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Research Note 53

## **The economic cost of a 42 per cent reduction in carbon dioxide emissions by 2020**

The recent TaxPayers' Alliance report *Ending the Green Rip-Off: Reforming climate change policy to reduce the burden on families* showed that existing climate change policy is imposing an excessive and inefficient burden on families and businesses. The report cited Citigroup analysis which suggests climate change policy is already heading for an "affordability crisis".<sup>1</sup>

Prime Minister Gordon Brown has now offered, at the climate change conference in Copenhagen, a cut of 42 per cent in Britain's carbon dioxide emissions by 2020. That would be a massive increase from the current 20 per cent target. This research note shows that meeting such a target could mean massive cuts in Britain's national income.

### **Key findings**

- If Britain continues a strong performance relative to other advanced economies in cutting emissions intensity, the number of tonnes of carbon dioxide produced per million pounds of GDP, we can expect **emissions intensity to fall by nearly 30 per cent by 2020**.
- With economic growth in line with Treasury expectations, that will mean that carbon dioxide emissions **can be expected to fall to around 489 Mt by 2020**. That means the cut from 1990 emissions levels will be nearly 18 per cent (the current target requires a 34 per cent cut in British emissions).
- To meet a 42 per cent target at the present rate of improvements in emissions intensity, the **size of the economy in 2020 would need to be cut by 30 per cent from expected levels, or nearly £507 billion** (2005 prices). That would leave GDP lower than it was in 2004.
- The rate of carbon intensity improvement would need to **nearly double** to meet a 42 per cent target without compromising national income. That is highly unlikely given that even existing technologies such as nuclear and tidal power, or carbon capture and storage, are unlikely to be able to make a major contribution by 2020.

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<sup>1</sup> Citigroup Global Markets 'Pan European Utilities', 22 October 2009



Matthew Sinclair, Research Director at the TaxPayers' Alliance, said:

*"It is absolutely incredible that Gordon Brown is still pledging ever more extreme and expensive emissions cuts on Britain's behalf. The Government are relying on rapid economic growth to help restore the public finances to health, but meeting such an ambitious target for emissions cuts could require a recession of unprecedented ferocity. Governments shouldn't sign up to international targets unless they have a serious plan to meet them, and they definitely shouldn't sign a death warrant for the British economy."*

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## Sources and Methodology

Emissions of carbon dioxide can be understood as the product of GDP and carbon intensity (the amount of CO<sub>2</sub> produced per unit of GDP). The following equation is, therefore, a simple way of understanding the challenge of cutting emissions:

$$\text{CO}_2 \text{ emissions} = \text{GDP} \times \text{Carbon Intensity}$$

If we want to bring down CO<sub>2</sub> emissions by 80 per cent by 2050 then either GDP or carbon intensity will need to fall. Clearly, the preferred option is to reduce carbon intensity. Emissions data<sup>2</sup> and official economic data<sup>3</sup> from 1989 to 2007 show that, on average, Britain has cut emissions intensity by 2.72 per cent a year.

Table 1: Carbon intensity growth estimates, 1990-2007

Year	GDP, £ million (2005 prices)	Growth	Emissions, t CO <sub>2</sub>	Emissions intensity, t CO <sub>2</sub> /£m	Emissions intensity growth
1989	856,345	-	580,800,000	678.23	-
1990	863,019	0.78%	592,900,000	687.01	1.29%
1991	851,002	-1.39%	600,200,000	705.29	2.66%
1992	852,250	0.15%	583,000,000	684.07	-3.01%
1993	871,188	2.22%	568,000,000	651.98	-4.69%
1994	908,477	4.28%	561,900,000	618.51	-5.13%
1995	936,207	3.05%	553,100,000	590.79	-4.48%
1996	963,220	2.89%	575,300,000	597.27	1.10%
1997	995,077	3.31%	551,600,000	554.33	-7.19%
1998	1,030,967	3.61%	553,600,000	536.97	-3.13%
1999	1,066,768	3.47%	543,000,000	509.01	-5.21%
2000	1,108,538	3.92%	551,100,000	497.14	-2.33%
2001	1,135,823	2.46%	562,500,000	495.24	-0.38%
2002	1,159,641	2.10%	544,900,000	469.89	-5.12%
2003	1,192,206	2.81%	556,200,000	466.53	-0.71%
2004	1,227,387	2.95%	555,900,000	452.91	-2.92%
2005	1,254,058	2.17%	553,200,000	441.13	-2.60%
2006	1,289,833	2.85%	551,100,000	427.26	-3.14%
2007	1,322,842	2.56%	542,600,000	410.18	-4.00%
<b>Average</b>					<b>-2.72%</b>

<sup>2</sup> DECC, Estimated emissions by source, fuel type and end user; national communication categories, 1990-2007; total greenhouse gases, carbon dioxide, methane and nitrous oxide, Table 5b

<sup>3</sup> Office for National Statistics, ABMI: Gross Domestic Product: chained volume measures: Seasonally adjusted

It is possible to assess the sacrifice in GDP that will be needed to meet a 42 per cent by 2020 emissions target, at the current rate of emissions intensity reduction, by combining that figure with the growth assumptions in the Pre-Budget report and assuming that growth continues at 2.5 per cent a year from 2015 when the Treasury's projections end.

Table 2: Emissions projections under current policy and economic projections

Year	GDP, £ million (2005 prices)	Growth	Emissions, t CO <sub>2</sub>	Emissions intensity, t CO <sub>2</sub> /£m
2008	1,330,118	0.55%	530,731,707	399.01
2009	1,266,937	-4.75%	491,759,986	388.15
2010	1,282,774	1.25%	484,352,325	377.58
2011	1,327,671	3.50%	487,657,500	367.30
2012	1,374,139	3.50%	490,985,229	357.30
2013	1,422,234	3.50%	494,335,666	347.58
2014	1,472,012	3.50%	497,708,967	338.11
2015	1,508,813	2.50%	496,263,689	328.91
2016	1,546,533	2.50%	494,822,609	319.96
2017	1,585,196	2.50%	493,385,713	311.25
2018	1,624,826	2.50%	491,952,990	302.77
2019	1,665,447	2.50%	490,524,427	294.53
2020	1,707,083	2.50%	489,100,012	286.51

That implies that emissions would be 82 per cent of 1990 levels under expected levels of national income and emissions intensity. In order to cut emissions to the level required by the 1990 target – 344 Mt CO<sub>2</sub> – there would need to be a 30 per cent cut in the expected 2020 GDP. That is around £507 billion and would leave GDP at just over £1.2 trillion or less than it was in 2004 (all in 2005 prices).

The only way such a fall in income could be avoided would be if emission intensity growth rose very substantially. It would need to almost double to avoid any fall from expected levels of GDP. It is highly unlikely that is possible for a number of reasons:

- Britain's performance in cutting emissions intensity has been relatively good thanks to changes like a switch to greater gas generation, the 'dash for gas'. Opportunities like that are limited and increasingly mean sacrificing energy security.
- The short amount of time to the 2020 target rules out many existing means of cutting emissions. Dieter Helm, Professor of Energy Policy at the University of Oxford, argues:<sup>4</sup>

*"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*

<sup>4</sup> Helm, D. 'EU climate-change policy – a critique', Smith School Working Paper Series, October 2009

*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.”*

- It is implausible that new technological developments will significantly reduce the cost of cutting emissions by 2020. Even if they emerge very soon that does not leave enough time for the necessary development, testing and installation.