

The Carbon Ask: Frequently Asked Questions



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What is the Carbon Ask?

It is the reduction in wealth that will be experienced by participants in the global fossil fuel enterprise as the result of policies to limit global warming.

Which fossil fuels are you talking about?

Oil, natural gas, and coal.

What is the global fossil fuel enterprise?

The enterprise comprises all governments, investors, firms, workers, and consumers involved in the exploration and production, transportation, refining, distribution, sale, and use of fossil fuels.

How big is the Carbon Ask?

We estimate the Ask at \$185 trillion, which is the approximate equivalent of two and a half years of the value of the world's production of all goods and services (i.e., global GDP).

How did you estimate the Carbon Ask?

The Ask is the difference between two values. We first compute the present value of fossil fuels over the next 100 year in a world not constrained by climate policy at \$295 trillion. We then re-compute this value assuming strong climate policies intended to hold warming to 2° C above pre-industrial levels and the result is \$110 trillion. The estimated Ask of \$185 trillion is the difference between these two values.

Why is there such a big difference between the unconstrained case and the policy case?

The Carbon Ask is driven by two, related, phenomena. First, a strong climate policy will reduce demand for fossil fuels; as a result, a smaller quantity will be produced and used over the next 100 years. Second, reduced demand will lead to lower prices for those fossil fuels that are sold. In short, both prices and quantities – and hence total revenues – will be lower in a policy-constrained world.

How can you accurately predict future prices and quantities of fossil fuels over the next 100 years?

We can't. Our intent is not to omnisciently compute the "right" value of the Ask which, with hindsight in 2115, will match 100 years of actual history. Because we are interested in today's political dynamic, we just have to be "right" about what key players think the value of the Ask is today and how climate policies might affect their wellbeing. Like these stakeholders, we have no choice but to apply reasonable assumptions to available data to estimate the Ask.

What economic data did you use to estimate the Carbon Ask?

The forecast trajectories of prices and quantities of oil, natural gas, and coal come from the International Energy Agency's 2015 World Energy Outlook. IEA projects these values from 2015 to 2040; we used simple straight-line extrapolation for prices and quantities from 2041 to 2115. (We also tried other methods for projecting prices and quantities through 2115, but they didn't change our conclusions in any significant way.)

How did you figure out how much oil, natural gas, and coal remain underground?

Just to be clear, we didn't collect any original information but used data from government agencies like the US Geological Survey (USGS) and the German Federal Institute for Geosciences and Natural Resources (BGR). We included conventional resources and unconventional resources (like shale gas and tight oil). We also looked at both proved reserves *and* estimates of resources that haven't been developed yet, but could be recovered with today's technologies. Reserve estimates tend to be point estimates based on site-specific analyses, while estimates of undeveloped resources tend to be the result of probabilistic modeling about the likelihood of discovering fossil fuel resources in locations around the world as a function of geological conditions.

Does your quantitative estimate capture the full magnitude of the Carbon Ask?

No. Due to data limitations, we monetize the Ask only for those entities involved in the production of fossil fuels. We do not capture the impact on users of fossil fuels.

Are there other limitations to your estimate?

Yes. We believe the estimated Ask of \$185 trillion is an under-estimate as there is probably more oil and natural gas beneath the earth's surface than we estimated. Since these resources have economic value, a policy that keeps them underground will create additional cost beyond what we've estimated.

\$185 trillion is a huge number! What are its implications?

Common sense suggests that when the holders of this wealth are asked to surrender it for the greater good of the planet, they will have powerful incentives to resist a strong climate policy. To the extent they also hold political power, they may very well be able to stop or slow climate policy.

Why should we care about the well-being of wealthy multinational companies like Exxon, Shell, & BP?

While the major oil and gas companies are extraordinarily large, the global fossil fuel enterprise is much, much bigger than just these companies. In the United States *alone*, there are about 92,000 companies and over 2 million workers engaged in some aspect of the fossil fuel industry (and that doesn't even include railroads or the tanker industry!). What's more, like it or not, these large multinational companies have considerable clout. Measuring the threat to their economic interests created by the Carbon Ask thus helps us to understand climate politics.

What does the historical record show when it comes to technological transformations?

Decarbonization of the world's economy will be a massive undertaking, but it is not unprecedented. The Industrial Revolution, the shift from horses and sailing ships to mechanized transport (trains, planes, automobiles, and container ships, for example), and the rapid growth of the Internet and mobile technologies, are just three examples of radical technological change experienced around the world.

OK, then, these historical examples prove that decarbonization is just a matter of time. Right?

Not so fast. Several studies going back two centuries have found that when new technologies threaten established economic and political interests, industry incumbents routinely exert power in the policymaking process to impede the diffusion of new technologies.

But, what about iPhones? They didn't even exist ten years ago and now they are everywhere! Why can't it be the same for wind and solar power?

What almost all successful new technologies have in common is that they were driven by the superiority of the new technology *in the marketplace*. People didn't replace their landlines and flip-phones with an iPhone because of government policy. They did so because of great new features and conveniences delivered at a price they deemed reasonable. Remember, electricity is just a commodity. Your refrigerator works the same with coal-fired electricity as it does with wind-generated electricity. Other than your concern for the climate, as a customer, you have no reason to prefer one type of electricity over another.

Government has already made great progress on air and water pollution, land conservation, and protection of the ozone layer. Why is climate policy so different?

We struggled to come up with examples of economic transformations that were both at the same scale as global decarbonization *and* the result of intentional government action. While you're right that substantial environmental progress has taken place in the past few decades, it's not been at the same scale as a radical, worldwide shift in the global energy enterprise. While campaigns to reduce tobacco consumption seem to have been successful, the U.S. experiment with alcohol prohibition is widely viewed as failed policy. While a more thorough historical analysis might yield other cases of large, policy-driven economic transformation, it is important to appreciate the limited precedents for such actions.

Your study focuses on underground fossil fuel resources. Is there any evidence that such resources really make a difference when it comes to climate politics?

Though it only scratches the surface, our analysis of EPA's Clean Power Plan (CPP) suggests that the answer is yes. Sixty-seven percent of the states with coal reserves have sued to block the CPP, while only 28% of states without reserves have joined the suit. In other words, fossil fuel interests have not confined their efforts to lobbying lawmakers and trying to influence the public, but also have activated the policy apparatus *within government* to take action on their behalf.

The plight of the shrinking U.S. coal industry is repeatedly in the news and a point of acrimony between the two Presidential frontrunners. Does your study shed light on the situation?

Keep in mind that our study was global in nature; we didn't parse out the Carbon Ask across countries. But there is no doubt that a strong climate policy will undermine the coal industry. We estimate that the Carbon Ask for the global coal mining industry is about \$24 trillion, which is a 75% reduction over the Business-as-Usual Case.

When it comes to the U.S., the bitter political fights in coal country are almost certainly a sign of things to come if and when climate policy starts to radically shrink other parts of the fossil fuel enterprise. After all, of the 2 million U.S. fossil fuel related jobs, "only" 90,000 are in the coal mining industry.

OK, now I am really depressed. What will it take to achieve decarbonization of the world's economy?

Well, we don't have a crystal ball but it seems like few things need to happen. First, carbon-free energy needs to become cheaper than carbon-based energy. If clean technologies can outcompete fossil fuel technologies in the marketplace, then strong economic forces may negate the political power of industry incumbents over the long run. A price on carbon and an end to fossil fuel subsidies would help level the playing field.

Second, as the clean-tech industry grows, we would expect its political influence to increase commensurately. We note that some politicians – who deny climate change – still support wind power because of its economic benefits back in their home districts. Politics can be a tough game, but there's no reason to think that the clean-tech industry can't play it as well as the fossil fuel industry does.

Finally, as mentioned above, if strong climate policies do move forward, then the political fights in coal country are probably a harbinger of things to come across other fossil fuel industries. Transitional assistance to workers, communities, and possibly even firms, could not only improve the welfare of those entities on the receiving end of the Carbon Ask, it might also temper political opposition to climate policy.