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Universities Can Do Better Than Symbolism: A Revenue-Neutral Carbon Tax

By Frank Wolak

The Stanford Board of Trustees recently announced that the university will not make direct investments in coal-mining companies. This action was taken in response to broader efforts at Stanford and other universities to rid their endowments of investments in fossil fuels. Such efforts have not been confined to universities. In fact, a number of non-profit foundations have made similar announcements.

Because other universities and non-profits are likely to follow Stanford's lead, it is important to evaluate the consequences of this action and consider whether a more productive approach is available to address the climate challenge. Here's part of the problem: even the most avid proponents of divestiture acknowledge that it constitutes a symbolic gesture, a gesture that will not in and of itself reduce global greenhouse (GHG) emissions. Presumably, these same advocates believe it might, however, lead to substantial change in United States (US) climate policy through a kind of chain reaction. Will it? I have serious doubts for the reasons discussed below.

Moreover, I believe there is a far more productive way for Stanford and other universities to address the climate challenge that is completely consistent with their teaching and research missions that will positively contribute to the US and other countries taking meaningful action to address the global climate challenge.

Climate Change Is Not Really Like Apartheid

Advocates of fossil fuel divestiture often draw parallels between investments in firms that produce fossil fuels and investments in South African firms during Apartheid. However, climate change is a global public policy challenge that should be solved using the best possible scientific and economic analysis. Saying that a firm that produces fossil fuels is doing something as morally wrong as a firm operating under Apartheid seems misguided at best, for the reasons discussed below.

It therefore seems inappropriate to paint climate change and Apartheid with the same brush or address them

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About The Author

Frank Wolak is the Holbrook Working Professor of Commodity Price Studies in the Economics Department and the Director of the Program on Energy and Sustainable Development. Wolak's recent research focuses on regulation, design, and monitoring of energy and environmental markets. From April 1998 to April 2011, he was Chair of the Market Surveillance Committee (MSC) of the California Independent System Operator. In this capacity, he has testified numerous times at the Federal Energy Regulatory Commission (FERC), and at various Committees of the US Senate and House of Representatives on issues relating to market monitoring and regulatory oversight of energy markets. Until December 2013, Wolak served as a member of the Emissions Market Advisory Committee (EMAC) for California's market for greenhouse gas emissions allowances. This committee advised the California Air Resources Board on the design and monitoring of the state's cap-and-trade market for greenhouse gas emissions allowances.

with the same tool kit. To do so only exacerbates the political divisions already polarizing the climate policy debate in Washington, which only prevents Congress from taking meaningful action.

If Fossil Fuels Are Evil, Then We Are All Guilty

Different from goods and services produced by South Africa, we all consume fossil fuels. There is no 'us' versus 'them'. Fossil fuels are used for home heating, cooking, and automobile and air travel. Somewhat ironically, they are even used to produce much of the electricity that charges our electric vehicles and plug-in hybrids. And then there are cell phones, personal computers, and home appliances, all of which contain components derived from fossil fuels and are powered by electricity produced from fossil fuels. Not to mention our food. Natural gas is used to produce the fertilizer that grows it. And fossil fuels power the equipment used to plant and harvest it.

True, it is possible to make distinctions among different sources or uses of fossil fuels, but these are artificial, not inherent, distinctions. A university could divest itself of investments in coal-mining or oil and natural gas exploration and production companies, but it cannot at this point in good faith commit itself to foregoing services or products made using coal, oil, or natural gas. The analogy would be a dieter who decides to eliminate refined sugar but continues to eat food containing sugar. The dieter may feel he is being virtuously healthy, but the reality is quite different: There's little absolute change in the sugar-content of his diet.

Coal Is the Engine of Economic Development

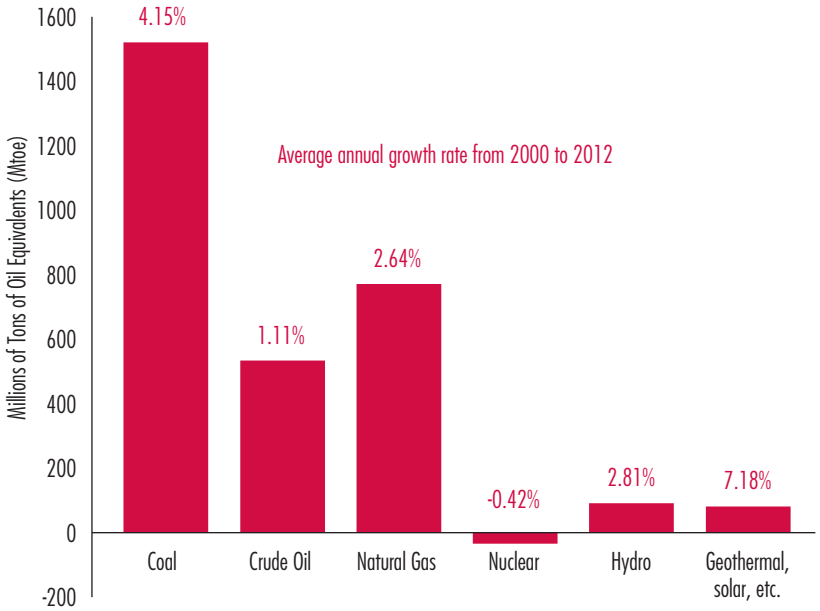
Another popular argument in the US is that natural gas and oil consumption can be tolerated, but coal consumption cannot. While it is undeniably true that coal produces almost double the amount of greenhouse gas (GHG) emissions that natural gas does per unit of heat energy burned, the fact is that coal remains, whether we like or not, the engine of economic development. It was the world's fastest growing source of heat energy over the past decade, with an incremental increase in global consumption far greater than that of oil or natural gas. Virtually all of this growth took place outside the US, in places where it has given millions of people access to modern energy services.

Figure 1 shows the incremental growth in annual global consumption of each of the major energy sources from 2000 to 2012 in millions of tons of oil equivalent. The figure above each bar is the annual average percentage growth in annual consumption from 2000 to 2012. Absolute growth in energy consumption from coal over this time period is larger than that for oil and natural gas combined.

To provide empirical evidence that coal is a driver of economic development, Figure 2 graphs China's annual coal consumption and its real GDP in 2012 dollars from 2000 to the present. When coal consumption is relatively flat, economic growth is slow, but when coal consumption rapidly increases starting in 2000, real GDP rapidly increases. This growth in coal consumption also led to increased access to and use of modern energy services in China. China is also not the only country benefitting from this rapid growth in its coal use. The US, Europe, and other developed countries benefit from the goods produced by China from this coal.

Substantial economic growth fueled by increasing coal use is not unique to China. As history

Figure 1
Change in Annual Global Consumption from 2000 to 2012 in Millions of Tons of Oil Equivalent (Mtoe)



textbooks routinely point out, coal production increased in tandem with industrialization in the US. Figure 3 shows coal consumption in the US and real GDP from 1875 to 1925, when oil consumption began to take off in the US. Note that this figure looks remarkably similar to Figure 3.

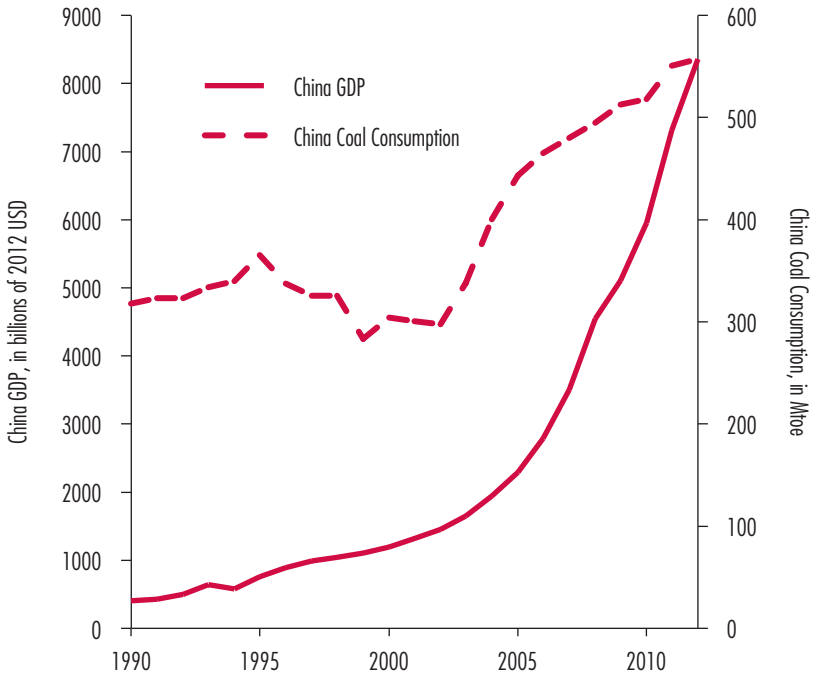
GHG emissions are a stock pollutant, meaning that cumulative GHG emissions net of the rate that the natural environment can process these emissions are what cause global climate change. Therefore, on inter-generational equity grounds it is difficult for the current generation in the US to argue against the use of coal by the current generations in China, India, or Africa to fuel industrialization in these countries, given that the US used to coal to fuel its own industrialization approximately 100 years ago. This does not mean that arguments against coal use in the developing world cannot be made, but these facts add another layer of complexity to the issue.

United States and Europe Still Use Significant Amounts of Coal

Until very recently, the US obtained more than 50 percent of its electricity from coal. The rapid increase in shale gas production in the US over the past decade has led to natural gas prices in the US falling to roughly one-half to one-third of those that prevailed in the early 2000s. This decline in natural gas prices reduced the cost of producing electricity from this fossil fuel versus producing electricity from coal. This, in turn, reduced the share of coal use in the US electricity sector from over 50 percent to just under 40 percent. This shift from coal to natural gas has also resulted in the US having the largest reduction in total GHG emissions of any country over the past decade. Thanks to the shale gas boom, the pursuit of less expensive megawatt-hours (MWhs) of electricity has resulted in the significant environmental benefits to the US and global economy.

Unfortunately, the rest of the world has yet to realize both of these benefits (lower cost MWhs and less GHG emissions) from shale gas extraction technology. Coal use in European countries continues to increase, including, rather counterintuitively, Germany, Spain, and the UK, countries which have significantly increased their production of electricity from renewable sources. In a nutshell, higher natural gas prices in European countries means coal remains the cheaper source of electricity, with the obvious consequences for coal use and GHG emissions.

Figure 2
Real Gross Domestic Product (GDP) and Coal Consumption in China from 1990 to 2012



Source for coal consumption: http://www.iea.org/statistics/statisticssearch/report/?country=OECDTOT&product=balances&year=2012

Source for real GDP: http://unstats.un.org/unsd/snaama/dnllist.asp

Price Carbon Everywhere in the World

The difference in the growth of coal use in the US versus Europe and the accompanying reduction in GHG emissions in the US relative to Europe points to a straightforward mechanism for reducing country-level GHG emissions: Increase the relative price of the more GHG emissions-intensive energy source. In order to reduce global GHG emissions, this must occur in all countries, which implies that all countries must set a price for GHG emissions.

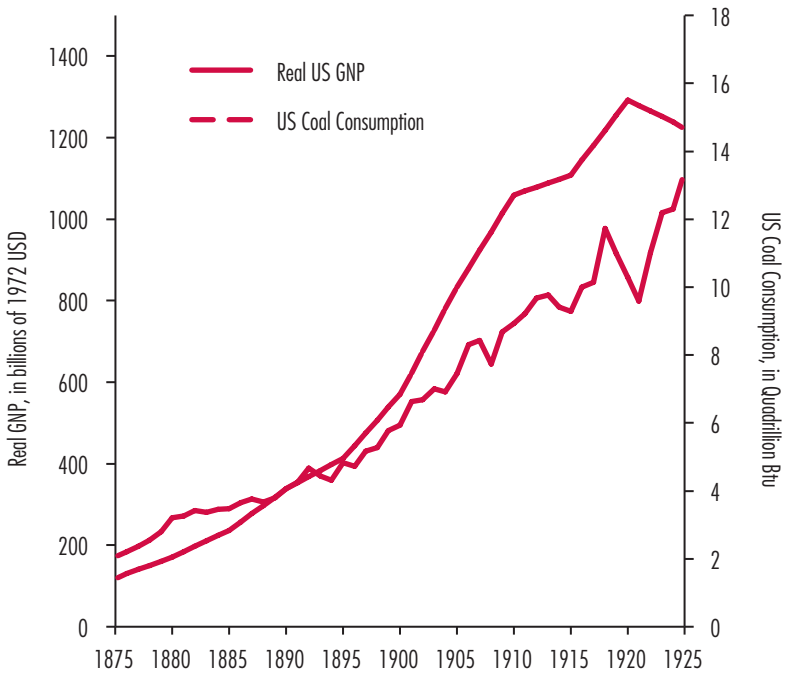
Governments should not concern themselves with the level of this price. It is far most important for every country to set a positive price

for GHG emissions, no matter how small. If this action is only taken by some countries, it will reduce the global demand for the most GHG emissions-intensive energy source, typically coal. The global price of this GHG emissions-intensive energy source will fall, which makes it more attractive to use by countries that don't set a positive price for GHG emissions. Under these circumstances, a higher price for GHG emissions in some countries will make the more GHG emissions-intensive energy even more attractive to the rest of the world.

To avoid this counterproductive outcome, all countries must price GHG emissions. Once all countries, including those in the developing world, have done so, the process of coordinating these policies internationally can begin. This "bottoms up" approach to setting a global price for GHG emissions seems far more likely to lead to significant global GHG emissions reductions than the current "top down" United Nations Framework Convention on Climate Change (UNFCCC) approach, which first requires all countries to agree to global emissions reductions. Focusing the climate policy process on getting countries to commit to specific emissions reductions only distracts the attention of governments from the ultimate goal of reducing global GHG emissions using the most cost-effective method: A positive price for GHG emissions. To repeat myself: pricing GHG emission in all countries makes it more expensive to produce them everywhere in the world, which necessarily means that global emissions fall.

Figure 3

Real Gross Domestic Product (GDP) and Coal Consumption in the United States from 1875 to 1925



Source for real GDP: http://www.nber.org/data/abc/

Source for coal consumption: http://www.eia.gov/totalenergy/data/annual/showtext.cfm?t=ptb1601

A Productive Role for Universities and Foundations

The primary role of research universities is knowledge creation and dissemination. Universities are especially well-placed to address the challenges of pricing GHG emissions in light of the technical and implementation challenges involved.

For example, measuring and verifying GHG emissions where they occur may be so administratively burdensome as to be practically impossible. Consider the case of measuring GHG emissions associated with the consumption of transportation fuels. Measuring emissions at the point of their production would require measuring devices on all automobiles, trucks, planes, and so forth. Not only would this be very expensive, but the process would lend itself to misrepresentation and fraud. Imagine the challenge of requiring every driver to report their GHG emissions! A more practical, albeit imperfect, solution is to assess GHG emissions when the transportation fuel is produced rather than when it is consumed. This necessarily involves some degree of approximation, because how an automobile, truck, or airplane is operated determines its fuel efficiency and therefore the total GHG emissions produced by the consumption of a given quantity of fossil fuel.

There are also different kinds of greenhouse gases with differing impacts on the global climate. This necessitates setting exchange rates between these greenhouse gases and carbon dioxide, the most prevalent greenhouse gas. This process sets carbon

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dioxide-equivalent factors for converting a unit of each type of greenhouse gas into a ton of carbon dioxide in terms of its impact on the global climate. Uncertainty about the values of these exchange rates can be addressed through further scientific and economic research, as can a host of other measurement, verification, and regulatory issues.

Returning to the topic of a grand symbolic gesture by universities and non-profits, is there a more productive gesture that avoids the pitfalls mentioned above of further exacerbating political divisions, limiting the developing world's access to modern energy services, and increasing energy costs to US businesses and households?

One political barrier to implementing a price on GHG emissions is the allocation of the revenues collected. A politically viable approach is to refund these revenues to consumers in a revenue-neutral manner to ensure that, in the aggregate, households are "held harmless," in the sense that the total amount of revenues collected by pricing GHG emissions is refunded to households. Moreover, those entities that more effectively reduce their carbon footprint than other households could receive greater revenue refunds than what they pay for their GHG emissions.

This policy is often referred to as a "revenue-neutral carbon fee (or tax)." Significantly, it has support from both sides of the aisle. Former Secretary of State George Schultz is a strong advocate, as are a number of Democrats in the House and Senate, who have themselves proposed a carbon tax.

Given that there are so many crucial details to be worked out before this policy can be efficaciously implemented on a national scale, what better place to do so than on a university campus? In other words, why not implement a university-wide revenue-neutral carbon tax at Stanford and other universities around the world?

The Devil Is in the Details

As noted above, there is a slew of implementation details to be worked out, both in terms of how compliance with a pricing program would work and which sectors of the economy should be covered. And then there is the thorny issue of how to ensure that the funds collected from pricing GHG emissions are collected in a revenue-neutral manner from consumers.

Here's how it might work at Stanford or any other university: A dollar-per-ton fee would be assessed on all GHG emissions-producing activities on campus. Students, faculty, and staff would pay an extra amount for the GHG emissions associated with their daily activities on campus: electricity use, waste disposal activities, consumption of transport services, and GHG emission-producing activities in research labs and buildings. This tax could even be assessed on the carbon content of all products purchased by the university and by students and faculty at campus stores.

The carbon content on each product would be determined and then the carbon tax would be recovered from the price charged. Precisely how this would be accomplished requires addressing a number of scientific and economic challenges that are highly amenable to solution by an inter-disciplinary teaching and research environment. This process has a direct analogue to what a country would need to do in order to compute the fee for the GHG emissions content of each of the goods that it imports.

Stanford could then use the proceeds from this carbon tax to reduce tuition and fees charged to students and to increase the salaries paid to faculty and staff in a revenue-neutral manner. Again, at the risk of belaboring the point: The process of designing such a scheme would require addressing many scientific, economic and political challenges, all within the purview of a research institution. Students could certainly be involved in this process in creative career-enhancing ways.

Stanford could serve as an example for other universities wanting to reduce their carbon footprint. These university-level initiatives could then be scaled to the national level. Students and faculty from each university could build on their experience to contribute to this larger process. The collective and collaborative experiences both within and across universities would provide valuable input to the design of a national policy. A multi-university effort would also increase the likelihood that Washington would adopt national policy, which would begin the process of solving the climate challenge.

International Cooperation Among Universities

Students and alumni around the world should press for a revenue-neutral carbon tax at their universities. Nonprofits should financially support student and faculty involvement in these efforts. This is a symbolic gesture that can lead to meaningful progress towards addressing the global climate challenge. Moreover, by coordinating their actions, students and alumni from around the world can learn from each other's experiences. Finally, the process of implementing revenue-neutral carbon taxes at a number of universities that can easily be integrated into single global carbon tax at these same universities could serve as a model for how this process might take place among at the national and international level.

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