Subcommittee on Environment and Climate Change

Hearing on, "Building a 100 Percent Clean Economy: Pathways to Net Zero Industrial Emissions"

Mr. Bob Perciasepe

October 25, 2019

The Honorable Paul Tonko (D-NY)

1. Several Members asked about the role for a pollution pricing program to reduce emissions cost effectively. There seems to be agreement that coverage of energy-intensive, trade exposed (EITE) industries must be well-designed and thoughtful about reducing potential competitiveness and leakage risks.

a. How might a pricing program manage those risks?

Every major carbon pricing program on the globe has provisions for protecting EITE industries (and according to the World Bank, as of April 2019 there were 57 carbon pricing initiatives implemented or scheduled for implementation). These programs use a variety of policy tools including: free allocation, output-based allocation, exempting sectors, phasing in sectors, reducing other taxes, grants/tax credits for the use of clean technology and rebates. Border adjustments have recently received much attention as an option with climate policy but have not been widely used to date.

California, which has a carbon price and an energy system connected to several states that do not have a similar program, addressed the competitiveness issue by creating something similar to a border adjustment when they required buyers of imported electricity to also obtain and surrender allowances. California's low-carbon fuel standard (where fuels are produced and imported into the state), also has provisions that are similar to a border adjustment, to protect in-state fuel producers. With these two provisions, California has taken a sector-specific approach to addressing competitiveness and potential carbon leakage that might arise from their carbon regulations on electricity and fuel rather than a single border measure to address all potential leakage that might arise from their economy-wide approach. To address competitiveness implications in other sectors, California uses a hybrid approach of fixed-sector benchmarking and output-based allocation. This approach rewards firms with in-region production with free allowances, while at the same time sending a financial signal through its carbon price that GHG emissions should be reduced.

In the European Union Emissions Trading Program (EU ETS) – a pan-continental cap-and-trade program, energy-intensive and trade exposed (EITE) firms were phased-in to the program and today receive a higher proportion of free allowances than other industrial sectors, based on an evaluation of need and performance benchmarking. In addition, because their program is pan-continental, linkage between programs such that companies have access to a common carbon market also provides a degree of protection from carbon leakage.

In addition, carbon pricing is rarely a sole climate strategy. Often other policies aimed at reducing the cost of low-carbon technologies, increasing renewable energy generation, funding low-carbon technology development, and/or improving energy efficiency, are combined with carbon pricing to form a suite of climate policies. This is what we recommend in our soon to be released report on what it will take to decarbonize the U.S. economy called Getting to Zero: A US Climate Agenda. While these other policies may not be directly aimed at protecting against competitiveness impacts, they can help firms transition to lower-emitting technologies, reduce emissions, and indirectly reduce impacts by lowering the cost of compliance.

b. Do you have recommendations on the policy design decisions that should be considered under an output-based allowance allocation program for EITE industries?

For output-based allocation (OBA), energy-intensive and trade exposed (EITE) firms are allocated emissions credits based on their level of output. The number of credits or "allowances" they get typically depends on a sector-specific performance evaluation, which sets a benchmark for tons of greenhouse gas (GHG) emissions per unit of output. Effectively, firms get an amount of credits that corresponds to what their total emissions would have been if their emissions intensity of production had matched the benchmark. They then must buy credits or allowances and pay the carbon price on the emissions that they don't have enough credits to cover. The worst performers end up paying more to cover their actual emissions and the better performers end up paying less. The firms that can beat the benchmark end up with more credits than they need, which they can then sell to other producers at a profit. Firms have an incentive to reduce emissions by improving their emissions performance, but not by reducing production.

A key decision is the sector-specific performance benchmark. Another key decision is which companies are eligible for the EITE provisions. Finally, such a provision is best implemented in a targeted, temporary and transparent manner. Not every company should be eligible to receives EITE protection. Also an end date or at least a date specific for reevaluation should be determined. Finally, the formula for who is eligible under the provision for EITE and how the benchmark is established, should be clearly and transparently spelled out.

The Honorable John Shimkus (R-IL)

1. Raising energy and production costs in energy intensive or trade exposed industries can be harmful for communities in terms of lost jobs and economic output, especially if the developing world is unable to make the same changes to their energy and manufacturing systems.

a. What are the risks of leakage of U.S. industrial jobs to other nations if cost of energy or processing is increased compared to international competitors?

For subsectors that are energy-intensive and trade-exposed—i.e., their products are traded globally—the costs of decarbonizing may pose a potential competitive disadvantage which might lead to increased imports and/or production moving to countries where greenhouse gas standards are not yet as stringent, resulting in carbon leakage. Researchers who have examined the degree to which carbon pricing has an impact on corporate decisions about where to location or invest have consistently found, however, that a carbon price is only one factor among many that influence these decisions and is not the most important. These same studies have concluded that other variables—corporate tax rates, wage rates, labor availability, infrastructure, geographic location, cost of capital, exchange rates, among others—exert a stronger influence than carbon pricing on most industry decisions to locate or invest. The same is true of other forms of environmental taxation.

The concern, however, is real and one that policy makers must deal with prior to program enactment and implementation. Fortunately, there are a range of policy tools to mitigate the economic impacts that may be foreseen. The increased cost of energy or processing can largely be offset through well-considered policy design. Empirical evaluations of existing carbon pricing programs have repeatedly demonstrated that impacts on industry have overall been small—although a few sectors have seen impacts and additional measures have been required. Because of this, an economy-wide carbon pricing program should include provisions to protect against these impacts (e.g., free allocation of allowances in a cap-and-trade system, tax credits for clean technology transition, rebates for carbon tax system and/or border adjustments based on best in class benchmarks). All of these policy elements should be reexamined periodically for their effectiveness and necessity.

Moreover, an international climate agreement, like the Paris Climate Agreement, that requires action by developed and developing countries alike to reduce greenhouse gas emissions is, in the long run, arguably the most effective way to address leakage and ease competitiveness concerns. Such an agreement can actually strengthens U.S. competitiveness by expanding markets for innovative clean technologies where U.S. companies are well positioned to lead.

b. What are the impacts on technical skills, supply chains, R&D and innovative capacity in U.S. manufacturing and industries exposed to relatively high energy or production costs?

Electricity and other energy purchases represent a large proportion of total production costs for EITE firms. Often more efficient firms and facilities, those that are able to produce a ton of goods using a lower quantity of electricity and/or energy have a competitive advantage.

Also, it is important to note that high energy costs can also stimulate innovation. Without high and volatile natural gas prices 20 years ago, investments in horizontal drilling to increase supply might never have happened. Furthermore, in order to manage energy costs, firms can, and will invest to become more energy efficient and research to develop new, less-energy intensive, lower-emission processes will proceed because there is value in that research. Industrial tax rebates, training and R&D support can help support these efforts, while preserving and enhancing technical skills in industrial subsectors, and maintaining existing supply chains. Additionally, lower production costs from implementing R&D breakthroughs can spur the construction of new industrial facilities and all the accompanying economic benefits.

c. What policy options have been proposed to prevent leakage, to what extent have they been examined for impacts on specific industries, and to what extent will this require international cooperation? Please elaborate.

Most of the carbon pricing proposals introduced in the 116th Congress include some form of a border adjustment to address carbon leakage. A carbon fee could be placed on imported covered fuels, imported carbon-intensive goods, or certain industrial sectors (e.g., manufacturing sectors, metal ores, soda ash, and phosphate processors). A refund could also be issued on the export of carbon-intensive goods. The fee could be reduced (or not applied) to countries that have comparable policies to reduce greenhouse gas emission reduction programs.

These provisions could be tailored to apply to countries with less stringent greenhouse gas emission reduction targets or countries that produce the same good, but less efficiently (i.e., higher emissions per unit). These provisions should also be phased out over time as more countries develop comparably stringent programs

While border measures have not been widely used, studies suggest that they can be very effective. Other policy tools including output-based allocation, free allocation, and benchmarking have been more widely used and they have been studied extensively, particularly for the European emission trading program. Impacts on cement, steel, glass, refining and many others have been studied including whether geographic location matters. Notably, if impacts were detected they were relatively small but again—the E.U. has protections built into their program. Once recent instance, however, between electricity generators in and out of the E.U. where carbon leakage has been identified is now the subject of consideration and further protections are likely to be forthcoming.

Multinational cooperation on carbon pricing and trade issues would likely provide a more durable framework, allowing a sustained ratcheting down of global emissions.

2. What work has been published to your knowledge of the economic costs, the impacts on prices and supply, or employment impacts from reducing emissions in the industrial sectors? What work has been done to evaluate the legal, economic, and socio-economic impacts of deep decarbonization of the industrial sector?

A large body of research has examined the economic costs, the degree of cost-pass through and employment impacts from carbon pricing on the industrial sector. The World Bank's 2019 *Report on the High-Level Commission on Carbon Pricing and Competitiveness* provides an overview of these studies.

- World Bank Group. 2019. *Report of the High Level Commission on Carbon Pricing and Competitiveness*. World Bank Group, Washington, D.C. Sept. 2019. https://openknowledge.worldbank.org/bitstream/handle/10986/32419/141917.pdf.

While a variety of studies have examined the potential economic impacts of economy wide decarbonization, we are not aware of studies that have looked at the legal or socio-economic impacts.

a. Would you please list pertinent studies?

- Arlinghaus, J. 2015. "Impacts of Carbon Prices on Indicators of Competitiveness: A Review of Empirical Findings." Environment Working Paper 87, OECD (Organisation for Economic Cooperation and Development), Paris, March 27, 2015. Accessed October 15, 2018.https://doi.org/10.1787/5js37p21grzq-en.

- Dechezleprêtre, A., D. Nachtigall, and F. Venmans. 2018. "The Joint Impact of the European Union Emissions Trading System on Carbon Emissions and Economic Performance." Economics Department Working Paper 1515, OECD (Organisation for Economic Co-operation and Development), Paris. December 14. Accessed June 20, 2019.https://www.oecdilibrary.org/docserver/4819b016en.pdf?expires=1563212682&id=id&accname=guest&checksum=BEE8052A54050DE45D1742FEB47BC9B4.

- Jaffe, A., S. Peterson, P. Portney, P. and R. Stavins. 1995. "Environmental Regulation and the Competitiveness of U.S. Manufacturing: What Does the Evidence Tell Us?" *Journal of Economic Literature* 33, no.1 (March): 132-163. Accessed November 10, 2018. https://scholar.harvard.edu/stavins/publications/environmental-regulation-and-competitiveness-us-manufacturing-what-does.

- Oberndorfer, U., Alexeva-Talebi, V. and Loschel A. 2010. "Understanding the Competitiveness Implications on Future Phases of the EU ETS on Industrial Sectors." Discussion Paper 10-044, ZEW (Leibniz Center for European Economic Research), Mannheim, July 2010. Accessed September 30, 2015. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1649445&download=yes.

- Reinaud, J. 2008. "Issues behind Competitiveness and Carbon Leakage: Focus on Heavy Industry." Information Paper, IEA (International Energy Agency), October 24, 2008. Accessed October 15, 2018. https://www.iea.org/publications/freepublications/publication/Competitiveness_and_Carbon_Leakage.pdf.

3. According to a recent report by the Energy Futures Initiative, many "subnational decarbonization strategy and road-map reports contain insufficient detail for establishing effective and efficient implementation policies and programs."

a. What should be done to develop a more in depth understanding of the cost and economic impacts of state and regional (subnational) decarbonization policies, particularly in the industrial sector?

Given its tremendous diversity, its heavy reliance on large quantities of thermal heat, and the fundamental nature of many core manufacturing process, the industrial sector is especially challenging to decarbonize. Economy-wide carbon pricing, as recommended above, can drive some emission reductions across the sector, but a wide range of complementary policies are also needed. As we outline in our upcoming report *Getting to Zero*, priorities over the next decade include developing innovative lower-carbon manufacturing processes, setting standards to drive energy efficiency, electrification and other forms of fuel switching, and safeguarding the competitiveness of energy-intensive, trade-exposed sectors.

Some states and regions are leading the way on industrial decarbonization efforts, notably California, and the province of Alberta. A landscape analysis of subnational decarbonization efforts can help identify and assess existing policies. Largely, these decarbonization policies reflect regional priorities and differences (e.g., regional differences in carbon-intensity of power generation mix). An analysis of programs would likely find that states have varying definitions of clean energy, decarbonization targets, and programs to achieving these goals. To orient companies toward decarbonization, the federal government should undertake a benchmarking process to establish intensity-based greenhouse gas objectives for the major sub-industries. The benchmarking process, informed by programs already implemented in Canada and Europe, would highlight best practices and promote industry-wide learning. Benchmarking best practices in each subsector will provide ongoing incentive and flexibility for companies to pursue their most affordable decarbonization options. These intensity-based objectives could also be used to determine how a company or facility is treated within the economy-wide carbon pricing system and for purposes of competitiveness protections; in the absence of economy-wide pricing, the benchmarks could serve as the basis of mandatory performance standards that can be traded within and across sub-industries.

In addition, harmonizing definitions, best in class benchmarks and a review of successful programs within and outside of the U.S. would provide a better understanding of decarbonization efforts and successful policies.

Finally, the capture and use of carbon dioxide (CCUS) will be needed in the industrial sector because of the process emissions. The options and incentives needed for deployment in the industrial sector is not well studied and a roadmap for its deployment should be created.