



Environmental Updates

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Environmental and Natural Resource Economics textbook

Leaving Fossil Fuels Unused to Meet Climate Targets

The 2009 United Nations Climate Change Conference in Copenhagen, Denmark endorsed an international target of a maximum increase in global temperature of 2 degrees Celsius. A 2015 analysis in the journal *Nature* by researchers at University College London explores the implications of meeting this target for the management of currently known reserves of fossil fuels.

As discussed in Chapter 11, the reserves of a nonrenewable resource are those quantities that are identified and economically profitable under current prices and technology. Reserves may increase over time, even as large quantities are extracted, due to new discoveries, price increases, and technological improvements. Based on current demands, the world has about 50 years of oil and natural gas reserves, and over 100 years of coal reserves.¹

Can we burn all of these known reserves and meet the 2 degree target? The answer seems to be a clear “no” according to the *Nature* article. As shown in the table below, humans need to leave 82% of current global coal reserves, 49% of natural gas reserves, and 33% of oil reserves in the ground in order to meet the 2 degree target. The table further shows how much different regions

and countries will need to leave unused. Virtually all coal in the United States and the Middle East must be unused to meet the climate target. About three-quarters of Canada’s oil reserves, mostly comprised of oil sands, would be left undeveloped. The values in the table assume that carbon capture and storage techniques are further developed and deployed. If some carbon is not stored, then

Table 1: Percent of Current Reserves that Must Be Left Unused to Meet 2 Degree Target

Region	Coal Reserves	Natural Gas Reserves	Oil Reserves
World	82%	49%	33%
United States	92%	4%	6%
Canada	75%	24%	74%
Middle East	99%	61%	38%
China and India	66%	63%	25%
Africa	85%	33%	21%
Central & South America	51%	33%	39%

Source: McGlade and Ekins, 2015.

¹ Based on BP's Statistical Review of World Energy 2014.

the percentages that must be left unused are even higher.

The policy implications of these results are substantial – suggesting that humans need to begin ramping down production of fossil fuels, particularly coal.

The new work reveals the profound geopolitical and economic implications of tackling global warming for both countries and major companies that are reliant on fossil fuel wealth. It shows trillions of dollars of known and extractable coal, oil and gas, including most Canadian tar sands, all Arctic oil and gas and much potential shale gas, cannot be exploited if the global temperature rise is to be kept under the 2°C safety limit agreed by the world's nations. (Carrington, 2015)

Of course the reality is that most nations are seeking to further develop their fossil fuel reserves. The total amount of recoverable fossil fuel resources is likely to be

much higher than known reserves. These results suggest that if nations are truly committed to meeting the 2°C target, then essentially no future fossil fuel discoveries could be exploited. A future binding international agreement compatible with the 2°C target would render millions of dollars of exploration wasted.

The new analysis calls into question the gigantic sums of private and government investment being ploughed into exploration for new fossil fuel reserves, according to [study co-author Paul Ekins]. “In 2013, fossil fuel companies spent some \$670 billion on exploring for new oil and gas resources. One might ask why they are doing this when there is more in the ground than we can afford to burn,” he said. “The investors in those companies might feel that money is better spent either developing low-carbon energy sources or being returned to investors as dividends,” said Ekins.

The study concludes by noting the need for a shift in thinking about fossil fuels and energy policy. In the past, some energy experts have warned about the scarcity of fossil fuels. But going forward the problem we must accept that fossil fuel reserves are overly abundant. To prevent the most damaging consequences of climate change, we must make a conscious decision to leave the majority of the world's fossil fuel resources underground.

Sources:

McGlade, Christophe, and Paul Ekins. 2015. “The Geographical Distribution of Fossil Fuels Unused when Limiting Global Warming to 2°C,” *Nature* 517:187-190;
Carrington, Damien. 2015. “Leave Fossil Fuels Buried to Prevent Climate Change, Study Urges,” *The Guardian*, January 7, 2015.