THIRD WAY

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How a Fee on Fossil Exports Can Make the U.S. a Clean Energy Superpower

Melissa Carey
Deputy Director, Clean Energy Program

Josh Freed
Vice President for the Clean Energy Program
@ThirdWayEnergy

Against all expectations, America has become an energy superpower. While there's no debate about going backwards, important questions remain about our role in the world's energy future. Will we seize the opportunity to reshape the energy landscape in favor of lower-carbon fuels and game-changing technology? Or will we stick with the status quo and lock in an emissions load we cannot live with?

While some have framed this as a clash between the environment and the economy, we believe this is a false choice. We propose taking a page from industry's playbook by using a small public goods fee on the export of fossil fuels to fund innovation that will clean up fossil fuel pollution and maintain America's leadership in a clean energy future.

Climate change is an existential and pressing threat; if we can't curb our contribution to it, nothing else much matters in the long run. But Congress has failed to act. In the shadow of inaction, and as the domestic energy sector has boomed, some of the focus of the debate has shifted to the growth in fossil fuel infrastructure—in particular, the question of whether or how much we should export fossil fuels. To read the coverage, it is the planet versus the pipelines; winner take all.

But this coverage misses a more fundamental set of facts: we have become an energy superpower. There's really no debate about going back to our days of energy poverty. The question is how can we create the greatest value from the economic juggernaut that domestic energy production has become? Is there a way to harness that growth and capital to move the sector in a much cleaner direction? We believe there is, and our future depends on it.

Right now, fossil fuels are driving a domestic energy renaissance that was scarcely conceivable five years ago. Domestic oil and gas production in particular have provided one of the few areas of significant growth in our lackluster economy since the Great Recession. But it's complicated: coal, oil, and natural gas are just as carbon intensive as they ever were, and we still don't know how to clean them up. Even worse, we aren't making much progress on figuring it out. Energy research and development budgets, where they exist at all, are tiny relative to the task—and the technological challenges are massive. And so we face an all-or-nothing energy debate: either the U.S. will take a pass on energy sector economic dominance (unimaginable) or will barrel full-speed ahead toward a climate disaster (unconscionable).

But we can sidestep that fight and solve the technology problem without adding a dime to our federal deficit. How? By placing a small fee on fossil fuel exports and using the revenue to develop technologies to clean up carbon pollution from those fuels. We estimate that even a modest fee could create $20 billion or more over ten years for carbon abatement technology, helping us take advantage of our domestic energy bounty without the carbon pollution we must avoid. Moreover, the fund would extend the benefits of innovation to many traditional energy states that now see the move to clean energy only as a threat. With well-placed technology investment, it's possible to imagine a future in which we export not only the fuels the world wants, but also the pollution control technology the world needs. *That* is energy super power.

THE PROBLEM

The Domestic Energy Sector is Growing, but so are Emissions

Rising global energy demand and the economic benefits of domestic fossil fuel production are driving an energy boom in the United States at exactly the time the world needs to

reduce carbon dioxide emissions. Present day fights over exports of oil, coal, and natural gas reflect a larger struggle, which is about creating a future in which the world gets the energy it needs without the carbon it can't take.

Short-run economics strongly favor more fossils, including exports

The press to build more infrastructure, particularly for exports, reflects the development of a domestic energy bounty unthinkable even five years ago. [1] U.S.-produced energy now supplies 86% of America's demand, reducing our dependence on foreign oil and eliminating the need to import natural gas. [2] The question is no longer whether we can become "energy independent," it's to what extent we can reap the economic gains of the energy resources in which we are now awash. The economic case is hard to argue: oil and gas sector employment grew by 40% from 2007 through 2012, [3] blowing away the anemic 1% growth in overall private sector employment during the same period.

The sector could grow even more as American energy companies seek to meet enormous global demand, often at prices far higher than in the U.S. market. In 2012, the price of natural gas in Europe was four to six times higher than in the U.S.; prices in Asia were five to six times higher. [4] And the bounty keeps coming: U.S. natural gas production is expected to rise 11% and oil production 22% between 2012 and 2019. [5] If that weren't enough, the U.S. is sitting on an enormous amount of coal; domestic coal reserves are larger than oil and gas combined. [6] Coal consumption is expected to increase globally, albeit at a slower rate of 1.3% annually through 2020, led by China and India. [7] This trend drove U.S. coal exports in 2011 to their highest level in two decades. [8]

Hoping to take advantage of the favorable global economics, energy companies are applying to build new export terminals [9] in the U.S. and are even working to lift a nearly 40 year-old ban on oil exports. [10] There are more than twenty proposed liquefied natural gas export terminals wending their way through the Federal Energy Regulatory Commission

(FERC) approval process. [11] And though market dynamics are tricky for coal exports, changing economics may make coal export terminals a force in the future. [12]

Because of carbon pollution, business-as-usual can't be a long-term strategy for the fossil fuel industry

Given the atmospheric impact of these fossil fuels, unchecked global growth is untenable. Even as nations continue to consume vast quantities of fossil fuels, their governments are increasingly focused on avoiding an atmospheric load of carbon dioxide that the planet can't take.

In the U.S., the EPA is in the process of drafting performance standards for power plants that could eventually spell the end of many of the dirtiest coal plants. [13] Individual states, like California, are creating ever more stringent greenhouse gas (GHG) rules that could affect natural gas. [14] Domestic coal use has been in steady decline due to competition from lower-priced, cleaner natural gas and stricter pollution regulations. From 2011 through 2013, 288 coal-fired power plants were retired. An additional 329 of the remaining 903 coal plants—one third of the fleet—are unable to compete with cheap natural gas and wind-generated electricity and may be shut down. [15]

Overseas, developed countries are increasingly adopting cap-and-trade systems, as in the European Union, [16] or a carbon tax, as Australia has done, [17] which makes fossil fuels more expensive and reduces demand. Even China, which burns half of all the coal consumed in the world and was the largest consumer of coal in 2012, may be changing its ways. [18] China released a plan in late 2013 to reduce air pollution by curbing the output of coal-fired power plants and use of high-polluting vehicles. [19] China is even considering a nationwide cap-and-trade program for carbon. [20] Air pollution has become a major issue in China, where it took an estimated $112 billion toll on the economy in 2005 and has worsened dramatically since then. [21] As environmental advocate Ma Jun

explained to *The New York Times*, the answer to the growing pollution crisis in China is "is to curb coal burning." [22]

This adds up to a murky longer-run picture for traditional fossil fuel combustion and the role of U.S. fossil fuel exports. If China and other nations act in earnest to reduce coal and oil use, the future for fossil fuel exports may be limited unless new technologies are commercialized to curtail pollution. The appetite for new technology is there; the question is which nation will provide it.

Clean energy innovation for fossil fuels is in crisis due to a lack of funding

Global energy trends present a confusing picture that is full of seeming contradictions, but a step back makes one thing clear: for environmental and economic reasons, fossil energy needs major innovation to retain its place in the energy future our planet depends on. The world needs "all of the above," but not the way it looks today. Realistically, we need *both* alternatives to traditional fossil fuels *and* cleaner-burning versions of what we have now. But innovation takes money, which is in short supply in this fiscal environment. Even worse, *how to invest* in clean energy research and development is not even under serious discussion in today's political environment.

Public investment can yield major changes in the energy landscape. While the Manhattan Project's impact on the development of civilian nuclear energy is a good example, it doesn't take a time machine to find another. Using revenues from a fee paid by industry, the Gas Research Institute invested more than $500 million in R&D that eventually led to the hydraulic fracturing technology responsible for the current boom in U.S. gas production.

Consider the case for investment in coal. Despite the fact that our domestic coal reserves are massive, very few new coal plants are on the drawing board in the U.S. [23] In part, concerns about future environmental regulation dissuade

developers. If we could add carbon capture and storage (CCS) to a new, supercritical coal plant, we could ameliorate those concerns. And there could be a double benefit for the coal industry: even if CCS for coal did not appear economically viable for the U.S. market, the potential for its deployment in China would hold promise for American companies.

To date, however, the U.S. investment in CCS R&D has been extremely paltry compared to the economic and environmental benefits the technology could yield. [24] The minimal, stop-and-start investment in CCS to-date means the technology currently adds 35% to costs. [25] If we continue on the current path and tried to replace one in ten coal plants in the U.S. today (building 30 new ones) [26] with CCS, we would have to invest $25 billion more to capture 50% of the carbon dioxide emissions. [27] Consistent investment in this technology would yield results, and over time the cost would decrease: as with most emerging technologies, the more CCS is deployed, the lower the cost of deployment will be as we learn how to install these plants a few at a time over several years. [28]

Natural gas is in a different place in the U.S. and global markets. The Gas Technology Institute (GTI), formerly the Gas Research Institute, continues to identify opportunities to reduce the carbon emissions of natural gas development and use. In the late 1970s, GTI and a handful of other private and publically funded research organizations deployed the original funding for fracking research and development. Unfortunately, total R&D investment by GTI has fallen from a high of $212 million in 1992 to less than $70 million in 2013. [29]

The Department of Energy Fossil Fuels Program also lacks sufficient funding for research on how to make natural gas cleaner. Their annual budget for natural gas research is roughly $5 million, the bulk of which is not spent on efficiency or emissions reductions in the production, transmission, or distribution of natural gas. [30] With further investment, these facilities could accelerate their work on

improved pipeline materials to reduce methane leaks, advanced repair methods to address pipeline leaks more cost-effectively, and a wide variety of technologies to increase the efficiency of natural gas-fired power plants, boilers, HVAC equipment, and vehicles.

There are similar opportunities to develop emission-control technologies for petroleum refineries. The U.S. refining industry emits 173 megatons of CO_2e each year—roughly equivalent to the emissions from 50 coal-fired power plants. Advances in boilers, process heaters, cracking units, and venting processes could allow for substantial reductions in greenhouse gases in the long term.

Despite these opportunities—not just to cut emissions in the U.S., but to develop transformative technologies for export—we're just not investing in energy R&D. The U.S. energy sector invests only 0.23% of its revenue in research and development, and federal R&D spending is only half of what it was in 1980. [31] Even though energy accounts for nearly 9% of U.S. GDP, or about $1.4 trillion, its R&D funding amounts to only about $5 billion. By contrast, the defense sector receives an estimated $80 billion in R&D funding. [32] This is part of a bigger picture: from 2010 to 2013, federal R&D as a percentage of the U.S. economy dropped roughly 35%. Over the last 10 years, non-defense R&D spending has declined from $68.1 billion to $61.1 billion. [33]

If we are going to change something big in our energy sector, we need a big change in our energy R&D funding priorities.

THE SOLUTION

Use Fossil Fuel Exports to Fund Development of a Cleaner Energy Future

The U.S. has plenty of fossil fuels for the global market. And while individual export infrastructure battles may be won or lost, it's hard to imagine that the nation will simply take a pass on the economic opportunity they represent. Still, as

David Eyton, BP's head of research and technology notes, "We are running out of the carbon-carry capacity of the atmosphere." [34]

There is a way to thread this needle, and it doesn't require Uncle Sam's wallet. By placing a small public goods fee on exported fossil fuels, the U.S. could finance game-changing innovation in the development, deployment, and commercialization of zero or low-carbon fossil fuel technologies. This approach would provide critically needed funding for clean energy. We know this because it has been done before. In the 1970s, FERC approved a surcharge on interstate natural gas pipelines to fund the Gas Research Institute to help find new sources of natural gas for the U.S. [35] Complementing other research, development, and deployment at DOE, [36] this was part of a set of public-private partnerships that developed hydraulic fracturing and horizontal drilling—the very technologies that made today's energy bounty possible.

Billions, not millions, of dollars for clean energy innovation

An export fee has the potential to raise billions of dollars in revenue annually. Such a fee would be small compared with the economic value of the exports. This avoids materially affecting the economics of these sizable investments, and keeping the fee small while directing the funds back at the sector they come from ensures compliance with World Trade Organization rules. [37] At the same time, this fee would only apply to exports and would not increase energy costs on American companies and consumers.

The fee could be structured a number of different ways. If implemented on an energy basis, a fee of $0.18/million British Thermal Units (mmBTU) in 2012, [38] decreasing to $0.15/mmBTU by 2025, it would yield an estimated $2 billion annually. [39] At this level, the fee would have added 3.9% to the 2012 price of exported coal, 3.3% to the price of exported natural gas, [40] and less than 1% to exported gasoline—amounts that are well within the price range required for

economic viability for these export terminal and infrastructure investments. [41] With natural gas prices in Japan and Europe three to four times more expensive than in the U.S., [42] and coal trading on the international markets for between 30% and 50% more than it does in the U.S., this export fee would not significantly influence the viability of U.S. export terminal projects. [43]

Though it would face a tougher path in our Congress, the fee could alternatively be based on the carbon content of the fuel. Under this system, a modest price of $10/ton [44] would have raised more than $1 billion from coal and natural gas exports in 2012. [45] Again, these fees would add marginal costs to the fuels, raising prices less than 5% for most fossil products, maintaining their dominant position in the global energy market.

Making cleaner American energy

With the kind of investment outlined above, it's possible to imagine commercial-scale CCS for coal and gas. It's possible to imagine highly efficient manufacturing processes, captured fugitive emissions, and an end to dangerous waste products. It's possible to imagine things that are presently only the gleam in an engineer's eye.

Importantly, ***these technologies themselves***—not just the fuel they run on—could become a lucrative American export. It would be especially attractive for the rapidly growing economies of the developing world that are just now beginning to grapple with the impacts of pollution. This presents enormous opportunities for American manufacturers, and could ensure long-term markets for both domestic fossil fuels and advanced American energy technologies.

The money needn't spawn endless bureaucracy, and it could be used to leverage even larger private investment. The revenue could support an independent domestic energy finance institution like an infrastructure bank. Connecticut, New York, and California have launched state banks using

minimal public funds that have unleashed greater private capital for clean energy projects. [46] But unlike the state-specific banks that have been launched to date, any clean energy or infrastructure bank financed with funds derived from export fees should include natural gas, coal, and advanced nuclear projects.

This presents an opportunity for traditional energy states. A proposal by Senators Mary Landrieu (D-LA) and Lisa Murkowski (R-AK) to share offshore oil production revenue between the federal government and states, with the additional state funding going to clean energy R&D, offers one model. The states most dependent on the coal, oil, or natural gas sectors would be among the most impacted by the changing future energy economy. With funding from an export fee, those states could take advantage of their energy expertise and skilled labor and put themselves on the path to benefitting from cleaner energy technologies.

Conclusion

The new U.S. fossil fuel boom has led to a debate that seemed unthinkable only five years ago: the exporting of not only coal, but also domestic natural gas and oil. The global demand for fossil fuels speaks to an important truth: in an increasingly carbon-constrained world, the role for coal, natural gas, and oil must be a sustainable one. The technologies to accomplish this are not ready today, but they are achievable and urgently needed. By placing a modest fee on exported fossil fuels, the U.S. could fund the research, development, and deployment we need to get these technologies to market. This would be a victory for climate and an important step toward the eventual elimination of carbon emissions.

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