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Dr. David McKay
Chief Scientific Advisor, Department of Energy and Climate Change, United Kingdom
Professor of Natural Philosophy, Cavendish Laboratory, University of Cambridge

Dear Professor McKay,

I appreciate the chance to respond to your request for evidence on the supply and demand for oil in a 40 year time frame. If I recall correctly, when you gave your seminar at Caltech, you gave three reasons for being interested in energy efficiency: climate change, world resource availability, and national security.

1. Climate change: My production curve fits indicate that oil and gas reserves give appropriate estimates of future production, while coal reserves are probably over-estimates. I have attached an invited paper on coal supplies that is under review at the *Coal Geology* Journal. It is traditional in climate projections to assume that a large multiple of reserves is available for production. Particularly for coal, there is no historical justification for this assumption, as the paper shows. The mature coal regions have come nowhere near producing their early reserves. For this reason, the IPCC scenarios are likely to over-estimate of the effects of future fossil-fuel burning on climate, and it is possible that no climate policy is needed at all.

2. World resource availability: The curve fits indicate that cumulative production of fossil fuels will reach 90% of the eventual total around 2070. Over time, there is considerable substitution for oil by natural gas and coal in heating, producing electricity, and in making plastics, and this means that we can expect world production of all three to go down together. At that time, we could expect world production to be half what it is today, and it would be reasonable to have policy encouraging alternative sources and efficiency improvements that recognizes this. However, 60 years is probably outside of your time frame.

3. National security: For the UK, this may be the most important consideration. It is striking that if we look in the *2010 BP Statistical Review* at UK total fossil fuel production for the ten-year period 1999-2009, we find that production has dropped 6.1% per year. Consumption has only fallen 0.8% per year. For comparison, the numbers for North America are production unchanged (0.0% per year) for 10 years, and consumption dropping 0.2% per year. For the UK, the result is an extremely sharp shift from exporting 26% of consumption in 1999 to importing 27% of consumption in 2009. There are no bright spots here. British oil, gas, and coal production are all falling steadily, and probably nothing can be done about this. The rapid shift from energy exporter to importer is a threat to the traditional independence that the UK has had in making foreign policy. According to the DECC's 2010 Digest of UK Energy Statistics, the UK burned more Russian coal in 2009 than British coal. To me, the most sensible policy goals are to encourage energy efficiency, as you are doing, and to expand the use of alternatives, particularly wind, where the UK has been slower than other European countries.

Regards,