of different fuels and the existence of climate change agreements; however, it should provide a reasonable estimate.

• Statistics for energy use in Northern Ireland are extremely limited as they are felt to be commercially sensitive. This study works on the assumption that people and companies consume electricity and natural gas at the same per capita rate in Northern Ireland as the average in the rest of the country.



#### Renewables Obligation

The burden of the Renewables Obligation is distributed according to final consumption of electricity:

• Statistics for electricity use in Northern Ireland are extremely limited as they are felt to be commercially sensitive. This study works on the assumption that people and companies in Northern Ireland consume electricity at the same per capita rate as the rest of the country.

#### Landfill Tax

The burden of Landfill Tax is distributed according to the population of the local authority area:

• This assumes that the amount of waste sent to landfill per person is roughly equal across the country. There will be some variation between different local authority areas but the differences should be relatively minor and population probably offers a reasonable proxy.

#### Population

Population figures are obtained from the same DECC report that provides local emissions estimates. 2007 population figures are used for both years.

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## 3. The problems with existing policy

#### 3.1 The price being placed on emitting activity is already too high

The results of this study suggest that British green taxes and charges already go far beyond correcting for the externalities associated with greenhouse gas emissions. For those who aspire to make the polluter pay, their work is already more than done. Even if Stern is correct in arguing that climate change constitutes the "greatest market failure that the world has seen",<sup>25</sup> that market failure has already been corrected for.

This implies that there is no justification for a further increase in green taxes or the range of other policies that aim to correct for externalities associated with emitting greenhouse gases:

• Despite the massive burden of taxation on road transport the Government also supports the strengthening of already stringent European Union emissions regulation. That regulation is entirely unnecessary if the externalities of rising greenhouse gas emissions have already been addressed in the tax system.

• The Government's own study has shown that aviation taxes are already excessive yet airlines are also set to be included in the European Union Emissions Trading Scheme, making flights even more expensive.

• Further increases in taxes on motoring, particularly in Vehicle Excise Duty, are planned. These cannot be justified by the environmental costs of driving.

This study focuses on aggregate taxes and the aggregate cost of emissions, whether across the country or in a local authority area, and different activities are taxed to different extents. There might be a case that there is room to do more to correct for the externalities associated with emissions from agriculture, for example, which is currently actively subsidised. If someone is to take that line though, they have to also accept that green taxes such as Fuel Duty are currently set too high and should be reduced.

Excessive green taxes, not justified as a Pigovian attempt to address externalities, are an arbitrary burden on particular industries and consumers. People pay for electricity, motor fuels and other goods subject to green taxes with income that has already been taxed; companies that pay green taxes also pay corporation tax; and most green taxes are accompanied by VAT. They have already paid their fair share and additional taxes, without proper justification, constitute a deeply unfair and distorting victimisation.

Green taxes are generally deeply inefficient. They undermine the competitiveness of British industry and waste money in administration. For example, the Government's own

<sup>&</sup>lt;sup>25</sup> Stern, N. et. al. 'Stern Review: The Economics of Climate Change', HM Treasury, 2006



preliminary Regulatory Impact Assessment suggested that the European Union Emissions Trading Scheme would cost £62 million per year in administrative costs to British firms and public sector bodies alone.<sup>26</sup> Green taxes can also create social costs of their own by reducing the poor to economic dependency and increasing the cost to dispersed families who want to keep in touch.

#### 3.2 The burden of green taxes falls unevenly and imposes a particular burden on those living in rural areas, the poor and elderly

The burden varies significantly between suburban and rural areas:

• Figure 3.2.1, taken from the earlier TPA report *The Burden of Green Taxes,* suggests that low population density areas tend to face greater excess green taxes.



Figure 3.2.1: Excess green taxes versus population density

Population density, persons per hectare

• For example, in Maldon – a rural district – residents pay £622 per person in excess green taxes while in Camden – in central London – residents pay £136 each in excess green taxes (using the IPCC social cost of carbon).

• This is likely to be driven by a greater reliance on private transport away from the dense public transport networks in cities.

<sup>&</sup>lt;sup>26</sup> Open Europe, "*The high price of hot air: Why the EU Emissions Trading Scheme is an environmental and economic failure*", July 2006



• Increasing the cost of living outside cities will encourage migration to urban areas and increase pressure on services in those areas.

Those on low and middle incomes spend a larger share of their income on electricity:

• Figure 3.2.2 shows that lower incomes tend to be associated with spending a higher proportion of income on electricity.



Figure 3.2.2: Electricity spending as a share of total income, by income decile<sup>27</sup>

• This is because electricity is a necessity. Regulations like the Renewables Obligation which transfer from energy consumers will always be regressive.

Fifth

Sixth

Seventh

Eighth

Ninth

Highest

Lowest Second

Third

Fourth

• That means policies which increase the price of electricity will increase poverty and benefit dependency.

<sup>&</sup>lt;sup>27</sup> Office for National Statistics, Annual Survey of Hours and Earnings 2008 and Family Spending 2008



Elderly households also spend more on energy:

• Figure 3.2.3 shows that older families spend significantly more on electricity.



Figure 3.2.3: Electricity spending as a share of total expenditure, by age group

• The elderly tend to have lower incomes – which means they tend to spend more on electricity as a share of their income as it is a necessity – and they also use more electricity for heating, in particular.

• Increasing the cost of a necessity like electricity could have serious social costs. For example, increasing the cost of electric heating adds to the cost of coping with the cold and may therefore increase excess winter mortality.



#### 3.3 Undermining competitiveness

British firms have to compete with those in other countries, facing different fiscal regimes. Many OECD countries take less in green taxes. For example, the proportion of the British unleaded pump price constituted by tax is the joint 3<sup>rd</sup> highest in the EU15.





Diesel is even more heavily taxed relative to other EU countries, as figure 3.3.2 shows.

<sup>&</sup>lt;sup>28</sup> BERR 'Energy trends and prices', Table 5.1.1, June 2008





Figure 3.3.2: Tax component in the pump price of diesel in EU15 nations, per cent<sup>29</sup>

Taxes on motor fuel are one example that hints at a broader pattern. Many of Britain's industries will not be able to compete with foreign firms on a level playing field as British companies have to live with the burden of more onerous green taxes and regulations.

That picture becomes considerably starker when you compare Britain with developing countries. Firms in countries such as China do not have the burden of green taxes and many have their energy costs heavily subsidised:

- Morgan Stanley have found that half of the world's population have their purchases of fuel subsidised. Thanks to subsidies the price of petrol in China was just 79 cents per litre in early 2008 whereas the price in the United States was \$1.04 per litre. British drivers paid well over \$2 per litre at the time.<sup>30</sup>
- Most developing world countries face no equivalents of the EU Emissions Trading Scheme, the Renewables Obligation or many of Britain's other green taxes.

There has been a steady decline in British manufacturing employment in the last decade. While there are many factors contributing to this trend, high green taxes certainly make it harder for British firms to compete and maintain manufacturing employment in the UK:

• This has almost certainly contributed to job losses. Manufacturing employment has fallen by 1.5 million since 1999.<sup>31</sup>

• As well as leading to aggregate job losses, undermining the competitiveness of British industry is also likely to mean lower overall prosperity and harm poorer regions dependent on manufacturing, thereby increasing regional inequalities.

<sup>&</sup>lt;sup>29</sup> BERR 'Energy trends and prices', Table 5.2.1, June 2008

<sup>&</sup>lt;sup>30</sup> The Economist 'Fuel subsidies: Crude measures', May 2008

<sup>&</sup>lt;sup>31</sup> Office for National Statistics 'UK Workforce jobs', LOLO, November 2008



#### **3.4 Exporting emissions**

Another result of Britain's high green taxes relative to industrial competitors is that Britain exports more emissions. This undermines the effectiveness of green taxes. Britain's emissions intensity is relatively low. This will partly be the result of the UK economy specialising in activities that tend to produce relatively low emissions, but it is also a reflection of the relative energy efficiency of British industry. Exporting emissions to countries like China, with much higher emissions intensity, could increase total emissions.

A recent report for the Government found that Britain's Consumer Emissions, those produced both in the UK and abroad providing goods for UK consumers, were 762.4 Mt of  $CO_2$  in 2004:<sup>32</sup>

• That is 132 Mt more than the producer emissions total that is generally quoted when discussing UK carbon dioxide emissions, a measure which does not include emissions exported to other countries.

• Emissions exports are creating a growing gap between the emissions reported to the UN and Consumer Emissions, as can be seen in the graph on the next page.



#### Figure 3.4.1: UK Consumer Emissions and UNFCCC reported emissions<sup>33</sup>

<sup>&</sup>lt;sup>32</sup> Stockholm Environment Institute & University of Sydney '*Development of an embedded carbon emissions indicator*', DEFRA, July 2008

<sup>&</sup>lt;sup>33</sup> Stockholm Environment Institute & University of Sydney '*Development of an embedded carbon emissions indicator*', DEFRA, pp. 21-22, July 2008



This is a general problem with unilateral policy. The EU's target, which the UK is signed up to, to cut emissions by 20 per cent by 2020 does not imply a reduction in global emissions. As Dieter Helm puts it:<sup>34</sup>

"This international dimension raises perhaps the most important aspect of the 20 per cent overall target: it is based on production of carbon within the EU, and not on consumption. Thus the EU can achieve its targets if it switches carbon production that would have taken place within the EU to overseas, and then imports back the goods and services which would have caused the emissions internally."

#### **3.5 Picking losers**

The ideal for climate change policy is that it should be neutral between different potential methods of cutting emissions. The only reason policy should violate that rule would be if particular methods had other social costs, for example the public may want to avoid the use of windfarms to minimise disruption to rural landscapes:

• The Renewables Obligation only provides subsidy to a limited set of low carbon sources of power. In particular, it excludes nuclear power. There is little justification for this in terms of cutting emissions. The scheme provides massive subsidies, one Renewables Obligation Certificate (ROC) is given to renewable generators for each MWh of renewable energy supplied to customers and those ROCs are worth £40-50.<sup>35</sup> By comparison, the substantial federal subsidies for wind power in the United States are only around £15 per MWh.<sup>36</sup>

• The Renewables Obligation is now "banded" to provide greater subsidy to the sources of energy with the highest costs, on the grounds those technologies are seen as "emerging". The table shows the original proposed bands,<sup>37</sup> but off-shore wind has since been moved to the "Emerging technologies" band:

<sup>&</sup>lt;sup>34</sup> Helm, D. '*EU climate-change policy – a critique'*, Smith School Working Paper Series, October 2009

<sup>&</sup>lt;sup>35</sup> E-ROC, Track Record, <u>http://www.eroc.co.uk/trackrecord.htm</u>

<sup>&</sup>lt;sup>36</sup> Energy Information Administration '*Federal Financial Interventions and Subsidies in Energy Markets 2007*', Executive Summary, Table ES5

<sup>&</sup>lt;sup>37</sup> House of Commons Select Committee on Innovation, Universities, Science and Skills 'The Renewables Obligation', *Fifth Report*, 11 June 2008, Table 6



Proposed 'banding' of the Renewables Obligation					
Band	Technologies	ROCs/MWh			
Established	Sewage gas; landfill gas; co-firing of non-energy crop biomass.	0.25			
Reference	Onshore wind; hydro-electric; co-firing of energy crops.	1.0			
Post-demonstration	Offshore wind; dedicated regular biomass.	1.5			
Emerging technology	Wave; tidal stream; advanced conversion technologies (anaerobic digestion, gasification, pyrolysis); dedicated biomass burning energy crops; dedicated regular biomass with CHP; photovoltaics; geothermal.	2.0			

• Providing additional support for the deployment of "emerging" technologies is a perverse approach. That implies providing the greatest support for immediate deployment in those areas where the greatest cost savings can be had by waiting until the technology has matured, instead of locking in high costs by installing existing technology now. Beyond that, the idea that that the high costs of wind power are the result of it needing time to develop – both wind power and offshore construction are long standing technologies – rather than the inherent challenges of installing and connecting wind power offshore is hard to sustain. The Government are no longer picking winners but actively picking losers.

• Singling out the highest cost technologies for additional subsidies will significantly increase the cost to consumers of reducing emissions. Given that, as we established earlier, increasing electricity prices will affect poorer and elderly families the most, this is likely to increase both poverty and benefit dependency.

#### **3.6 Short term targets**

In a number of ways, existing policy is too focussed on the short term and this may come at the expense of longer term progress:

• The high volatility of the carbon price under the ETS discourages long term investments on the basis of that price. As environmentalist Oliver Tickell wrote for the Guardian: "Wild fluctuations create a risk that deters some investors altogether and makes others demand a significant risk premium, putting up the price of capital."<sup>38</sup> This is particularly problematic for the nuclear industry, who have called for a floor under the price on that basis, but such a floor would further push up the burden of the ETS on consumers.<sup>39</sup>

• Short term targets dictate the use of existing technologies. The failure of the current excessive price to deliver significant emissions cuts suggests that existing alternatives to fossil fuels are not economical. Deploying uneconomical alternatives now instead of

<sup>&</sup>lt;sup>38</sup> Tickell, O. 'Carbon: a market we can't allow to fail', *Guardian*, 29 January 2009

<sup>&</sup>lt;sup>39</sup> Reuters '*EDF Energy calls for UK carbon floor price*', 26 May 2009



directly supporting technological development to allow more affordable cuts in the medium term may significantly increase the net present cost of emissions reductions.

• While 2020 may be a long time away in politics, it is a short term target in terms of infrastructure investment and rules out many important options. In particular, nuclear and tidal power and carbon capture and storage (CCS) are unlikely to be able to make a significant contribution by 2020.

Again, this point is made by Dieter Helm:

"The 2020 date itself is a further serious flaw in the EU package: 2020 is so close that it is unlikely that there will be much technical change by then. In other words, the target is to be met by existing technologies. As a result, there are only two major candidates to meet the target on the energy side (in addition to outsourcing energy-intensive industries): renewables and demand reductions. In the renewables category, wind is likely to be the main technology. Energy efficiency might help to reduce demand, but not necessarily. If income rises sharply over the period, overall demand might also rise, even if energy efficiency goes down. And energy efficiency itself creates an income effect. There is not much room for nuclear before 2020, or for CCS. Tidal power is not likely to make a significant contribution until post-2020, and the target itself provides no incentive towards the sorts of R&D required. For transport, the focus is on biofuels, since hydrogen and electric based cars are unlikely to be significant pre-2020 technologies. The contribution of biofuels to reducing global warming is at best controversial and could even be adverse. Thus choosing a short-term target date induces a very powerful technology bias—with both short- and long-term consequences."

#### 3.7 Existing policy has failed to deliver significant emissions reductions

Despite the massive burden of green taxes, significantly in excess of the social cost of British greenhouse gas emissions, there has been little progress in cutting emissions in recent years.

Figure 3.7.1 shows the pattern of emissions from 1970 to 2007 (data on all greenhouse gases is more limited), and there is no sign that emissions are below the level we would expect based on their long term trend since before there were any policy interventions to cut emissions. Above-trend declines in emissions appear to be taking place in periods of slow economic growth or recession such as the late 1970s, early 1980s and early 1990s. The decline in 2008 is clearly connected to the recession. As Prins et. al. argue, current policy has abjectly failed to deliver *intended* cuts in emissions, those cuts in emissions that have been achieved have generally been the result of recessions.

<sup>&</sup>lt;sup>40</sup> Prins, G. et. al. '*How to get climate policy back on course*', 6 July 2009







<sup>&</sup>lt;sup>41</sup> DECC '*Emissions of carbon dioxide, methane and nitrous oxide by NC source catergory, fuel type and end user*', 27 March 2008, Table 5b Estimated emissions of carbon dioxide (CO2) by National Communication source category, type of fuel and end user: 1970 - 2007



### 4. Reforming climate change policy

With such problems in existing policy, a range of reforms are needed. For example, support for biofuels through policies like the Renewable Transport Fuel Obligation is of dubious value in terms of cutting emissions and has wider problems as the biofuel crops compete with the food supply and increase pressure on wilderness land. Short term targets that enshrine aspirations to cut emissions in law are clearly distorting policy towards favouring short term fixes that hurt long term progress. But, three particular changes are needed to reduce the pressure this policy agenda places on ordinary families:

- Energy policy should be reformed to bring down the burden on families and industrial consumers, and give a level playing field to different low carbon sources.
- Greater direct support should be provided to research and development, funded by cutting existing climate change spending of dubious value.
- Transport policy should be reformed to focus resources on the roads and commuter railways that move the most passengers.

## 4.1 Leave the Emissions Trading Scheme and replace the Renewables Obligation with a technology-neutral Low Carbon Obligation

The latest Government estimate of the cost of climate change policies suggests that they make up 14 per cent of domestic electricity bills and 21 per cent of industrial electricity bills:<sup>42</sup>

"Our current climate change policies (e.g. the Renewables Obligation, EU Emissions Trading Scheme, and the Carbon Emission Reduction Target) make up around 14% of average domestic electricity bills and 3% of average domestic gas bills. On the industrial side, for an average medium-sized consumer, the Renewables Obligation, EU ETS, and Climate Change Levy together contribute around 21% to industrial electricity bills and about 4% to gas bills. We expect that incoming climate change policies such as Better Billing will add further to retail prices, as suppliers pass on policy costs downstream; however, as some of these policies will reduce consumption of energy, the net effect on actual energy bills will be lower."

That burden clearly imperils a number of policy objectives. It increases poverty and benefit dependency by pushing up the cost of electricity for low income families, and increases excess winter mortality by pushing up the price of electric heating for the elderly. And, the competitiveness of manufacturing industry is undermined by an increase

<sup>&</sup>lt;sup>42</sup> BERR 'UK Renewable Energy Strategy – Consultation', Paragraph 10.5.3, June 2008



in a major share of their costs. At the same time, the instability of the carbon price under the ETS and the focus on the most expensive technologies under the Renewables Obligation means that those policies are not delivering reductions in emissions efficiently.

Instead of trying to deliver greater emissions cuts by putting an even larger burden on families – as proposals to put a floor under the ETS price would, the focus should be on producing policy that will deliver more efficient cuts at a lower cost to families and manufacturing industry. Two reforms are needed:

• **Leave the Emissions Trading Scheme**. As the TPA report *The expensive failure of the European Union Emissions Trading Scheme* argued the flaws with this scheme are fundamental. Beyond that, the scheme is likely to continue to be subject to intense lobbying at an EU level for special favours for specific industries, which will continue to hinder its chances of operating efficiently. Most permits are given away so there would be little loss in revenue, and significantly more is likely to be spent supporting the connection of renewable energy to the grid than will be raised from permits in the foreseeable future; the Conservatives have even earmarked the funds for that purpose.<sup>43</sup>

• Replace the Renewables Obligation with a technology-neutral Low Carbon Obligation. The scheme's requirements to reduce the UK's carbon-intensity and exposure to fossil fuel prices can be met at the lowest cost possible, and may be able to become more ambitious, if the policy provides a level playing field for all low carbon technologies.

While it is impossible to precisely estimate the trajectory of future prices under different policy scenarios, significant savings can be expected.

Government estimates put the cost of climate change policies at 14 per cent of household electricity bills. That burden is likely to rise significantly, Citigroup research has argued that Ofgem's estimate of a 35 per cent rise in electricity prices under Government policies, characterised by Ofgem as a "Green Transition Scenario", is overly sanguine and suggest that a real terms increase of between 57 per cent and 100 per cent is possible, even if commodity prices remain stable, in order to finance needed investment.<sup>44</sup>

In that context, it seems very reasonable to expect that scrapping the Emissions Trading Scheme and allowing other sources such as nuclear energy to fulfil the Renewables Obligation could **cut electricity bills by 10 per cent or more** from the level under current policies by the end of the next Parliament. The savings would then build to as high as 50 per cent from levels under present policy by 2030.

<sup>&</sup>lt;sup>43</sup> Conservative Party '*The Low Carbon Economy: Security, stability and green growth'*, Protecting Security, Policy Green Paper No. 8, 16 January 2009

<sup>&</sup>lt;sup>44</sup> Citigroup Global Markets 'Pan European Utilities', 22 October 2009



As discussed earlier, this would reduce poverty and benefit dependency. Citigroup's research also suggests that massive subsidies for renewable energy will lead to lower productivity, reduced output and reduced consumer and business spending power.<sup>45</sup> Those consequences should be avoided if the ETS and Renewables Obligation are scrapped, with a replacement not forcing the use of high cost sources of energy.

As there would also be less pressure to shift to gas power, as more nuclear plants would be built and coal would face less of a handicap, this policy would better secure the UK against sharp price hikes or shortages in gas supplies than present policy.

In order to make this change in policy, it would be necessary to repatriate control from the EU. However, as the renewable energy target is unlikely to be met anyway and the ETS is somewhat detached from EU membership – as non-member states have joined the scheme – that should be possible.

It would also be necessary to abandon the 2020 renewable energy target, but that target is unlikely to be met anyway and clearly imposes a disproportionate burden on Britain. Britain has been among the most successful countries in decarbonising since 1990, but Table 4.1.1 shows that British is going to have to spend far more than other major European countries to meet the renewable energy target, and will be the only one spending more on meeting environmental targets than on replacing or renewing capacity to meet demand:

Country	Replacement/Renewal	Environmental Targets	Total
UK	77	161	236
Germany	91	72	163
France	130	56	186
Spain	69	18	87
Italy	102	23	124
Total	470	330	800

#### Table 4.1.1: Estimated Utility Capex Spend by Country, € billion<sup>46</sup>

#### 4.2 Invest in technology

The temptation to look at current policy and conclude that if the current price on carbon has not delivered the desired cuts in emissions, then the price is too low, has to be avoided. As the price is already excessive, what that actually shows is that there are not effective alternatives to fossil fuels. Cuts in emissions will require new alternatives and

<sup>45</sup> Ibid.

<sup>&</sup>lt;sup>46</sup> Ibid. Figure 1



that means new technologies are needed. The case for focussing on technological efforts to provide new alternatives is made by Nordhaus & Shellenberger, of the Breakthrough Institute:<sup>47</sup>

"That's because virtually every nation that has established carbon caps has also included measures, either overtly or covertly, to reduce the cost of compliance, which renders the caps largely symbolic. Carbon caps have failed to reduce emissions all over the world because fossil-fuel alternatives are still much more expensive than current polluting energy sources, and voters and policy-makers are not willing to make fossil fuels so expensive that clean-energy alternatives are economically viable. If we succeed in developing the right new technologies, it might pave the way for a future cap or carbon-pricing approach that would cause less hardship and thus actually work."

Prins et. al. also argue for an expansion in support for technological development:<sup>48</sup>

"The Kaya Direct Approach would focus on expanding the provision of carbon-free energy. To this end, we support a low ring-fenced carbon tax in one form or another to fund innovation policies. The core argument of the Breakthrough Institute is an elementary political truth, namely that clean energy will only advance radically when it is made cheaper than dirty energy at point-of-use by the consumer. Accordingly, a switch to public intervention in this area, where governments are well capable of directing public finance to stimulate research, development and deployment of innovations that work to reduce the costs of alternatives to fossil fuels, is prescribed."

Support for technological development could focus on two areas, providing more affordable alternatives to fossil fuels and alternatives for adaptation or a geo-engineering response to climate change.<sup>49</sup> It could be paid for with savings in other government climate change programmes.

The various government agencies trying to improve energy efficiency in households and companies are of dubious value. Businesses and households have an existing incentive to use energy as efficiently as possible, to cut their bills. There is most plausibly a market failure, due to information costs, with households but there is little evidence the introduction of the Energy Saving Trust in 1993 has significantly affected the trend of families increasing their use of energy saving technologies over time.

<sup>&</sup>lt;sup>47</sup> Nordhaus, T. & Shellenberger, M. 'Getting Real on Climate Change', *The American Prospect*, December 2008

 <sup>&</sup>lt;sup>48</sup> Prins, G. et. al. '*How to get climate policy back on course*', 6 July 2009
<sup>49</sup> The Economist Blog '*Six questions for Jim Manzi*', 29 August 2009, http://www.economist.com/blogs/democracyinamerica/2009/08/six questions for jim manzi





Figure 4.2.1: Suitable households installing various energy saving measures<sup>50</sup>

The argument that there is a market failure is weakest in the case of big businesses, the group catered to by the Carbon Trust. If big businesses want advice on how to cut their energy bills they can, should and will pay for it themselves. The Trust's other objectives are also dubious, some resources are directed towards supporting innovation but their approach is rather bureaucratic. The organisation should be abolished, saving £100 million, or entirely refocused on supporting technological development. If more money is needed, the Energy Saving Trust, Greenwise and other government spending in this area should also be cut or abolished.

Supporting basic research, in particular, is an established area in which government has been involved for an extremely long time and is much more practical than trying to ration energy use.

• **Invest in technological improvements** to make decarbonisation more affordable and provide new options to adapt to climate change.

• Fund this policy by **abolishing the Carbon Trust** and making other savings in existing climate change related spending.

There are a number of approaches to encouraging technological development:

• Fund basic research through universities. There is a long track record of basic university research encouraging associated, practical technological developments.



• Provide prizes for specific, pre-specified technological achievements. This has been an effective strategy for private sector associations from the Industrial Revolution<sup>51</sup> to the recent X-Prize for private spaceflight which attracted \$100 million of investment chasing a \$10 million prize.<sup>52</sup>

• Look at other models for supporting technological development that may have been successful abroad, for example in Japan.

## **4.3** Focus transport policy on delivering maximum capacity with scarce resources

As this report and the earlier TPA report *Relative transport spending* argues, motorists are currently significantly overtaxed relative to their emissions and the amount spent on road building. There may not be many opportunities to redress the balance on that score in the years to come though, as there is clearly massive pressure on the public finances.

The focus should be on ensuring that, when striking priorities with a scarce transport budget, the focus is on those modes of transport that deliver the most capacity for each pound spent on subsidy.

In particular, roads move around ten times as many people per pound of public subsidy as railways. The most overcrowded train routes are all commuter routes into major cities, particularly London. As Tim Leunig, at the LSE, has noted "about 70 per cent of rail journeys begin or end in London, and the three busiest stations are Waterloo, Victoria and Liverpool Street."<sup>53</sup> Table 4.3.1 shows the ten most congested trains in 2006:

Train departs at	From	То	Load factor, %
06:35	Bedwyn	London Paddington	155
06:14	Oxford	London Paddington	150
07:26	Brighton	Bedford	150
17:52	London Paddington	Worcester Shrub Hill	150
07:49	Gidea Park	London Liverpool Street	148
06:20	Ashford	London Victoria	148

#### Table 4.3.1: Ten most congested trains, 2006<sup>54</sup>

<sup>&</sup>lt;sup>51</sup> Brunt, L., Lerner, J. & Nicholas, T. '*Inducement Prizes and Innovation'*, Centre for Economic Policy Research, Discussion Paper No. 6917, July 2008

<sup>&</sup>lt;sup>52</sup> X Prize 'Ansari X Prize', <u>http://space.xprize.org/ansari-x-prize</u>

 <sup>&</sup>lt;sup>53</sup> Woods, R. 'Hang the high-speed train, just give commuters a seat', *Sunday Times*, 29 June 2008
<sup>54</sup> Department for Transport response to FOI,

http://webarchive.nationalarchives.gov.uk/+/http://www.dft.gov.uk/foi/responses/2007/july2007/foitenmostcrowded/foi crowdedtrains2.pdf



Train departs at	From	То	Load factor, %
	International		
17:48	Luton	Sutton	148
18:06	London Paddington	Oxford	148
08:02	Woking	London Waterloo	148
06:37	Hertford East	London Liverpool Street	147

It seems unlikely that any of these routes would benefit from the introduction of high speed rail.

The environmental benefits of high speed rail are questionable, environmentalist George Monbiot has argued:<sup>55</sup>

"Though trains traveling at normal speeds have much lower carbon emissions than airplanes [...] energy consumption rises dramatically at speeds above 125 miles per hour [...] If the trains are powered by electricity, and if that electricity is produced by plants burning fossil fuels, they cause more  $CO_2$  emissions than planes."

Regardless, railways already have a large share of the market for most of the middle distance domestic routes in which they can be competitive.

**Transport investment should be focussed on roads and commuter rail.** High speed rail networks should be accorded a lower priority.

This would have a number of benefits:

• Road spending would be better aligned with the amount levied in motoring taxation.

• Congestion on the road and all parts of the rail network would be reduced. Even intercity rail would be less overcrowded if there was greater capacity for people to use the roads instead. Congestion is economically wasteful and congestion on the roads increases emissions.

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<sup>&</sup>lt;sup>55</sup> Monbiot, G. 'Flying Into Trouble', *The Nation*, 7 May 2007



## 5. Conclusions

It is becoming increasingly clear that a new approach to climate change policy is needed. A majority of the public are not convinced on the scientific case that humans are the primary cause of global warming, let alone prepared to pay the heavy price that is expected under current policies. At an international level, other countries are not following Europe's "lead" and countries like Britain are isolated as other countries refuse to commit to policies of similar severity. A new approach is not just preferable but will become a political necessity.

#### 5.1 Public opinion

Polling for the Times newspaper suggests that 41 per cent of the public believe that global warming is taking place and is largely man-made, 32 per cent believe the link is not yet proved, 8 per cent believe it is environmentalist propaganda to blame man and 15 per cent say the world is not warming.<sup>56</sup>

In that context, policies are only likely to be democratically viable if they are low cost and do not endanger other objectives. Focus group work for the Institute for Public Policy Research produced the result that the best way to convince the public to adopt behaviours that might reduce emissions was: "Don't focus on climate change".<sup>57</sup> To the extent the public were willing to support measures to improve energy efficiency, they wanted to spend the money saved elsewhere in ways that might increase emissions:

"If I was to build a house tomorrow, it would have anything energy saving that I could possibly ram in it to make it as energy efficient as I could – and then I could have my Audi TT." (Female, York, with children)

In that context, it will clearly be impossible to maintain public support for overly costly measures to reduce emissions. YouGov polling found net opposition to increased taxes on petrol, increased airline fares and increased taxes to subsidise wind and solar energy.<sup>58</sup> That will particularly be the case if the cost comes through higher utility bills. 65 per cent of the public named "cost of utility bills" as a major financial worry for them and their family in response to a TPA poll in 2007, it was the number one financial worry; council tax was second at 61 per cent.<sup>59</sup>

<sup>&</sup>lt;sup>56</sup> Webster, B. & Riddell, P. 'Global warming is not our fault, say most voters in Times poll', *The Times*, 14 November

<sup>2009 &</sup>lt;sup>57</sup> Platt, R. & Retallack, S. '*Consumer Power: How the public thinks lower-carbon behaviour could be made mainstream*',

<sup>&</sup>lt;sup>58</sup> YouGov Survey for the Economist and the Hoover Institution, March 2008,

http://www.yougov.co.uk/extranets/ygarchives/content/pdf/UK%20US%20topline%20comparison.pdf TPA-YouGov Party Conference Season Poll 2007, http://tpa.typepad.com/about/files/0709\_tpa\_yougov\_poll\_final.ppt



#### **5.2 International politics**

While interventions to reduce emissions are increasing, other countries are not following Europe's lead and imposing policies on anything like the scale of current policy in Britain. 'Cap and trade' regulation is struggling in the US and Australian Senates. India and China appear unwilling to accept binding caps on emissions.

The reason for this reluctance is simply that those countries are unwilling to bear the economic cost such caps could entail. Figure 5.2.1 was produced by Dr. Keigo Akimoto, Senior Researcher at the Research Institute of Innovative Technology for the Earth (RITE) in Japan and shows the scale of the economic sacrifice that would be needed to meet a global target to halve emissions by 2050, even with emissions intensity improvements well above the historical average.

Figure 5.2.1: Required level of CO2 intensity improvement needed to meet global emission targets in 2050<sup>60</sup>



<sup>&</sup>lt;sup>60</sup> Akimoto, K. 'Global Warming Mitigation Analyses Based on Sectoral Approach', Presentation to METI, 22 January 2009



The Department of Energy and Climate Change's Impact Assessment for the Climate Change Act accepts that "the economic case for the UK continuing to act alone where global action cannot be achieved would be weak."<sup>61</sup>

#### 5.3 The affordability crisis

The combination of rising costs and weak public support is likely to lead to a serious political crisis for climate change policy. Citigroup, in a report for investors, suggest that:<sup>62</sup>

"As the bills for the €1trn of investment become due in the coming years we believe the issue of affordability – especially for domestic consumers – will become a significant political issue. Power and heating may well become unaffordable for many of the poorest in society and even for those on middle incomes it is likely to take up an unacceptable percentage of disposable income."

Later in the report, they argue that:

"Of course it can and will be argued that in the long term the overall cost benefit will be positive even for countries like the UK as the economic and social affects of climate change are mitigated by this investment. However, politicians may struggle to convince voters of the merits of this argument unless the affordability issue is addressed, particularly for the poor."

The wider context strengthens the case that politicians will struggle to convince the public to support expensive mitigation policies. There is a massive crisis in the public finances and efforts to address that through spending cuts or tax rises will involve financial pain for middle income families. Combining that with large rises in energy bills will add up to an intolerable burden on average household incomes, and if the burden is intolerable for average households as well as poorer ones, socialising the issue cannot address the problem effectively.

## 5.4 The political opportunity for a party that attacks costly environmental policies

Both parties clearly face political challenges at present:

<sup>&</sup>lt;sup>61</sup> Department of Energy and Climate Change 'Climate Change Act 2008 Impact Assessment', March 2009

<sup>&</sup>lt;sup>62</sup> Citigroup Global Markets 'Pan European Utilities', 22 October 2009



• The Conservatives' poll lead appears to be eroding and could leave them facing a hung parliament. Even if they are elected with a majority, they will also seek to be reelected for a second term despite imposing considerable fiscal restraint.

• Labour are looking to reconnect with voters, particularly those on low and middle incomes and in the industrial heartlands where they are under threat from minor parties.

While the vast majority of the public are paying a high price for the current direction of policy, two groups bear a particularly heavy burden:

• **Suburban commuters.** Who pay high motoring taxes and see investment in roads and commuter rail under threat with a political commitment to high-speed rail in an attempt to compete with air travel.

• **The elderly.** Who spend a high proportion of their income on energy and are most vulnerable to rises in electricity prices.

Those groups are clearly highly important as they live in the marginal seats that decide elections and have high turnout rates at elections, respectively. They are likely to become increasingly aware of the price they are paying for current climate change policies as that price rises.

It seems extremely unlikely that environmentalist pressure can indefinitely prevent one of the parties claiming the mantle of the party of low energy prices by opposing costly climate change policies. The first party to take that step can expect to enjoy a significant electoral advantage.

#### 5.5 "Realist" climate change policies

The approach to climate change policy advocated in this paper can best be described as "realist". It accepts a number of constraints upon climate change policy:

• An excessive burden cannot be imposed on the public. Imposing a high burden on poor and middle families is unfair and increases a range of social problems. It is also impossible to establish democratic support for such policies. It is unrealistic to assume that effective climate change policy can be formed without democratic support.

• International agreement on steps that will have high short to medium term economic costs is extremely difficult to establish or maintain. The difficulties negotiating trade deals show that even international agreements which increase short to medium term incomes are difficult to achieve. Expecting international negotiations to produce a deal when there is good reason to expect that will cut income in the short to medium term is unrealistic.



• Short term renewable energy targets are unhelpful and cannot meet the UK's need for stable, secure and affordable energy. Wind power is too volatile and too expensive, and increases the need for gas back-up. Energy efficiency will allow politicians to avoid the issue, particularly as there is an income effect; some of the savings will be spent on other emitting activities.

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### Appendix 1: Responses to TaxPayers' Alliance work on green taxes

This report builds on earlier research paper's *The case against further green taxes* and *The burden of green taxes*. Our first report received a variety of responses:

• The **Liberal Democrats** argued that more recent estimates of the social cost of carbon showed a higher value, and therefore the lower estimates we used were not relevant, and that fuel duty accounted for many externalities other than greenhouse gas emissions and the need to spend money on roads.<sup>63</sup>

Tol, who has studied the peer-reviewed literature for his estimate of the social cost of carbon, has concluded that "there is a downward trend" in the estimates.<sup>64</sup> There is little evidence to substantiate the idea that estimates of the social cost of carbon are generally increasing. We had already dealt with the argument that Fuel Duty should correct for externalities other than road building and greenhouse gas emissions in the report and there is an extended discussion of this issue in Section 2 of this study.

• The **Treasury's** criticism of our report was that "in arguing against these taxes, the Taxpayers Alliance are being doubly dangerous – it would mean cuts to public services, schools and hospitals, as well as higher carbon emissions leading to accelerated climate change."<sup>65</sup>

As we illustrated, the externalities have already been corrected for so the current level, or greater, of green taxes cannot be justified to prevent accelerated climate change. The other half of their argument is that these taxes are needed to raise revenue. That confirms our arguments that green taxes constitute an attempt to use green rhetoric to disguise increases in total taxation and victimise certain groups, such as motorists, who already pay other taxes such as VAT.

• None of the rebuttals established a genuine flaw in our research. Rod Liddle, writing in **the Spectator**, observed that:<sup>66</sup>

"Now, OK, it's a fair cop — I suppose you would not expect an organisation called the TaxPayers' Alliance to commission a study which concluded that we should all pay more in tax of one kind or another. But still, I have not seen those figures convincingly rebutted anywhere. I suspect that they are impossible to rebut and that instead the answer will come that we have a duty to the world which well exceeds the damage we wreak upon it. Perhaps — but if so, then let's say as much, clearly."

<sup>&</sup>lt;sup>63</sup> Liberal Democrats '*TaxPayers' Alliance Wrong on Green Taxes'*, September 2007, http://www.libdems.org.uk/news/taxpayers-alliance-wrong-on-green-taxes-huhne.13124.html

<sup>&</sup>lt;sup>64</sup> Tol, R.S.J. '*The Social Cost of Carbon: Trends, outliers and catastrophes*', August 2007

<sup>&</sup>lt;sup>65</sup> *Daily Telegraph*, 'Britons 'pay £10.2bn too much in green tax', September 2007

<sup>&</sup>lt;sup>66</sup> Liddle, R. 'All These Green Taxes And Rules Are Just Witless Nods To Fashion', *Spectator*, August 2008



The Government and other organisations have since adopted our methodology, further confirming its validity:

• The **Department for Transport** compared the social costs of air travel with the amount charged in green taxes. The Department established that, since the increase in Air Passenger Duty in 2007, flights have been charged green taxes in excess of their social costs by £100 million.<sup>67</sup> The report used the DEFRA shadow price of carbon, which is one of the estimates we use in this study.

• Evidence for the **Institute for Fiscal Studies** Mirrlees Review has looked at both Fuel Duty and the Landfill Tax. It concluded that "road fuel duty is much higher in the UK than the environmental cost of vehicle emissions would appear to justify" and "UK landfill tax has been raised to levels much higher than the environmental costs of landfill justify".<sup>68</sup>

The conclusion from our reports, that emitting activities are already excessively taxed, is increasingly supported by studies elsewhere confirming that a broad range of the most important emitting activities face taxes higher than the externalities they impose.

<sup>&</sup>lt;sup>67</sup> Department for Transport 'Aviation emissions cost assessment 2008', July 2008

<sup>&</sup>lt;sup>68</sup> Institute for Fiscal Studies 'Don't expect much extra revenue from green taxes, says study prepared for the Mirrlees Review', July 2008



## Appendix 2: Local summary tables

Council	Greenhouse gas estimate, 2008, kT CO2 equivalent	Social Cost of Carbon, IPCC 2008, £	Total Green Taxes and Charges 2008, £	Green taxes above social cost 2008, £	Population 2007	Excess green taxes per person 2007, £	Excess green taxes per person 2008, £
Aberdeen City	2,214	£16,290,905	£70,491,824	£54,200,919	210,757	£208.88	£257.17
Aberdeenshire	3,173	£23,342,110	£145,902,305	£122,560,195	240,866	£495.70	£508.83
Adur	419	£3,082,665	£25,594,379	£22,511,714	61,022	£355.28	£368.91
Allerdale	1,690	£12,434,801	£52,945,360	£40,510,559	95,158	£381.13	£425.72
Alnwick	279	£2,056,042	£19,830,959	£17,774,918	32,525	£541.05	£546.50
Amber Valley	1,213	£8,925,383	£55,859,843	£46,934,460	121,238	£358.82	£387.13
Angus	1,245	£9,161,887	£55,585,642	£46,423,755	110,665	£396.99	£419.50
Antrim	753	£5,543,549	£19,384,111	£13,840,562	52,966	£261.67	£261.31
Ards	688	£5,063,779	£34,220,750	£29,156,971	77,637	£370.39	£375.56
Argyll and Bute	-405	-£2,980,417	£45,760,479	£48,740,896	92,036	£503.99	£529.58
Armagh	741	£5,452,843	£23,856,262	£18,403,419	58,102	£301.26	£316.74
Arun	1,010	£7,432,605	£65,552,997	£58,120,392	147,419	£383.53	£394.25
Ashfield	1,006	£7,403,031	£45,683,377	£38,280,347	116,707	£302.01	£328.00
Ashford	1,087	£7,997,221	£63,267,272	£55,270,051	113,283	£481.26	£487.89
Aylesbury Vale	1,442	£10,608,320	£103,883,867	£93,275,547	175,312	£532.00	£532.05
Babergh	803	£5,906,645	£50,942,345	£45,035,699	87,304	£504.61	£515.85
Ballymena	794	£5,843,530	£25,950,358	£20,106,828	62,532	£310.63	£321.54
Ballymoney	312	£2,299,037	£13,170,001	£10,870,963	29,907	£349.07	£363.49
Banbridge	524	£3,851,776	£21,625,884	£17,774,108	46,723	£372.03	£380.41
Barking and Dagenham	1,099	£8,085,312	£48,396,698	£40,311,386	168,062	£209.69	£239.86
Barnet	2,065	£15,191,157	£100,641,317	£85,450,160	331,996	£235.59	£257.38
Barnsley	2,129	£15,664,796	£86,560,800	£70,896,004	226,164	£292.59	£313.47
Barrow-in-Furness	716	£5,271,430	£27,202,237	£21,930,807	72,300	£259.08	£303.33



Council	Greenhouse gas estimate, 2008, kT CO2 equivalent	Social Cost of Carbon, IPCC 2008, £	Total Green Taxes and Charges 2008, £	Green taxes above social cost 2008, £	Population 2007	Excess green taxes per person 2007, £	Excess green taxes per person 2008, £
Basildon	1,508	£11,091,968	£86,335,420	£75,243,453	170,982	£422.20	£440.07
Basingstoke and Deane	1,829	£13,459,531	£92,021,901	£78,562,370	161,215	£471.33	£487.31
Bassetlaw	1,290	£9,494,237	£56,302,575	£46,808,338	112,478	£387.84	£416.16
Bath and North East Somerset	1,285	£9,452,220	£75,883,252	£66,431,032	179,542	£349.94	£370.00
Bedford	1,287	£9,467,908	£76,239,303	£66,771,395	155,979	£412.86	£428.08
Belfast	2,754	£20,260,166	£58,398,732	£38,138,566	269,363	£122.94	£141.59
Berwick-upon-Tweed	436	£3,207,003	£14,203,647	£10,996,644	26,181	£387.96	£420.02
Bexley	1,423	£10,467,662	£84,500,096	£74,032,434	223,647	£314.32	£331.02
Birmingham	8,082	£59,463,453	£307,470,160	£248,006,707	1,017,234	£212.51	£243.80
Blaby	979	£7,201,871	£44,594,967	£37,393,096	93,547	£388.00	£399.73
Blackburn with Darwen	1,397	£10,274,708	£47,260,013	£36,985,304	141,881	£223.45	£260.68
Blackpool	951	£7,000,262	£46,331,517	£39,331,255	143,492	£245.60	£274.10
Blaenau Gwent	562	£4,132,280	£23,773,463	£19,641,182	69,682	£259.17	£281.87
Blyth Valley	583	£4,289,168	£40,044,470	£35,755,302	81,866	£430.13	£436.75
Bolsover	1,449	£10,658,362	£34,499,496	£23,841,133	74,717	£304.48	£319.09
Bolton	2,104	£15,483,654	£103,009,909	£87,526,255	264,127	£312.41	£331.38
Boston	562	£4,132,461	£23,911,481	£19,779,020	58,807	£298.46	£336.34
Bournemouth	1,086	£7,989,737	£69,316,420	£61,326,683	164,336	£349.98	£373.18
Bracknell Forest	884	£6,501,196	£61,309,703	£54,808,507	114,290	£457.80	£479.55
Bradford	3,657	£26,904,004	£156,760,089	£129,856,085	500,864	£234.27	£259.26
Braintree	1,206	£8,876,514	£87,270,286	£78,393,772	141,881	£551.29	£552.53
Breckland	1,338	£9,847,865	£72,798,934	£62,951,069	130,805	£469.14	£481.26



Council	Greenhouse gas estimate, 2008, kT CO2 equivalent	Social Cost of Carbon, IPCC 2008, £	Total Green Taxes and Charges 2008, £	Green taxes above social cost 2008, £	Population 2007	Excess green taxes per person 2007, £	Excess green taxes per person 2008, £
Brent	1,680	£12,358,341	£68,175,755	£55,817,414	271,880	£173.16	£205.30
Brentwood	773	£5,686,281	£36,675,367	£30,989,086	72,099	£416.69	£429.82
Bridgend	1,500	£11,039,221	£62,920,126	£51,880,905	134,832	£361.95	£384.78
Bridgnorth	812	£5,975,171	£30,412,743	£24,437,572	52,161	£433.81	£468.51
Brighton and Hove	1,655	£12,178,912	£100,335,877	£88,156,966	255,265	£327.13	£345.35
Bristol, City of	2,840	£20,897,906	£133,322,805	£112,424,899	419,300	£235.84	£268.13
Broadland	1,015	£7,467,228	£63,399,103	£55,931,875	123,857	£446.66	£451.59
Bromley	1,830	£13,465,392	£108,083,566	£94,618,175	302,794	£295.64	£312.48
Bromsgrove	1,131	£8,323,078	£49,090,314	£40,767,236	92,943	£438.15	£438.63
Broxbourne	620	£4,564,353	£42,884,026	£38,319,673	90,123	£411.39	£425.19
Broxtowe	1,029	£7,568,935	£44,895,474	£37,326,539	111,672	£322.67	£334.25
Burnley	710	£5,223,823	£30,015,429	£24,791,606	88,109	£252.49	£281.37
Bury	1,642	£12,083,426	£75,795,693	£63,712,267	184,576	£329.68	£345.18
Caerphilly	1,312	£9,650,133	£65,882,775	£56,232,643	172,996	£307.40	£325.05
Calderdale	1,837	£13,516,425	£75,696,099	£62,179,674	201,493	£284.45	£308.59
Cambridge	930	£6,840,038	£35,665,250	£28,825,212	120,836	£196.11	£238.55
Camden	2,077	£15,279,159	£47,139,036	£31,859,878	233,515	£68.93	£136.44
Cannock Chase	685	£5,037,271	£44,980,758	£39,943,487	95,057	£411.90	£420.20
Canterbury	1,077	£7,921,211	£65,610,884	£57,689,673	149,031	£376.98	£387.10
Caradon	715	£5,258,356	£44,672,421	£39,414,064	84,585	£457.04	£465.97
Cardiff	2,998	£22,057,974	£118,599,764	£96,541,789	323,235	£266.24	£298.67
Carlisle	1,250	£9,196,511	£45,913,159	£36,716,649	104,221	£319.64	£352.30
Carmarthenshire	1,954	£14,379,128	£91,379,800	£77,000,672	180,750	£404.46	£426.01
Carrick	738	£5,431,293	£44,480,498	£39,049,204	93,043	£402.56	£419.69
Carrickfergus	310	£2,281,996	£15,557,456	£13,275,460	40,279	£332.88	£329.59
Castle Morpeth	464	£3,412,490	£30,258,501	£26,846,011	50,147	£530.84	£535.35



Council	Greenhouse gas estimate, 2008, kT CO2 equivalent	Social Cost of Carbon, IPCC 2008, £	Total Green Taxes and Charges 2008, £	Green taxes above social cost 2008, £	Population 2007	Excess green taxes per person 2007, £	Excess green taxes per person 2008, £
Castle Point	507	£3,726,807	£50,412,308	£46,685,501	89,821	£527.71	£519.76
Castlereagh	507	£3,731,766	£21,093,955	£17,362,189	66,057	£269.96	£262.84
Ceredigion	644	£4,739,815	£41,496,084	£36,756,269	78,342	£455.43	£469.18
Charnwood	1,547	£11,384,194	£74,891,506	£63,507,312	165,948	£362.82	£382.70
Chelmsford	1,393	£10,247,028	£94,733,555	£84,486,527	165,645	£503.34	£510.04
Cheltenham	777	£5,715,495	£46,677,819	£40,962,324	113,082	£335.43	£362.24
Cherwell	1,982	£14,582,000	£79,809,678	£65,227,678	138,558	£451.17	£470.76
Chester	1,590	£11,695,084	£69,680,266	£57,985,182	120,735	£441.50	£480.27
Chesterfield	860	£6,326,997	£39,851,672	£33,524,676	101,301	£299.41	£330.94
Chester-le-Street	389	£2,864,465	£27,570,091	£24,705,627	53,570	£466.12	£461.18
Chichester	1,142	£8,400,170	£57,849,137	£49,448,967	110,162	£429.03	£448.88
Chiltern	740	£5,447,253	£53,089,551	£47,642,298	91,432	£518.08	£521.07
Chorley	1,055	£7,763,331	£54,733,868	£46,970,537	104,825	£445.36	£448.09
Christchurch	365	£2,685,126	£21,851,375	£19,166,249	45,716	£399.98	£419.24
City of London	1,972	£14,508,876	£34,122,259	£19,613,383	8,056	-£412.31	£2,434.72
Clackmannanshire	648	£4,768,938	£22,656,291	£17,887,353	50,247	£319.59	£355.99
Colchester	1,327	£9,763,831	£85,878,302	£76,114,471	176,722	£420.18	£430.70
Coleraine	596	£4,382,489	£24,211,703	£19,829,214	57,196	£345.93	£346.69
Congleton	1,271	£9,352,136	£58,851,699	£49,499,563	93,245	£525.91	£530.86
Conwy	933	£6,863,481	£53,705,313	£46,841,832	112,478	£404.54	£416.45
Cookstown	867	£6,381,547	£68,151,720	£61,770,173	35,647	£593.47	£1,732.85
Copeland	454	£3,342,702	£31,989,992	£28,647,290	70,890	£396.97	£404.11
Corby	851	£6,259,643	£23,097,787	£16,838,144	55,584	£231.67	£302.93
Cotswold	1,044	£7,682,363	£50,633,754	£42,951,391	84,484	£496.67	£508.40
Coventry	2,361	£17,370,275	£106,634,906	£89,264,631	308,836	£257.20	£289.04
Craigavon	891	£6,553,041	£31,219,034	£24,665,993	89,418	£233.57	£275.85



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Craven	589	£4,332,628	£29,991,210	£25,658,582	56,390	£439.26	£455.02
Crawley	1,067	£7,853,226	£49,551,091	£41,697,865	100,797	£376.91	£413.68
Crewe and Nantwich	1,136	£8,356,620	£54,852,465	£46,495,846	117,412	£369.73	£396.01
Croydon	2,016	£14,833,471	£106,792,878	£91,959,407	341,864	£245.06	£268.99
Dacorum	1,095	£8,059,435	£74,120,842	£66,061,408	139,565	£461.40	£473.34
Darlington	999	£7,349,653	£46,224,842	£38,875,190	100,696	£366.62	£386.06
Dartford	1,056	£7,770,996	£42,891,856	£35,120,860	91,231	£358.85	£384.97
Daventry	1,385	£10,189,322	£47,835,817	£37,646,496	79,651	£456.60	£472.64
Denbighshire	786	£5,785,012	£46,677,906	£40,892,893	97,675	£405.45	£418.66
Derby	2,088	£15,365,627	£83,913,953	£68,548,325	239,557	£255.37	£286.15
Derbyshire Dales	928	£6,827,956	£40,114,977	£33,287,021	70,689	£437.71	£470.90
Derry	1,337	£9,834,882	£30,152,467	£20,317,585	109,256	£160.09	£185.96
Derwentside	665	£4,891,022	£38,695,147	£33,804,124	87,807	£376.60	£384.98
Doncaster	3,086	£22,706,083	£129,279,414	£106,573,331	293,127	£341.06	£363.57
Dover	886	£6,515,983	£49,566,840	£43,050,857	107,443	£387.48	£400.69
Down	712	£5,241,315	£31,357,429	£26,116,114	69,682	£359.01	£374.79
Dudley	2,190	£16,116,435	£116,911,946	£100,795,512	307,527	£308.89	£327.76
Dumfries and Galloway	1,266	£9,314,898	£71,439,649	£62,124,751	149,333	£382.22	£416.02
Dundee City	1,380	£10,153,706	£42,178,204	£32,024,498	143,190	£177.25	£223.65
Dungannon and South Tyrone	745	£5,479,532	£45,634,829	£40,155,297	54,678	£389.87	£734.39
Durham	858	£6,312,931	£44,841,314	£38,528,383	94,957	£391.83	£405.75
Ealing	2,027	£14,910,382	£93,019,887	£78,109,505	307,426	£227.63	£254.08
Easington	799	£5,879,866	£36,627,269	£30,747,403	95,359	£303.66	£322.44
East Ayrshire	902	£6,638,067	£55,692,584	£49,054,516	120,433	£397.41	£407.32
East Cambridgeshire	1,016	£7,473,901	£49,235,475	£41,761,574	81,564	£508.08	£512.01



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East Devon	1,138	£8,369,964	£62,061,333	£53,691,368	133,221	£392.09	£403.02
East Dorset	702	£5,164,494	£49,640,430	£44,475,936	86,397	£511.78	£514.78
East Dunbartonshire	743	£5,464,114	£44,969,996	£39,505,882	105,630	£361.08	£374.00
East Hampshire	1,092	£8,033,016	£72,614,704	£64,581,688	111,773	£578.36	£577.79
East Hertfordshire	1,218	£8,962,441	£80,025,630	£71,063,189	134,933	£518.25	£526.65
East Lindsey	1,232	£9,064,779	£64,551,703	£55,486,924	141,076	£368.01	£393.31
East Lothian	1,760	£12,951,178	£46,709,930	£33,758,752	95,057	£335.64	£355.14
East Northamptonshire	779	£5,729,470	£49,017,085	£43,287,615	85,995	£502.17	£503.38
East Renfrewshire	613	£4,510,074	£40,497,547	£35,987,474	89,922	£396.63	£400.21
East Riding of Yorkshire	4,126	£30,357,519	£181,338,511	£150,980,992	335,319	£439.88	£450.26
East Staffordshire	1,254	£9,226,986	£52,319,951	£43,092,964	109,054	£356.55	£395.15
Eastbourne	600	£4,417,834	£35,208,764	£30,790,930	96,266	£299.94	£319.85
Eastleigh	1,007	£7,412,318	£64,529,966	£57,117,648	120,936	£460.85	£472.30
Eden	1,715	£12,619,640	£32,246,777	£19,627,137	52,261	£326.13	£375.56
Edinburgh, City of	4,133	£30,410,987	£137,420,999	£107,010,012	471,360	£184.81	£227.02
Eilean Siar	367	£2,699,642	£17,618,519	£14,918,877	26,483	£556.66	£563.33
Ellesmere Port & Neston	2,714	£19,971,367	£50,871,286	£30,899,919	82,370	£324.08	£375.14
Elmbridge	1,152	£8,472,482	£60,079,596	£51,607,114	131,912	£373.62	£391.22
Enfield	2,074	£15,257,519	£89,770,034	£74,512,514	287,085	£236.60	£259.55
Epping Forest	1,535	£11,295,381	£59,382,852	£48,087,471	124,159	£374.82	£387.31
Epsom and Ewell	440	£3,239,282	£29,301,867	£26,062,584	71,394	£352.97	£365.05
Erewash	1,016	£7,477,868	£47,147,970	£39,670,102	111,471	£335.00	£355.88
Exeter	824	£6,065,697	£43,455,176	£37,389,478	123,252	£276.45	£303.36
Falkirk	3,020	£22,218,379	£72,286,453	£50,068,074	151,749	£305.00	£329.94



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Fareham	884	£6,501,016	£62,046,788	£55,545,773	110,262	£492.83	£503.76
Fenland	1,282	£9,434,277	£47,500,763	£38,066,486	92,036	£388.21	£413.60
Fermanagh	1,305	£9,599,460	£25,188,780	£15,589,321	61,727	£265.12	£252.55
Fife	4,396	£32,339,986	£160,086,081	£127,746,095	363,010	£327.58	£351.91
Flintshire	2,945	£21,664,492	£90,534,030	£68,869,538	151,548	£421.91	£454.44
Forest Heath	716	£5,267,012	£31,654,796	£26,387,783	63,640	£377.44	£414.64
Forest of Dean	832	£6,120,067	£46,398,495	£40,278,428	82,470	£468.69	£488.40
Fylde	857	£6,308,873	£35,878,261	£29,569,387	76,932	£356.97	£384.36
Gateshead	1,975	£14,527,811	£69,658,302	£55,130,491	191,827	£258.22	£287.40
Gedling	666	£4,902,293	£45,720,146	£40,817,853	112,478	£352.41	£362.90
Glasgow City	4,791	£35,252,058	£142,939,864	£107,687,805	585,952	£138.70	£183.78
Gloucester	822	£6,045,681	£46,634,169	£40,588,489	115,297	£321.53	£352.03
Gosport	448	£3,293,201	£30,334,584	£27,041,382	79,752	£320.75	£339.07
Gravesham	2,161	£15,903,013	£49,878,565	£33,975,552	98,380	£325.97	£345.35
Great Yarmouth	611	£4,494,114	£43,907,941	£39,413,826	94,554	£401.94	£416.84
Greenwich	1,453	£10,690,191	£57,213,667	£46,523,477	224,654	£183.49	£207.09
Guildford	1,415	£10,411,670	£73,303,283	£62,891,614	135,336	£451.52	£464.71
Gwynedd	952	£7,007,204	£60,190,451	£53,183,246	119,224	£425.77	£446.08
Hackney	1,075	£7,909,580	£33,693,843	£25,784,263	211,160	£91.95	£122.11
Halton	2,014	£14,815,709	£51,742,568	£36,926,859	120,332	£264.63	£306.87
Hambleton	1,233	£9,068,927	£53,490,169	£44,421,242	87,505	£490.23	£507.64
Hammersmith and Fulham	1,297	£9,544,098	£36,313,849	£26,769,751	173,701	£106.34	£154.11
Harborough	992	£7,298,529	£49,330,378	£42,031,849	82,873	£498.80	£507.18
Haringey	1,193	£8,775,348	£46,030,051	£37,254,703	226,265	£138.52	£164.65
Harlow	722	£5,313,267	£36,390,567	£31,077,300	78,845	£358.08	£394.16



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Harrogate	1,962	£14,437,825	£85,349,601	£70,911,776	159,906	£427.70	£443.46
Harrow	1,173	£8,627,837	£73,787,612	£65,159,775	216,094	£288.59	£301.53
Hart	852	£6,267,578	£56,045,117	£49,777,540	90,526	£551.37	£549.87
Hartlepool	1,099	£8,084,591	£38,301,154	£30,216,563	92,036	£297.28	£328.31
Hastings	509	£3,742,315	£33,269,541	£29,527,226	86,800	£323.10	£340.17
Havant	797	£5,863,637	£55,146,285	£49,282,648	117,714	£407.20	£418.66
Havering	1,569	£11,545,319	£89,055,872	£77,510,552	229,990	£321.59	£337.02
Herefordshire, County of	1,992	£14,657,829	£89,903,697	£75,245,868	179,642	£393.14	£418.87
Hertsmere	1,097	£8,071,246	£44,696,719	£36,625,472	97,675	£349.98	£374.97
High Peak	3,557	£26,169,877	£50,924,585	£24,754,707	93,446	£212.66	£264.91
Highland	714	£5,253,397	£119,690,050	£114,436,652	218,914	£480.56	£522.75
Hillingdon	2,652	£19,514,679	£107,904,328	£88,389,649	252,446	£305.79	£350.13
Hinckley and Bosworth	1,023	£7,528,901	£52,894,327	£45,365,426	105,127	£413.26	£431.53
Horsham	1,250	£9,194,888	£78,954,728	£69,759,840	130,805	£527.87	£533.31
Hounslow	1,922	£14,138,026	£74,982,628	£60,844,602	222,136	£233.08	£273.91
Huntingdonshire	2,274	£16,727,576	£110,715,883	£93,988,307	168,868	£542.37	£556.58
Hyndburn	711	£5,231,036	£28,899,254	£23,668,218	82,571	£265.17	£286.64
Inverclyde	643	£4,729,356	£32,491,301	£27,761,946	81,665	£315.28	£339.95
Ipswich	844	£6,210,503	£44,336,302	£38,125,799	121,843	£279.29	£312.91
Isle of Anglesey	954	£7,018,114	£37,582,219	£30,564,104	69,480	£426.62	£439.89
Isle of Wight	965	£7,101,608	£48,394,143	£41,292,536	140,471	£268.06	£293.96
Isles of Scilly	16	£118,928	£618,881	£499,952	2,115	£166.77	£236.43
Islington	1,421	£10,455,129	£35,610,510	£25,155,381	189,108	£76.32	£133.02
Kennet	833	£6,125,297	£45,663,732	£39,538,436	79,449	£483.24	£497.66



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Kensington and Chelsea	1,638	£12,049,795	£41,586,370	£29,536,576	179,844	£92.47	£164.23
Kerrier	740	£5,441,212	£47,481,401	£42,040,190	99,488	£406.83	£422.57
Kettering	968	£7,119,731	£43,886,749	£36,767,018	90,123	£393.41	£407.96
King's Lynn and West Norfolk	2,013	£14,813,455	£74,867,694	£60,054,239	144,499	£387.34	£415.60
Kingston upon Hull, City of	2,134	£15,697,617	£76,821,480	£61,123,864	258,790	£199.12	£236.19
Kingston upon Thames	1,029	£7,572,902	£53,484,465	£45,911,563	159,000	£266.82	£288.75
Kirklees	3,508	£25,807,863	£157,360,373	£131,552,509	403,792	£304.35	£325.79
Knowsley	1,501	£11,042,828	£52,125,304	£41,082,476	151,951	£229.42	£270.37
Lambeth	1,647	£12,120,575	£52,329,059	£40,208,484	275,102	£112.66	£146.16
Lancaster	1,216	£8,947,023	£58,641,971	£49,694,948	144,499	£328.66	£343.91
Larne	380	£2,795,939	£14,203,230	£11,407,291	31,518	£356.39	£361.93
Leeds	6,791	£49,964,798	£276,586,039	£226,621,241	766,400	£267.27	£295.70
Leicester	2,375	£17,470,268	£83,243,171	£65,772,903	294,638	£182.26	£223.23
Lewes	718	£5,282,881	£44,909,259	£39,626,377	95,158	£405.69	£416.43
Lewisham	1,353	£9,955,884	£58,460,745	£48,504,862	260,300	£163.13	£186.34
Lichfield	1,074	£7,899,301	£55,671,926	£47,772,625	98,179	£478.93	£486.59
Limavady	365	£2,683,322	£16,229,548	£13,546,226	34,640	£329.45	£391.06
Lincoln	653	£4,806,267	£33,919,339	£29,113,072	88,411	£297.89	£329.29
Lisburn	1,283	£9,438,244	£68,242,074	£58,803,830	114,290	£325.04	£514.51
Liverpool	3,487	£25,658,549	£129,484,253	£103,825,703	438,533	£203.24	£236.76
Luton	1,235	£9,084,796	£73,729,883	£64,645,088	190,115	£321.12	£340.03
Macclesfield	2,143	£15,763,347	£85,362,363	£69,599,016	152,656	£434.29	£455.92
Magherafelt	503	£3,700,118	£19,382,001	£15,681,884	43,400	£347.70	£361.33



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Maidstone	1,370	£10,079,861	£82,560,724	£72,480,863	145,204	£489.01	£499.17
Maldon	475	£3,492,827	£42,572,741	£39,079,914	62,835	£614.65	£621.95
Malvern Hills	887	£6,527,074	£39,244,283	£32,717,210	74,817	£433.36	£437.29
Manchester	3,881	£28,552,588	£120,149,295	£91,596,706	461,290	£155.92	£198.57
Mansfield	686	£5,049,623	£39,517,826	£34,468,203	100,797	£320.16	£341.96
Medway	1,596	£11,744,495	£135,236,035	£123,491,540	253,956	£484.47	£486.27
Melton	560	£4,119,928	£28,067,848	£23,947,920	49,543	£461.43	£483.38
Mendip	1,217	£8,953,966	£55,110,812	£46,156,846	109,860	£397.99	£420.14
Merthyr Tydfil	453	£3,330,169	£21,259,497	£17,929,328	55,987	£298.82	£320.24
Merton	1,041	£7,660,633	£54,486,517	£46,825,884	200,688	£211.53	£233.33
Mid Bedfordshire	1,261	£9,274,774	£84,824,938	£75,550,164	134,832	£563.99	£560.33
Mid Devon	935	£6,877,006	£39,112,635	£32,235,630	76,429	£404.12	£421.77
Mid Suffolk	919	£6,762,766	£57,374,484	£50,611,718	94,453	£522.63	£535.84
Mid Sussex	1,120	£8,240,847	£75,540,351	£67,299,503	131,207	£512.13	£512.92
Middlesbrough	1,292	£9,504,425	£52,989,697	£43,485,271	139,666	£280.05	£311.35
Midlothian	628	£4,622,420	£32,007,828	£27,385,408	80,054	£327.99	£342.09
Milton Keynes	2,367	£17,412,833	£119,188,412	£101,775,579	229,990	£411.45	£442.52
Mole Valley	967	£7,113,239	£43,926,953	£36,813,714	81,765	£427.86	£450.24
Monmouthshire	1,087	£7,995,057	£51,671,290	£43,676,233	88,814	£476.37	£491.77
Moray	920	£6,770,069	£49,942,084	£43,172,015	87,505	£472.57	£493.37
Moyle	183	£1,345,989	£7,669,139	£6,323,150	16,816	£373.03	£376.01
Neath Port Talbot	10,241	£75,349,064	£72,808,903	-£2,540,162	138,357	-£99.18	-£18.36
New Forest	3,150	£23,178,640	£102,861,312	£79,682,672	175,917	£439.00	£452.96
Newark and Sherwood	1,392	£10,245,044	£59,160,324	£48,915,280	113,384	£410.13	£431.41
Newcastle upon Tyne	2,288	£16,837,397	£90,306,453	£73,469,056	273,491	£237.52	£268.63
Newcastle-under-Lyme	1,196	£8,798,520	£49,504,624	£40,706,104	125,166	£313.39	£325.22



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Newham	1,810	£13,315,537	£49,851,600	£36,536,063	251,338	£112.12	£145.37
Newport	2,401	£17,663,673	£61,146,179	£43,482,506	141,176	£247.31	£308.00
Newry and Mourne	1,026	£7,551,533	£35,469,425	£27,917,892	96,165	£259.72	£290.31
Newtownabbey	752	£5,534,172	£28,704,872	£23,170,700	82,269	£287.27	£281.65
North Ayrshire	1,529	£11,249,126	£70,037,924	£58,788,798	136,746	£398.87	£429.91
North Cornwall	1,033	£7,603,288	£45,261,733	£37,658,446	86,901	£403.74	£433.35
North Devon	944	£6,943,638	£38,664,629	£31,720,992	92,741	£312.06	£342.04
North Dorset	541	£3,981,975	£33,852,984	£29,871,009	68,071	£426.28	£438.82
North Down	634	£4,666,150	£29,753,955	£25,087,805	79,248	£322.70	£316.57
North East Derbyshire	919	£6,762,946	£48,005,308	£41,242,361	98,682	£399.76	£417.93
North East Lincolnshire	2,421	£17,812,085	£65,395,559	£47,583,474	159,503	£264.16	£298.32
North Hertfordshire	1,135	£8,349,407	£68,789,878	£60,440,472	123,353	£484.16	£489.98
North Kesteven	964	£7,093,673	£54,282,986	£47,189,313	105,530	£432.51	£447.17
North Lanarkshire	3,128	£23,014,539	£124,549,493	£101,534,954	326,961	£284.74	£310.54
North Lincolnshire	13,845	£101,862,021	£94,916,811	-£6,945,209	160,510	-£101.12	-£43.27
North Norfolk	861	£6,336,734	£54,168,592	£47,831,857	101,502	£447.50	£471.24
North Shropshire	609	£4,477,975	£33,736,432	£29,258,457	60,418	£464.20	£484.27
North Somerset	1,935	£14,233,511	£103,349,202	£89,115,691	206,125	£424.35	£432.34
North Tyneside	1,615	£11,878,841	£81,012,715	£69,133,874	197,365	£327.04	£350.28
North Warwickshire	1,491	£10,970,335	£37,303,757	£26,333,422	62,633	£378.69	£420.44
North West Leicestershire	1,564	£11,506,368	£51,363,663	£39,857,295	91,029	£408.93	£437.85
North Wiltshire	1,621	£11,924,194	£77,253,664	£65,329,469	133,020	£479.54	£491.13
Northampton	1,607	£11,822,037	£91,166,572	£79,344,535	204,212	£360.57	£388.54
Norwich	978	£7,198,626	£41,691,928	£34,493,303	133,121	£219.86	£259.11



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Nottingham	2,217	£16,313,897	£80,720,692	£64,406,795	290,710	£183.25	£221.55
Nuneaton and Bedworth	900	£6,623,641	£52,168,930	£45,545,289	122,044	£358.65	£373.19
Oadby and Wigston	356	£2,617,953	£23,879,838	£21,261,885	57,196	£357.95	£371.74
Oldham	1,458	£10,726,347	£73,098,243	£62,371,896	221,028	£261.37	£282.19
Omagh	636	£4,677,421	£20,030,079	£15,352,658	51,859	£276.99	£296.05
Orkney Islands	296	£2,176,863	£10,046,206	£7,869,343	20,039	£357.24	£392.71
Oswestry	347	£2,555,468	£20,140,743	£17,585,275	40,681	£416.87	£432.27
Oxford	1,164	£8,566,164	£44,304,100	£35,737,935	152,051	£191.36	£235.04
Pembrokeshire	1,461	£10,751,142	£71,344,435	£60,593,292	118,721	£461.28	£510.38
Pendle	745	£5,483,319	£32,287,564	£26,804,245	90,627	£269.91	£295.77
Penwith	438	£3,224,315	£29,485,187	£26,260,872	65,453	£385.62	£401.22
Perth and Kinross	1,509	£11,100,624	£73,415,701	£62,315,078	143,090	£411.78	£435.50
Peterborough	1,649	£12,131,304	£73,141,667	£61,010,363	164,437	£339.71	£371.03
Plymouth	1,801	£13,253,593	£101,198,766	£87,945,173	252,446	£326.25	£348.37
Poole	1,165	£8,574,009	£64,744,782	£56,170,773	139,062	£377.42	£403.93
Portsmouth	1,437	£10,572,795	£71,052,207	£60,479,411	199,077	£272.14	£303.80
Powys	1,092	£8,034,098	£69,522,126	£61,488,028	132,919	£447.76	£462.60
Preston	1,264	£9,303,176	£51,144,688	£41,841,512	132,818	£285.33	£315.03
Purbeck	534	£3,931,392	£25,542,415	£21,611,023	46,119	£427.13	£468.59
Reading	1,134	£8,342,464	£59,988,712	£51,646,248	144,701	£316.53	£356.92
Redbridge	1,299	£9,560,328	£74,164,236	£64,603,908	256,172	£238.01	£252.19
Redcar and Cleveland	10,671	£78,509,181	£78,740,644	£231,462	140,371	-£52.51	£1.65
Redditch	732	£5,383,686	£37,803,181	£32,419,495	80,154	£382.54	£404.46
Reigate and Banstead	1,241	£9,128,165	£65,353,158	£56,224,993	133,221	£405.43	£422.04
Renfrewshire	1,601	£11,776,413	£70,081,913	£58,305,500	170,781	£312.85	£341.41



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Restormel	1,177	£8,661,108	£53,785,734	£45,124,626	103,717	£389.24	£435.07
Rhondda, Cynon, Taff	1,963	£14,444,498	£96,643,177	£82,198,680	235,327	£335.56	£349.30
Ribble Valley	1,446	£10,640,419	£33,026,221	£22,385,802	58,706	£335.18	£381.32
Richmond upon Thames	1,220	£8,974,523	£63,134,654	£54,160,131	181,253	£274.08	£298.81
Richmondshire	642	£4,720,700	£26,137,419	£21,416,719	51,758	£404.57	£413.79
Rochdale	1,762	£12,966,687	£73,861,410	£60,894,724	207,535	£270.98	£293.42
Rochford	530	£3,902,539	£48,976,153	£45,073,614	82,772	£547.22	£544.55
Rossendale	682	£5,021,041	£32,294,838	£27,273,798	67,467	£376.27	£404.26
Rother	751	£5,522,631	£43,291,947	£37,769,316	88,814	£411.89	£425.26
Rotherham	2,441	£17,958,514	£105,975,935	£88,017,421	255,165	£323.03	£344.94
Rugby	3,044	£22,392,398	£48,104,719	£25,712,322	91,634	£237.61	£280.60
Runnymede	988	£7,270,307	£40,925,269	£33,654,962	83,175	£382.27	£404.63
Rushcliffe	1,080	£7,949,613	£57,483,857	£49,534,244	109,759	£447.75	£451.30
Rushmoor	753	£5,537,057	£46,918,654	£41,381,597	90,023	£439.88	£459.68
Rutland	1,663	£12,238,240	£24,474,516	£12,236,276	38,667	£240.75	£316.45
Ryedale	719	£5,292,168	£28,290,943	£22,998,775	53,671	£404.16	£428.51
Salford	2,074	£15,262,929	£76,215,813	£60,952,884	220,726	£243.70	£276.15
Salisbury	1,155	£8,494,934	£61,323,923	£52,828,990	116,606	£437.59	£453.05
Sandwell	2,718	£19,998,957	£84,912,108	£64,913,151	289,502	£187.41	£224.22
Scarborough	956	£7,036,508	£44,890,360	£37,853,852	109,155	£319.86	£346.79
Scottish Borders	903	£6,641,403	£57,391,956	£50,750,553	112,176	£430.92	£452.42
Sedgefield	1,081	£7,954,121	£41,304,729	£33,350,607	88,210	£354.46	£378.08
Sedgemoor	1,673	£12,311,004	£56,016,481	£43,705,477	112,981	£362.89	£386.84
Sefton	1,932	£14,217,461	£112,535,033	£98,317,572	278,123	£341.35	£353.50
Selby	1,426	£10,494,442	£53,197,011	£42,702,569	81,363	£499.99	£524.84



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Sevenoaks	1,378	£10,139,190	£60,010,534	£49,871,344	115,096	£422.67	£433.30
Sheffield	4,527	£33,305,658	£187,340,241	£154,034,584	533,993	£258.32	£288.46
Shepway	967	£7,117,747	£52,254,401	£45,136,654	100,797	£414.63	£447.80
Shetland Islands	369	£2,712,897	£16,492,443	£13,779,547	22,153	£584.98	£622.01
Shrewsbury and Atcham	898	£6,608,403	£48,265,165	£41,656,762	96,870	£413.68	£430.03
Slough	1,065	£7,834,833	£47,469,050	£39,634,217	120,936	£307.62	£327.73
Solihull	2,040	£15,007,400	£92,547,736	£77,540,335	205,018	£359.29	£378.21
South Ayrshire	919	£6,759,340	£55,756,773	£48,997,434	112,478	£418.42	£435.62
South Bedfordshire	1,030	£7,580,206	£65,804,092	£58,223,886	119,023	£484.08	£489.18
South Bucks	1,192	£8,766,872	£36,052,221	£27,285,349	64,748	£394.67	£421.41
South Cambridgeshire	2,201	£16,195,420	£82,446,839	£66,251,419	138,256	£459.91	£479.19
South Derbyshire	1,207	£8,877,956	£47,561,569	£38,683,613	91,835	£399.94	£421.23
South Gloucestershire	3,268	£24,045,039	£130,007,011	£105,961,971	258,286	£383.69	£410.25
South Hams	1,019	£7,496,262	£49,801,810	£42,305,549	84,081	£476.57	£503.15
South Holland	847	£6,235,118	£41,621,103	£35,385,985	83,175	£396.10	£425.44
South Kesteven	1,383	£10,176,428	£76,057,044	£65,880,615	132,013	£485.22	£499.05
South Lakeland	1,465	£10,776,569	£55,541,552	£44,764,983	105,630	£398.66	£423.79
South Lanarkshire	2,682	£19,734,412	£128,475,997	£108,741,586	311,655	£325.86	£348.92
South Norfolk	1,183	£8,701,232	£64,879,151	£56,177,919	118,117	£463.00	£475.61
South Northamptonshire	1,315	£9,673,756	£58,964,995	£49,291,239	90,929	£541.01	£542.09
South Oxfordshire	1,568	£11,539,368	£82,367,905	£70,828,537	129,294	£522.74	£547.81
South Ribble	1,057	£7,773,700	£50,158,125	£42,384,425	107,443	£378.55	£394.48
South Shropshire	432	£3,180,494	£22,938,140	£19,757,645	42,796	£451.84	£461.67
South Somerset	1,588	£11,686,789	£77,818,592	£66,131,803	158,899	£394.10	£416.19



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South Staffordshire	1,371	£10,085,992	£57,178,041	£47,092,048	107,040	£439.89	£439.95
South Tyneside	920	£6,767,905	£58,448,246	£51,680,341	152,051	£331.77	£339.89
Southampton	1,604	£11,804,815	£82,880,149	£71,075,333	232,810	£273.12	£305.29
Southend-on-Sea	1,142	£8,398,547	£74,972,258	£66,573,711	163,128	£393.35	£408.11
Southwark	2,030	£14,935,899	£55,654,284	£40,718,385	276,311	£91.07	£147.36
Spelthorne	781	£5,747,323	£42,144,039	£36,396,716	91,533	£373.37	£397.63
St Albans	1,384	£10,185,084	£71,792,834	£61,607,750	133,221	£455.88	£462.45
St Edmundsbury	1,481	£10,898,112	£58,146,111	£47,247,999	103,617	£434.13	£455.99
St. Helens	1,929	£14,193,748	£73,454,291	£59,260,543	178,635	£309.06	£331.74
Stafford	1,619	£11,911,932	£63,419,371	£51,507,439	124,863	£397.92	£412.51
Staffordshire Moorlands	1,768	£13,010,597	£49,235,013	£36,224,416	96,064	£355.71	£377.09
Stevenage	693	£5,100,206	£40,871,145	£35,770,939	79,953	£422.65	£447.40
Stirling	926	£6,814,972	£46,014,729	£39,199,757	88,814	£412.63	£441.37
Stockport	2,167	£15,947,104	£123,304,155	£107,357,051	282,856	£360.73	£379.55
Stockton-on-Tees	4,926	£36,240,812	£98,042,777	£61,801,965	191,524	£289.64	£322.68
Stoke-on-Trent	2,060	£15,158,518	£79,068,996	£63,910,478	240,664	£235.71	£265.56
Strabane	421	£3,096,550	£14,590,986	£11,494,435	39,674	£260.90	£289.72
Stratford-on-Avon	1,568	£11,536,573	£73,579,097	£62,042,523	118,620	£512.45	£523.03
Stroud	1,322	£9,728,486	£61,648,654	£51,920,168	111,471	£451.94	£465.77
Suffolk Coastal	1,004	£7,387,432	£61,423,542	£54,036,110	125,266	£413.36	£431.37
Sunderland	2,309	£16,987,072	£107,229,121	£90,242,049	282,252	£294.07	£319.72
Surrey Heath	967	£7,116,936	£51,759,696	£44,642,760	83,880	£527.61	£532.22
Sutton	1,036	£7,619,427	£65,913,837	£58,294,409	187,195	£294.44	£311.41
Swale	2,092	£15,390,784	£69,690,890	£54,300,106	131,207	£387.25	£413.85
Swansea	1,885	£13,870,144	£101,080,040	£87,209,896	229,688	£360.63	£379.69



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Swindon	2,158	£15,879,390	£83,335,112	£67,455,722	190,820	£313.01	£353.51
Tameside	1,584	£11,650,723	£76,747,752	£65,097,029	215,893	£277.91	£301.52
Tamworth	506	£3,719,774	£37,407,767	£33,687,993	76,126	£425.67	£442.53
Tandridge	984	£7,243,348	£42,986,614	£35,743,266	83,074	£423.30	£430.26
Taunton Deane	1,063	£7,819,685	£49,099,600	£41,279,915	108,953	£359.61	£378.88
Teesdale	313	£2,302,734	£14,109,243	£11,806,509	24,973	£458.84	£472.78
Teignbridge	1,252	£9,212,650	£62,346,371	£53,133,721	127,683	£406.45	£416.14
Telford and Wrekin	1,610	£11,843,767	£77,138,907	£65,295,140	162,826	£372.87	£401.01
Tendring	979	£7,202,503	£70,003,296	£62,800,794	147,218	£419.34	£426.58
Test Valley	1,303	£9,585,755	£65,885,990	£56,300,236	115,499	£476.19	£487.45
Tewkesbury	1,240	£9,125,100	£41,181,018	£32,055,918	79,752	£372.60	£401.95
Thanet	809	£5,950,105	£51,240,041	£45,289,935	130,100	£334.60	£348.12
The Vale of Glamorgan	1,861	£13,692,789	£59,440,281	£45,747,492	124,863	£345.46	£366.38
Three Rivers	880	£6,472,884	£43,335,953	£36,863,068	87,002	£412.48	£423.71
Thurrock	2,183	£16,058,278	£84,710,986	£68,652,708	151,045	£416.08	£454.52
Tonbridge and Malling	1,681	£12,371,325	£65,362,531	£52,991,206	116,506	£446.59	£454.84
Torbay	822	£6,051,181	£51,266,950	£45,215,770	135,134	£313.96	£334.60
Torfaen	781	£5,743,626	£36,631,483	£30,887,856	91,734	£311.93	£336.71
Torridge	527	£3,875,129	£28,609,778	£24,734,649	65,453	£360.72	£377.90
Tower Hamlets	2,777	£20,431,210	£53,053,453	£32,622,243	216,799	£46.31	£150.47
Trafford	2,471	£18,182,124	£100,961,577	£82,779,452	214,282	£332.16	£386.31
Tunbridge Wells	826	£6,079,583	£57,973,086	£51,893,503	106,335	£473.12	£488.02
Tynedale	808	£5,946,138	£41,744,774	£35,798,636	59,914	£566.68	£597.50
Uttlesford	1,102	£8,105,149	£49,491,078	£41,385,930	73,005	£558.01	£566.89
Vale of White Horse	1,393	£10,250,815	£65,077,840	£54,827,025	117,815	£441.32	£465.37



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Vale Royal	2,579	£18,978,104	£70,896,807	£51,918,702	127,280	£397.74	£407.91
Wakefield	3,330	£24,500,916	£132,234,989	£107,734,073	323,839	£305.18	£332.68
Walsall	2,102	£15,462,014	£86,088,175	£70,626,161	256,272	£248.05	£275.59
Waltham Forest	1,148	£8,447,056	£54,297,177	£45,850,121	223,848	£182.97	£204.83
Wandsworth	1,672	£12,302,438	£60,984,043	£48,681,605	283,762	£139.18	£171.56
Wansbeck	4,209	£30,966,947	£33,715,241	£2,748,294	62,130	£12.42	£44.23
Warrington	2,461	£18,109,361	£99,838,946	£81,729,585	196,559	£394.14	£415.80
Warwick	1,497	£11,013,343	£67,021,767	£56,008,423	135,537	£383.52	£413.23
Watford	630	£4,634,682	£35,928,590	£31,293,908	80,255	£358.57	£389.93
Waveney	918	£6,755,372	£54,598,549	£47,843,177	118,117	£379.67	£405.05
Waverley	933	£6,865,915	£72,117,879	£65,251,964	118,620	£550.25	£550.09
Wealden	1,188	£8,742,798	£84,916,955	£76,174,157	144,801	£527.31	£526.06
Wear Valley	463	£3,405,547	£28,238,597	£24,833,050	63,539	£380.37	£390.83
Wellingborough	758	£5,580,157	£36,515,392	£30,935,236	76,429	£384.06	£404.76
Welwyn Hatfield	1,069	£7,866,841	£47,631,784	£39,764,943	107,443	£342.52	£370.10
West Berkshire	2,294	£16,877,160	£87,526,127	£70,648,967	151,749	£441.93	£465.56
West Devon	618	£4,548,664	£30,259,140	£25,710,475	52,463	£478.59	£490.07
West Dorset	1,013	£7,451,269	£47,898,818	£40,447,549	97,776	£391.86	£413.67
West Dunbartonshire	712	£5,236,446	£34,265,905	£29,029,459	91,734	£292.94	£316.45
West Lancashire	1,329	£9,781,684	£55,461,139	£45,679,455	110,565	£393.79	£413.15
West Lindsey	856	£6,295,258	£45,520,025	£39,224,767	88,613	£432.29	£442.65
West Lothian	1,742	£12,815,209	£79,337,251	£66,522,042	168,968	£370.23	£393.70
West Oxfordshire	957	£7,042,098	£58,287,852	£51,245,753	102,307	£485.30	£500.90
West Somerset	550	£4,045,000	£17,075,806	£13,030,805	35,647	£323.98	£365.56
West Wiltshire	2,223	£16,356,365	£64,464,426	£48,108,061	126,575	£353.16	£380.07
Westminster	4,026	£29,621,950	£74,245,340	£44,623,390	235,730	£38.50	£189.30



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Weymouth and Portland	369	£2,716,143	£28,027,076	£25,310,933	65,553	£375.62	£386.11
Wigan	2,315	£17,028,999	£131,635,127	£114,606,128	307,728	£359.00	£372.43
Winchester	1,459	£10,732,388	£68,269,999	£57,537,611	112,075	£498.08	£513.38
Windsor and Maidenhead	1,508	£11,093,951	£73,346,203	£62,252,251	141,982	£416.77	£438.45
Wirral	2,273	£16,721,986	£125,057,539	£108,335,553	312,360	£327.15	£346.83
Woking	727	£5,347,530	£49,202,480	£43,854,950	92,036	£456.18	£476.50
Wokingham	1,371	£10,087,705	£87,788,619	£77,700,914	157,690	£485.34	£492.74
Wolverhampton	1,788	£13,152,518	£77,080,387	£63,927,869	237,643	£238.10	£269.01
Worcester	704	£5,181,084	£44,395,784	£39,214,700	94,352	£389.82	£415.62
Worthing	658	£4,843,145	£42,683,669	£37,840,524	100,294	£358.28	£377.30
Wrexham	1,730	£12,725,314	£65,832,636	£53,107,322	132,818	£349.45	£399.85
Wychavon	1,704	£12,536,688	£70,096,077	£57,559,389	117,915	£474.73	£488.14
Wycombe	1,478	£10,871,513	£91,148,241	£80,276,728	162,524	£482.75	£493.94
Wyre	1,062	£7,813,373	£50,439,276	£42,625,903	111,672	£367.24	£381.71
Wyre Forest	743	£5,464,023	£48,427,919	£42,963,896	99,287	£418.72	£432.73
York	1,477	£10,865,562	£75,618,697	£64,753,134	194,646	£311.50	£332.67
Total/Average	623,800	£4,589,576,947	£26,402,306,789	£21,812,729,842	61,400,000	£357.55	£390.16