

Analysis of UK greenhouse gas emissions and economic growth

Introduction

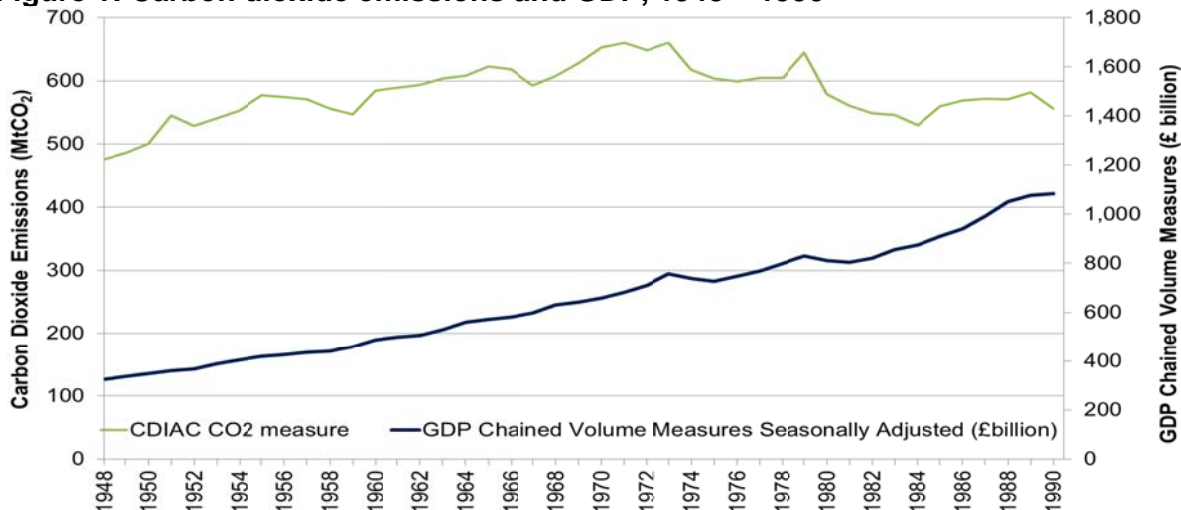
The article will present analysis on the links between UK Greenhouse Gas emissions published by DECC and economic growth using ONS Gross Domestic Product (GDP) data. The UK has committed to greenhouse gas (GHG) emissions reduction targets as part of taking action against climate change. Gross Domestic Product is a measure of the economic growth of a country. The GDP statistics used here are from the Chained Volume Measure (seasonally adjusted) which takes out the effect of inflation. The trends and drivers of both UK Greenhouse Gas emissions and GDP will be compared from 1990 to 2014 which shows that emissions have steadily decreased and GDP has steadily increased. The largest decrease in UK greenhouse gas emissions in a year of economic growth came in 2011, 2014 has the second largest decrease in emissions combined with an increase in economic growth.

Analysis

This analysis is split into pre-1990 and post 1990 as there is a robust data source of all greenhouse gas emissions post 1990. For pre-1990 carbon dioxide emissions data is available and was used as it accounts for the majority of emissions in the UK (82% of total emissions in 2014) and typically drives overall trends in total greenhouse emissions. Historically, when GDP increases so does greenhouse gas emissions, as can be seen in Figure 1 particularly between the years 1948 and 1970. As the UK economy was largely manufacturing and industrial based during this time, increased activity in these sectors led to increased burning of fossil fuels for electricity generation or directly as part of the industrial process. If the economy is to continue to grow, the UK needs to decouple emissions from GDP to meet the emissions reductions targets it has committed to.

From 1970 to 1990 (the earliest date for which we have robust emissions data for all greenhouse gases), carbon dioxide emissions varied but showed a net decrease, whilst GDP increased. This shows the early signs of some decoupling as the UK economy moved away from a manufacturing based economy to a services based economy¹.

Figure 1: Carbon dioxide emissions and GDP, 1948 – 1990



Source:

1. Carbon Dioxide information Analysis Center (CDIAC) United Kingdom Total emissions by source 1751-2011
http://cdiac.ornl.gov/CO2_Emission/timeseries/national
Data are in thousand tons of carbon and are converted to million tonnes of carbon dioxide (MtCO₂) by multiplying by 44 and dividing by 12 (to convert from carbon to carbon dioxide) and converting from thousands to millions of tonnes).
2. Quarterly National Accounts: Quarter 3 (July to Sept) 2015 time series data tables
www.ons.gov.uk/ons/rel/naa2/quarterly-national-accounts/q3-2015/tsd-qna.html

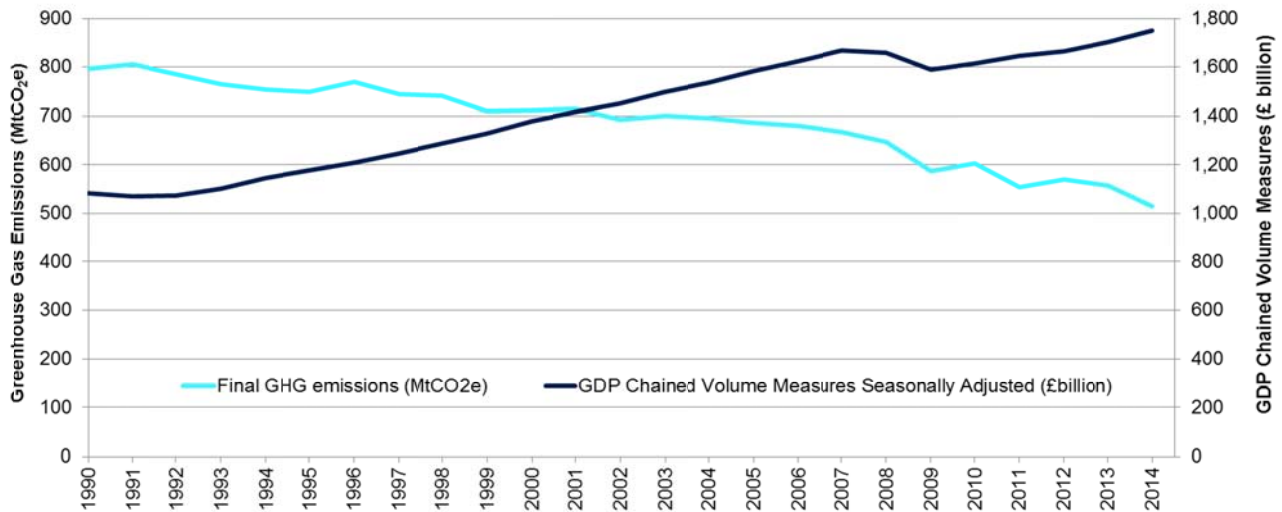
¹ Sources of economic growth- trade and investment analytical papers topic 6 of 18
www.gov.uk/government/uploads/system/uploads/attachment_data/file/32468/11-723-sources-of-economic-growth.pdf

Special feature – Analysis of UK GHG emissions and economic growth

Figure 2 below shows the trends of UK greenhouse gas emissions and GDP between 1990 and 2014. It shows that UK greenhouse gas emissions have steadily decreased, while GDP has increased. The decrease in emissions is mainly due to a move away from coal fired power stations towards the use of natural gas and renewable sources, technological improvements in energy efficiency and pollution control measures in industrial processes; while the increase in GDP is mainly due to increases in consumption (the value of goods and services bought by people).

This shows that UK territorial emissions are becoming decoupled from economic growth. However, as can be seen in the chart the financial crisis of 2007 to 2009 contributed to a particularly large decrease in emissions in 2009, which shows that GDP growth is still a driver of emissions trends. In particular, emissions from power stations, industrial combustion and industrial processes saw large reductions during the financial crisis.

Figure 2: Trends of UK Greenhouse Gas Emissions and GDP, 1990 – 2014



Source:

- Table 1, Final UK greenhouse gas emissions statistics 1990-2014 Excel data tables
www.gov.uk/government/statistics/final-uk-greenhouse-gas-emissions-national-statistics-1990-2014
- Quarterly National Accounts: Quarter 3 (July to Sept) 2015 time series data tables
www.ons.gov.uk/ons/rel/naa2/quarterly-national-accounts/q3-2015/tsd-gna.html

Table 1: Greenhouse gas emissions and GDP
UK, 1990-2014

	MtCO ₂ e/£ billion				
	1990	2013	2014	1990-2014 % change	2013-2014 % change
Total greenhouse gas emissions	796.6	557.3	514.4	-35.4%	-7.7%
GDP Chained Volume Measures Seasonally Adjusted	1083.5	1701.2	1749.7	+61.5%	+2.9%

Source:

- Table 1, Final UK greenhouse gas emissions statistics 1990-2014 Excel data tables
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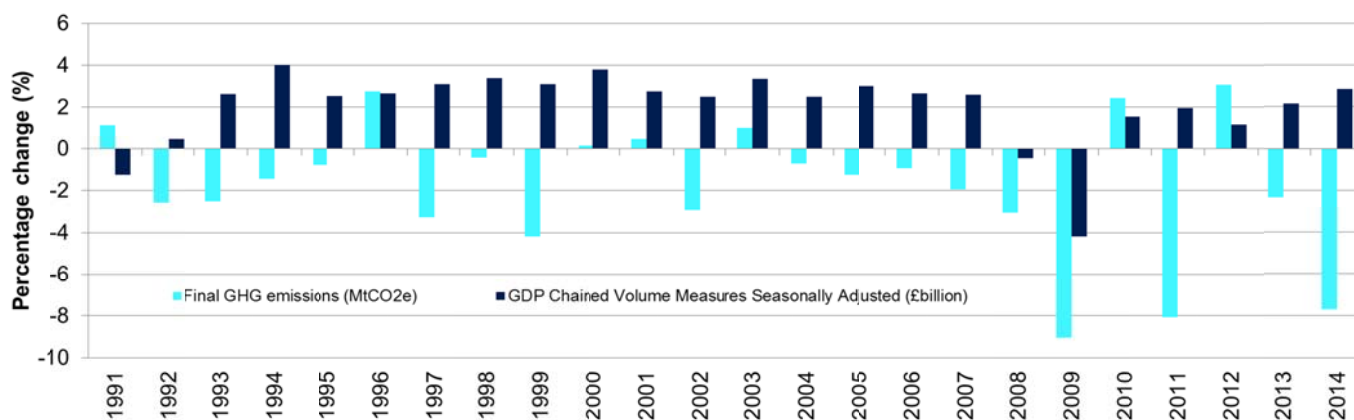
In 2014, UK greenhouse gas emissions were at their lowest levels and GDP reached its highest rate since 1990. Between 2013 and 2014, the largest decreases in UK greenhouse gas emissions came from the energy supply sector and the residential sector. Each of the main components affecting GDP (output, expenditure, and income) experienced positive growth greater than or equal to 2013² with strong growth in particular from construction and gross fixed capital formation (increase in value of physical assets i.e. property, plant or equipment).

Figure 3 compares the annual percentage change in UK greenhouse gas emissions and GDP. Some notable observations are below:

- There are 16 years between 1990 and 2014 where emissions decreased and GDP increased (or vice versa).
- There are 6 years where emissions and GDP have increased.
- There are 2 years where both emissions and GDP have decreased (around the time of the economic crash in 2008-2009).

The largest decrease in UK greenhouse gas emissions in a year of economic growth came in 2011, where there was an 8.1 percent decrease in emissions and a 2.0 percent increase in GDP. The second largest decrease in emissions in a year of economic growth came in 2014³.

Figure 3: Annual percentage change for UK Greenhouse Gas Emissions and GDP, 1991 – 2014



Source:

1. Table 1, Final UK greenhouse gas emissions statistics 1990-2014 Excel data tables
www.gov.uk/government/statistics/final-uk-greenhouse-gas-emissions-national-statistics-1990-2014
2. Quarterly National Accounts: Quarter 3 (July to Sept) 2015 time series data tables
www.ons.gov.uk/ons/rel/naa2/quarterly-national-accounts/q3-2015/tsd-qna.html

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² Summary: Quarterly National Accounts, Quarter 4 (Oct to Dec) 2014

http://webarchive.nationalarchives.gov.uk/20160105160709/http://www.ons.gov.uk/ons/dcp171780_400574.pdf

³ Note that 2011 and 2014 were considerably warmer than the long term UK average temperature (both were around 1 degree Celsius warmer) and temperature has a large effect on emissions.

www.gov.uk/government/statistics/energy-trends-section-7-weather