



Burning off natural gas. (photo: Shutterstock)

Fossil Fuel Companies Impose More in Climate Costs Than They Make in Profits

By David Roberts, Vox, 25 July 2015

It is fairly well understood by now that releasing carbon dioxide and other greenhouse gases into the atmosphere imposes an economic cost, in the form of climate change impacts. In most cases, however, those responsible for carbon emissions are not required to pay that cost. Instead, it's borne mainly by the world's poor and low-lying countries, and of course by future generations, as many of the worst impacts of climate change will emerge years after the emissions that drive them.

People sometimes refer to the unpaid cost of carbon pollution as a subsidy, or an "implicit subsidy," to polluting businesses. The IMF recently issued a [report](#) saying that total worldwide subsidies to energy, mainly fossil fuel energy, amounted to *\$5.2 trillion a year*. The reason that number is so high is that the IMF includes implicit subsidies — the social costs imposed by businesses (including climate damages) that they don't have to pay for.

Vox's Brad Plumer [raised some questions](#) about whether that's a misleading use of the term "subsidy." Whatever you call it, though, it makes for an unsustainable situation, literally. It can't go on.

As climate change gets worse and the chance to avoid harsh impacts dwindles, governments are getting serious about putting some sort of price on carbon emissions,

whether explicit (a tax) or implicit (regulations). By next year, a [quarter of the world's carbon emissions](#) will be priced in some way. Businesses that now emit carbon pollution for free (or cheap) will soon see their costs rise.

In other words, carbon pollution is a business risk. It's a bubble that's going to pop, probably soon. The Carbon Tracker Initiative has popularized a term for this looming liability: "[unburnable carbon](#)."

With proper accounting, the fossil fuel business doesn't look like such a moneymaker

There's been a [lot of work](#) recently trying to quantify carbon risk. A new contribution to that conversation was just released by Chris Hope and colleagues at the University of Cambridge Judge Business School: "[Quantifying the implicit climate subsidy received by leading fossil fuel companies](#)." It attempts to put a number on the carbon risk facing the world's top 20 fossil fuel companies, the ones most directly vulnerable to a price on carbon. The results suggest that those companies are in a perilous situation.

Hope took a fairly simple approach: He multiplied the carbon emissions embedded in the companies' products by the "social cost of carbon," i.e., the net economic, health, and environmental cost of a ton of carbon dioxide. He ran the calculation for data from 2008 to 2012 and took the results as a rough proxy for the level of carbon



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risk facing each company. (See the technical addendum below for more details on this calculation.)

The results are pretty startling. To wit: "**For all companies and all years, the economic cost to society of their CO2 emissions was greater than their after-tax profit**, with the single exception of Exxon Mobil in 2008" (my emphasis). In other words, if these fossil fuel companies had to pay the full cost of the carbon emissions produced by their products, none of them would be profitable.

It's even worse for pure coal companies, for which "**the economic cost to society exceeds total revenue in all years**, with this cost varying between nearly \$2 and nearly \$9 per \$1 of revenue." Total revenue, Hope and colleagues note, represents "employment, taxes, supply purchases, and indirect employment" — everything that coal companies contribute to the economy. It turns out the costs they impose through carbon emissions are larger than all those contributions combined. (For oil and gas companies, carbon costs generally range from 10 to 50 percent of total revenue.)

This is a somewhat idealized exercise, obviously. Fossil fuel companies are unlikely to bear the entire cost of carbon, if and when it is imposed. The cost of carbon itself is highly uncertain (see technical addendum) and theoretically varies based on geography and income.

Nonetheless, this kind of calculation is helpful in indicating the comparative level of risk among fossil fuel companies (see the paper for a ranking) and the materiality of that risk. It shows that the carbon bubble is very large indeed.

It's also a good reminder that we are, in carbon terms, eating the seed corn, using up resources that only appear cheap because we're shifting the costs to poor and future people, who don't have the political power to stop us. It is grossly irresponsible.

Technical addendum: How do you calculate the social cost of CO2 in the first place?

Hope's results depend entirely on his estimate of the social cost of carbon dioxide (SCCO2), which he pegs at "\$105 per tonne of CO2 in 2008." Here's a note from the study about how that figure was chosen:

Several estimates of the SCCO2 have been made over the last decade or so. The US Environmental Protection Agency (EPA) uses a central value of \$39 per tonne of CO2 (in \$2011) at a 3% discount rate. A [recent study](#) which tried to include the effects of climate change on

economic growth as well as consumption estimated a value of \$220 per tonne of CO2 in 2015. Here we use the mean estimate from business-as-usual emissions in the default PAGE09 model, one of the three models used by the EPA, of \$105 per tonne of CO2 in 2008. The SCCO2 increases in real terms as the world gets richer, and as the emission date gets closer to the time at which the most severe impacts of climate change are expected to occur. We assume it rises at 2.3% per year in real terms to \$122 per tonne in 2012.

As the wide range of possible values shows, calculating the SCCO2 is a fraught undertaking. It not only involves estimating the timing and severity of climate impacts, which are notoriously uncertain, but it also means choosing a discount rate, which determines how much you discount future harms relative to present harms. Think of it as a negative interest rate.

(I once wrote a [long, otter-filled post](#) about discount rates and their role in climate economics, if you have an hour to spare and want to know more.)

If you choose a high discount rate — say, 5 percent — you're saying that the value of harms falls quickly as they move into the future. It's worth very little to you to prevent damages in, say, 2100. If you choose a 0 percent discount rate, you're saying future damages are worth exactly as much as damages today; it's worth spending \$1 today to prevent \$1 of damage in 2100.

Which discount rate you choose completely shapes the results of your climate economic model. A high discount rate justifies only a modest carbon price, while a low discount rate justifies rapid, substantial action to reduce emissions.

What is the correct discount rate? There's much debate over that, but the answer, in short, is that there isn't one. It's a matter of values and risk tolerance, which are inevitably somewhat subjective, shaped by socioeconomic circumstance.

If discount rates depend on values, and the cost of climate change mitigation depends on discount rates, then the cost of climate change mitigation depends on values — there is no "objective" measurement of the cost of climate action. Put more bluntly: [We can't know how much it will cost to tackle climate change](#), not in advance, not with any confidence. For all our faux-precise economic modeling, we're acting, as humans always do, on some mix of educated guesses, fears, hopes, and instincts. Nobody wants to hear that, though, so I'm sticking it here at the end of the technical addendum.