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Congressional Testimony of

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Additional Questions for the Record

The Honorable Paul Tonko (D-NY)

1. What recommendations do you have for NIST, in consultation with DOE, EPA, or other Federal agencies, to develop industrial product performance standards to encourage greater use of low-emissions products?

NIST should work to augment existing standards or develop new standards for performance of industrial products. Performance based standards sometimes already exist but are not used or are not current given rapid technology evolution. I recommend these specific actions:

- *Assess landscape: NIST, in partnership with DOE, should identify which technology pathways are most mature, have received substantial work already, and have highest promise. Based on that, NIST should (a) generate a plan and timeline to develop and deliver performance-based standards and (b) fast-track those identified as near-term opportunities.*
 - *Develop testing protocols: NIST should develop a transparent and open process to test the performance industrial products. They should do so in partnership with DOE and Dept. of Transportation.*
 - *Develop LCA process: In parallel with the performance-based testing protocols, NIST should formalize a peer-reviewed methodology to assess life-cycle of all industrial decarbonization pathways and technologies. This MUST include a new effort to gather relevant data and share through an open-access system. NOTE: Industry is developing automated approaches to this task, which should be explored.*
 - *Explore international partnerships: NIST should work with the ISO, the World Business Council on Sustainable Development and similar institutions to build partnerships with similar institutions in other countries and to expedite pathways to international adoption of standards.*
2. While the hearing focused on cement, what other industrial goods would benefit from the development of low-emissions standards?



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Many economic sectors could benefit from low-emissions standards on a few important industrial products. These products include glass (flat, container, architectural), metals (iron, steel, aluminum, new alloys), chemical feedstocks (ammonia, methanol, ethylene, carbon black) and finished chemical products (polyethylene, PVC, lubricants). In particular, steel would benefit from separate new standards for both recycled and for new production, and provide other manufacturing customers (e.g., auto and government purchasers (fed, state, and municipal) with important information they could use to purchase greener products.

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 job loss or 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?

Leakage is always a risk as a function of many factors, including costs of labor, environmental stringency, and energy costs. If decarbonization approaches were to yield substantially higher product costs for U.S. industrial manufacturers, policy steps would be needed to help prevent leakage. Government procurement policies, tax policies, border tariffs, and other financial incentives (e.g., contract for difference) would be possible ways to avoid leakage.

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

High quality skilled labor, strong supply chains, and other factors play important roles in maintaining muscular U.S. industrial production and the jobs associated with them. Strong and dynamic government support for R&D and innovation in novel and low-C manufacturing approaches will help maintain U.S. leadership and competitiveness. As other countries increase their investments in labor skills and innovation, it is essential that the U.S. make investments that serve to keep American industry strong.

- 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 collaboration? Please explain.

In my response to question 1a above, I noted that government procurement policies, tax policies, border tariffs, and other financial incentives (e.g., contract for difference) would be possible ways to avoid leakage. In my original testimony, I wrote that one swift and robust policy was for the U.S. government (as well as state and municipal

government) to develop low-C procurement standards. This would provide secure customers to key industries, stimulate private sector investment in innovative approaches, and pass muster regarding WTO and IMF restrictions. At the Center on Global Energy Policy at Columbia, we are beginning analysis on how to design procurement policies and other policies (e.g. tax and trade policy) to minimize cost to consumers and maximize benefit to companies, workers, and delivering cleaner products to market.

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. Would you please list pertinent studies?

This is not an area of my expertise, so I can only provide limited assistance. Most of these studies do not provide deep and quantitative responses to your question but do discuss the issues raised by question 2.

1. Energy Transition Commission, 2018, "Mission Possible: Reaching net-zero carbon emissions from harder-to-abate sectors by mid-century, Report," <http://www.energy-transitions.org/mission-possible>
2. The European Chemical Industry Council (CEFIC), "European chemistry for growth: Unlocking a competitive, low carbon and energy efficient future," CEFIC (2013), https://cefic.org/app/uploads/2019/01/Energy-Roadmap-The-Report-European-chemistry-for-growth_BROCHURE-Energy.pdf
3. Materials Economics, 2019, Industrial Transformation 2050: Pathways to net-zero emissions from EU heavy industry, 208p. <https://materialeconomics.com/publications/industrial-transformation-2050>
4. Mckinsey, 2018, Decarbonization of the industrial sector: the next frontier. <https://www.mckinsey.com/industries/oil-and-gas/our-insights/decarbonization-of-industrial-sectors-the-next-frontier>
5. [The role of steel manufacturing in the global economy](#), Oxford Economics (2019).
6. World Steel Assoc., [Steel's contribution to a low-carbon future](#) (2018)
7. Third way, [Industry Matters: Smart Energy Use is the Key for U.S. Competitiveness](#) (2018)
8. Fleschen, D. [A possible future of steelmaking: Hlsarna](#). Market Steel (2018).
9. Department for Business, Energy & Industrial Strategy, "Contracts for Difference: Policy Paper," [Gov.UK](https://www.gov.uk/government/publications/contracts-for-difference/contract-for-difference) (2019), <https://www.gov.uk/government/publications/contracts-for-difference/contract-for-difference>
10. US Department of Commerce, International Trade Administration, Steel Import Monitoring and Analysis, "Global Steel Report," [Global Steel Trade Monitor](#) (2018), <https://www.trade.gov/steel/pdfs/global-monitor-report-2017.pdf> at pp. 3 and 11
11. Jennifer Hillman, "Changing Climate for Carbon Taxes: Who's Afraid of the WTO?," [German Marshall Fund of the United States: Climate & Energy Paper Series 2013](#) (2013), <https://www.scribd.com/document/155956625/Changing-Climate-for-Carbon-Taxes-Who-s-Afraid-of-the-WTO>

12. Joost Pauwelyn, “Carbon Leakage Measures and Border Tax Adjustments Under WTO Law,” *Social Science Research Network (SSRN)* (2012), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2026879
 13. Adele C. Morris, “Policy Brief: Making Border Carbon Adjustments Work in Law and Practice,” *Tax Policy Center: Urban Institute & Brookings Institution* (2018), https://www.taxpolicycenter.org/sites/default/files/publication/155511/policy_brief_making_border_carbon_adjustments_work_in_law_and_practice.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 costs and economic impacts of state and regional (subnational) decarbonization policies, particularly in the industrial sector?

There are several steps the U.S. government should consider to help develop a richer understanding of options, trade-offs, and costs associated with industrial decarbonization

- *Assembling and sharing data: As I wrote in my testimony, simple data associated with industrial production of many products is not aggregated, available, or shared. It is essential for data on industrial energy use, heat use, production, emissions, and labor to be gathered in one place. U.S. DOE (e.g., EIA) could undertake this function, ideally in partnership with agencies like EPA, Commerce, and Labor*
- *New analytical tools: The conventional energy analytical models used by most scholars and economists do not represent industrial energy well. They do not represent technology options well. The U.S. Government should support the development of a new generation of analytical tools that can assess trade-offs and options as well as the potential benefits to trade, labor, and the environment.*
- *Policy analysis: Even with data and new analytical tools, scholars and government experts should develop and assess policy models. Decision makers in Washington fundamentally lack the information needed to craft robust, comprehensive policy for industry or to advise what actions would serve best in international trade discussions and negotiations.*
- *Pursue sectoral international agreements: As mentioned in my written testimony, the U.S. Government should consider how to convene and drive sector specific agreements for GHG reductions. This could be led by Commerce and State with support from other agencies. Such agreements are needed to create consensus within industry, to place all countries on a level playing field, and to determine mechanisms for verification and compliance. The Montreal Protocol could serve as a model for such an approach.*