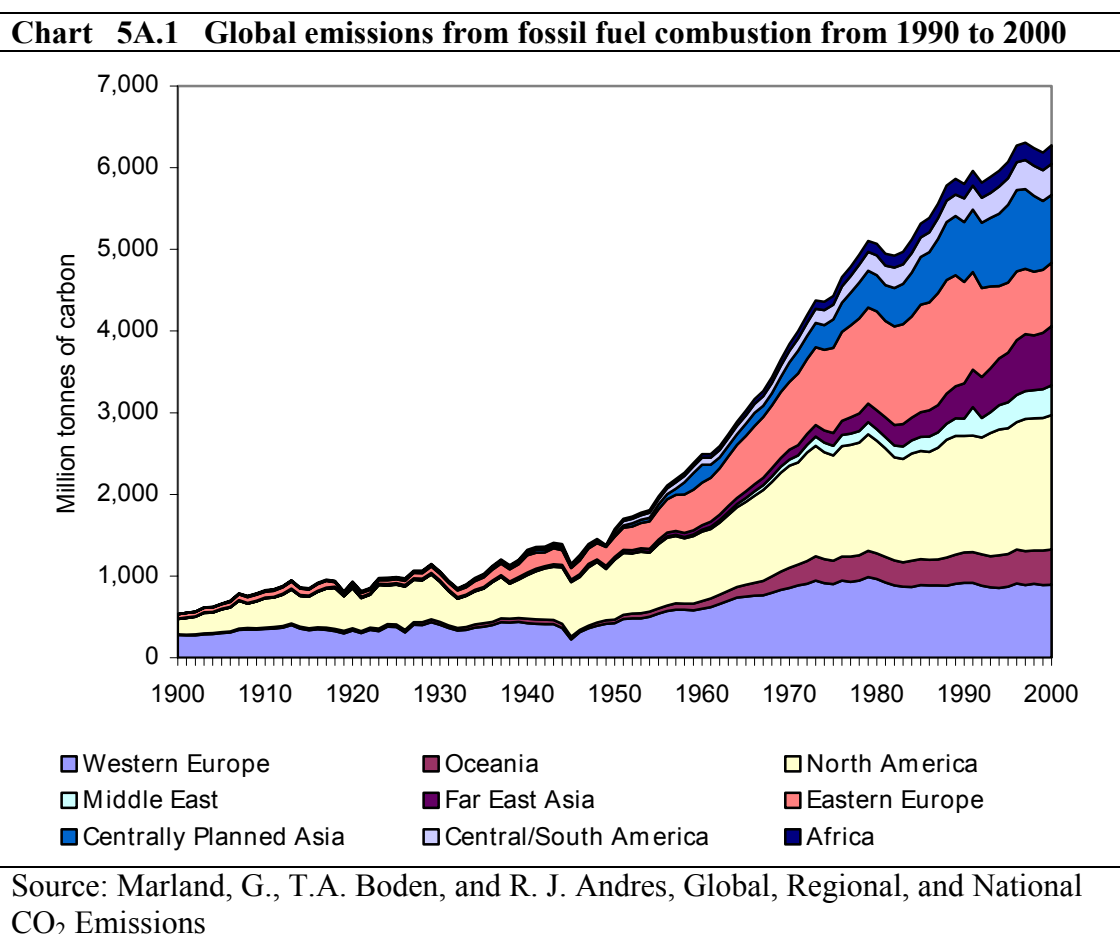


## Annex 5A

### Trends in international carbon dioxide emissions

5A.1 A global effort will be needed to reduce greenhouse gas emissions and to arrest climate change. The Intergovernmental Panel on Climate Change (IPCC) have predicted that unless emissions of greenhouse gases decrease there will be a temperature increase of between 1.4°C and 5.8°C by 2100. This Annex looks at carbon dioxide emissions, the most important anthropogenic greenhouse gas.

5A.2 The global emissions of carbon dioxide through the combustion of fossil fuels increased rapidly over the last century. Chart 5A.1 shows that global carbon dioxide emissions increased ten fold from 1900 to 2000. The growth in carbon dioxide emissions has been particularly rapid in the last fifty years, though the rate of increase has slowed to some extent in the last two decades.



5A.3 Chart 5A.1 shows that Europe and North America were responsible for 87 per cent of global carbon dioxide emissions at the start of the twentieth century, with Western Europe accounting for 52 per cent and North America 35 per cent. During the century, Western Europe's emissions increased more than three times and North America's increased nearly ninefold. However, their combined share of global emissions had fallen to 41 per cent at the end of the twentieth century, as emissions from other continents increased much faster from a low base. At the close of the twentieth century, Middle Eastern countries, whose carbon dioxide emissions were

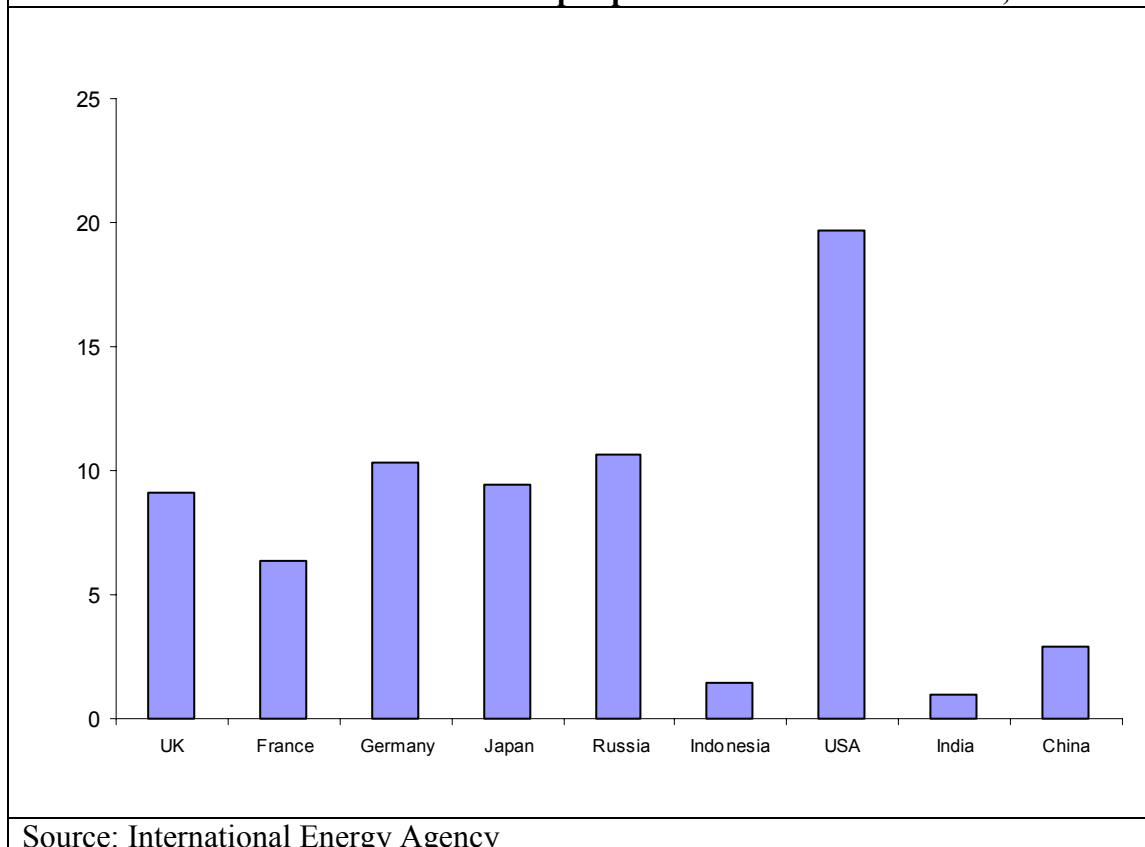
more than one thousand times higher than in 1900, contributed 6 per cent of global emissions. Centrally planned Asia (mainly China) contributed 14 per cent of global emissions following a six thousand-fold increase over the century.

5A.4 Between 1990 and 2003, global carbon dioxide emissions have grown by 20 per cent, according to figures from the IEA. Western Europe has seen a rise of about 3½ per cent in emissions over the same period. The biggest increases have been in Asia and the Middle East, with both regions showing a growth of over 80 per cent in their carbon dioxide emissions over this period, due primarily to economic growth and increased energy consumption. Falls in emissions were seen in former Communist countries, with a reduction of around one-third from the states of the former Soviet Union and in Eastern Europe, following a rapid decline in their industrial sectors.

5A.5 Despite their faster growth in emissions, developing countries such as those in Asia still emit a lot fewer emissions per head of population than wealthier countries in Europe and North America. Average emissions were 8.7 tonnes of carbon dioxide per person in the EU-15 in 2003 and 19.7 tonnes in the USA, compared with 2.9 tonnes in China and 1.0 tonnes in India. Chart 5A.2 shows figures for some of the wealthiest and most populous countries in Europe and the world.

5A.6 Wealthier countries tend to be responsible for more emissions because they consume more energy, which usually comes from fossil fuels. However countries with similar national income have widely different emission levels. Both these tendencies can be seen in table 5A.1, which shows total emissions, population, GDP per head and emissions per head in a selection of larger and wealthier countries. Chart 5A.3 shows emissions per head against GDP per head for the most populous and most wealthy countries in the world.

**Chart 5A.2 Carbon dioxide emissions per person for selected countries, 2003**

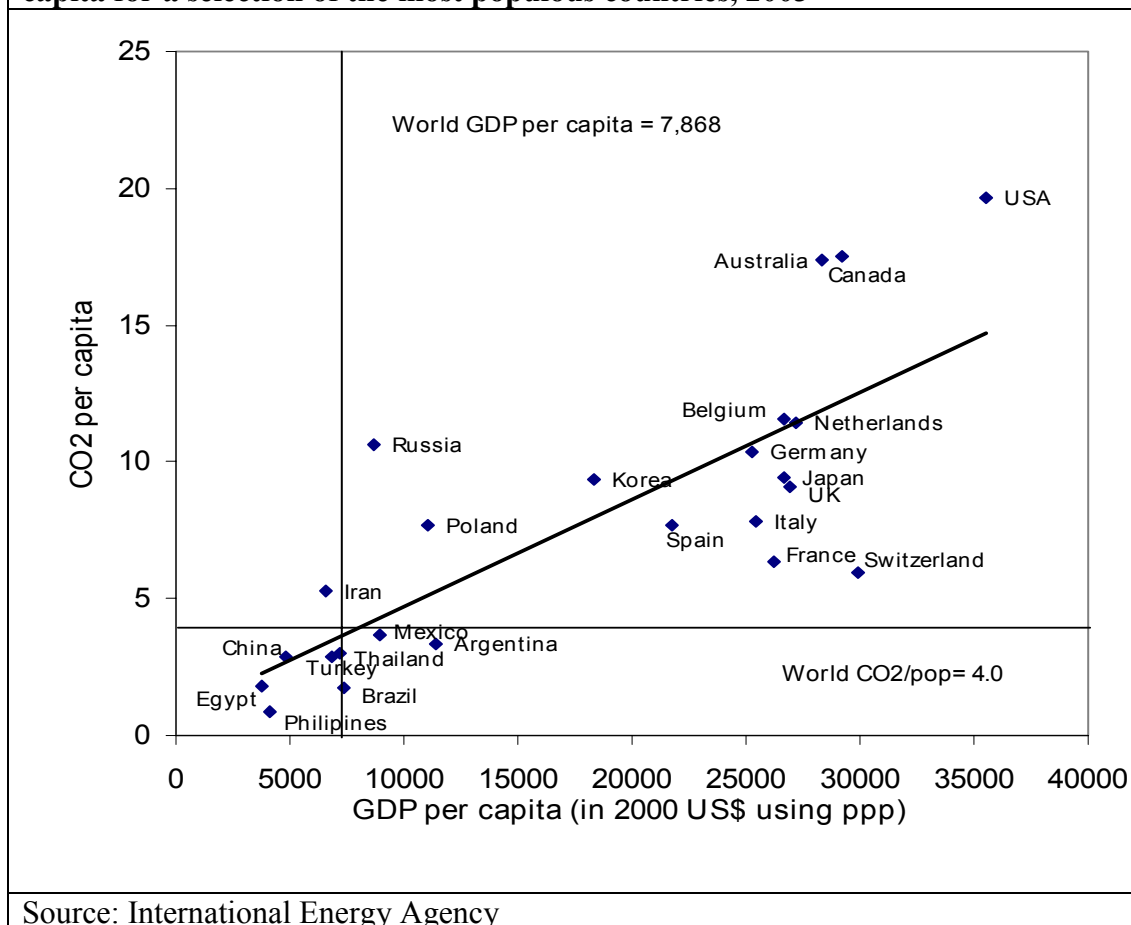


**Table 5A.1 Total carbon dioxide emissions, population, GDP per head and emissions per head for selected countries, 2003**

Country	Carbon dioxide emissions (million tonnes of carbon dioxide)	Population (millions)	GDP using Purchasing Power Parities per capita (2000 thousand US\$ per person)	CO <sub>2</sub> emissions per capita
UK	540	59.4	26.9	9.1
France	390	61.5	26.2	6.3
Germany	854	82.5	25.3	10.4
Japan	1,201	127.6	26.6	9.4
Russia	1,527	143.4	8.7	10.6
Indonesia	318	214.7	3.2	1.5
USA	5,729	291.1	35.5	19.7
India	1,050	1,064.4	2.7	1.0
China	3,760	1,295.2	4.8	2.9
EU-15	3,317	382.5	25.3	8.7
World	24,983	6,267.9	7.9	4.0

Source: International Energy Agency, Global CO<sub>2</sub> Emissions From Fuel Combustion 2005

**Chart 5A.3 Carbon dioxide emissions per person plotted against GDP per capita for a selection of the most populous countries, 2003**



5A.7 There are large differences in the level of emissions per head in countries with similar per capita incomes. While the richest countries do show some of the largest carbon dioxide emissions per capita, emissions do not rise proportionally with income so the line of best fit to current data in chart 5A.3 will not necessarily be representative of the future relationship between GDP per capita and emissions per capita. This is because economies tend to become less energy intense and more energy efficient over time. Indeed over the period 1990 to 2003, the world energy intensity (the amount of energy consumed per unit GDP) fell by 12 per cent.

5A.8 Emissions per head are high relative to national per capita income in the USA, Canada and Russia. They are lower relative to per capita income in Switzerland, France, Brazil and the Philippines. In addition to its wealth, the level of emissions in a country is influenced by a variety of factors. On the supply side, these include use of renewable sources of energy and the extent of nuclear generation of electricity, as well as the balance between coal, gas and oil in a country's use of fossil fuels. On the demand side climate can have a strong influence on the amount of energy used for heating purposes in colder climates. Transport demand is also much higher in some countries than others.

5A.9 The Earth Summit in Rio de Janeiro in 1992 led to the adoption of the UN Framework Convention on Climate Change (UNFCCC). The aim of the Convention

was that signatories would attempt to stabilise their greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. By May 2004, 193 countries had ratified the Convention, which came into force in March 1994, and became legally binding in February 2005.

5A.10 The developed countries, together with some former Union of Socialist Soviet Republics (USSR) countries and Eastern Europe agreed to go further and to adopt policies and measures that would aim to reduce their greenhouse gas emissions. They agreed to submit data annually to the UNFCCC. In 2003, seven developed countries and the countries of the former USSR had emissions below 1990 levels.

5A.11 Provisional estimates of UK carbon dioxide emissions for 2005 indicate that they are 5½ per cent below 1990 levels.

### **Further reading**

International Energy Agency

<http://www.iea.org/>