Britain and Norway avoid the 'carbon curse' of fuel-rich countries

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South Africa is one of the most carbon-intensive economies.

Countries rich in coal, oil and gas emit more carbon dioxide to generate the same amount of economic output as countries where fossil fuels are scarce, according to an Oxford University study.

The authors call this the 'carbon curse' and suggest that Britain and Norway are the only two fuel-producing countries that have largely managed to avoid it.

The study, published in the journal *Energy Policy*, claims that in an era of unprecedented climate change, a minimum of carbon dioxide should be emitted to generate a maximum of economic wealth and human welfare, and points out that fuel-rich countries have to date been a neglected category in the current policy debate on climate change

mitigation.

The researchers measured carbon intensity or carbon dioxide emissions per dollar of Gross Domestic Product (GDP) in 41 countries (including fuel-rich and fuel-poor, high-tech and low-tech economies), finding that the most carbon-intensive economies are South Africa, Iraq, China, Russia and Saudi Arabia – all countries rich in oil and/or coal.

The study shows that Britain managed to reduce its carbon intensity to 0.22 kg/$ in 2008 (after cutting its carbon emissions by 0.4% per year over 12 years) and suggests that this is due, in part, to the government's heavy investment in research and development (R&D) into more fuel efficient options and renewable energy sources. Norway did even better at 0.19 kg/$, and it is suggested that one reason for this success may be the decision to regulate fuel usage by imposing some of the highest fuel taxes in the world on its environmentally-conscious population (Norway had the second highest fuel prices of all 41 countries studied).

However, the study concedes that these key findings contain some caveats: Norway has touched the limits of its ability to further reduce its carbon intensity, given that more than a quarter of its economy relies on mining and utilities. Meanwhile, much of the North Sea oil and gas in the British sector has already been extracted (the United Kingdom became a net importer of oil and gas in 2004/2005), so the study remarks that the days of Britain being classified as a fuel-rich country may be numbered.

Causes for fuel-rich countries succumbing to the carbon curse are examined in the study, beginning with the fuel extraction industry itself, which is described as a highly carbon-intensive sector often rife with 'wasteful practices' such as gas flaring. It also identifies the particular pressure on governments in petro-states to grant fuel subsidies to its citizens and businesses, thereby encouraging further wastage. The study

also explains that where cheap home-produced fossil fuels dominate the domestic market, there is little incentive to invest in energy efficiency or green energy. Where the abundant fuel happens to be coal, the country's carbon footprint is likely to be among the highest, as in South Africa. It finds that even climate-conscious Germany is burning huge amounts of high-carbon lignite (also called brown coal) because it can be easily extracted from German soil.

Very few fuel-rich countries avoid the carbon curse – except for those suffering from the 'resource curse' (meaning that they have abundant natural resources yet, paradoxically, have disappointing economic growth and low levels of development). One example cited by the study is oil-rich Nigeria, whose low-carbon intensity must be attributed to low levels of economic development and human welfare.

The study identifies the level of spending on R&D as a key reason for why some fuel-rich countries manage to reduce their carbon intensity, pointing out that even relatively low levels of investment reduce the carbon footprint of highly carbon-intensive economies. The study notes, however, that there are diminishing returns on R&D once a country is below a carbon intensity of about 0.5 kg/$. The data suggests that any further reduction of carbon intensity requires research spending above 1.25% of GDP.

Lead author Dr Joerg Friedrichs, from the Department of International Development at the University of Oxford, said: 'It sounds like a no-brainer that countries awash with fossil fuels will also be tempted to burn them more wastefully, yet fuel-rich countries are a neglected category in the current policy debate on climate change mitigation. To date, the debate has pitted established Western economies with their historical emissions against emerging markets like China. Our study demonstrates that there needs to be a better awareness of the responsibilities of fuel-rich countries. The Venezuelas of this world have a long way to go to

generate economies that produce more for less: more prosperity for more of their citizens, using less energy and emitting less carbon dioxide.'

Co-author Dr Oliver Inderwildi, from Oxford University's Smith School of Enterprise and the Environment, said: 'Fuel-rich countries do not have to accept the carbon curse as destiny. Britain and Norway have led the way through government policies and vigorous regulation, not only managing fuel use but also seeking out cleaner alternatives. Russia has also decarbonised a lot, but they started from a staggeringly high post-Soviet baseline. Coal-rich China gives more reason for hope because of its announced policies and increased spending on research, development and deployment to further cut the Chinese carbon intensity'

Provided by Oxford University