June 24th, 2024

Hon. Jennifer Granholm, Secretary of Energy
U.S. Department of Energy

Mr. Avi Schultz, Director
Industrial Efficiency & Decarbonization Office (IEDO)
U.S. Department of Energy

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RE: Request for Information: *Transforming Industry: Strategies for Decarbonization* (DE-FOA-0003363)

Submitted electronically via email to Transforming-Industry@ee.doe.gov.

Dear Madam Secretary Granholm:

The American Chemistry Council (ACC) appreciates the opportunity to comment on the *Request for Information (RFI): Transforming Industry: Strategies for Decarbonization*. ACC represents a diverse set of companies engaged in the business of chemistry – a $639 billion enterprise. ACC members work to solve some of the biggest challenges facing our nation and our world, driving innovation through investments in research and development (R&D) that exceed $13.4 billion annually and capital investments of over $25 billion. The chemical sector is incredibly diverse, touching every sector of the nation's economy at every level of the value chain.

Our members are key stakeholders and partners in the nation's drive toward a lower emissions future, both as heavily regulated entities in a hard-to-abate sector and as providers and enablers of the materials, products, and technologies needed to reduce emissions across the larger economy. It is important to note that many of the base chemicals and chemical products manufactured by ACC members and utilized throughout the economy use carbon as a building block. As such the chemical industry generally uses more-specific terms "emissions reductions" and "emissions abatement" when referring to reductions to greenhouse gas emissions, rather than the more general term "decarbonization," which can have multiple meanings and applications.

Please find ACC's responses to pertinent RFI questions below:

Category 1: Industrial Decarbonization Challenges, Barriers, and Cross- Cutting Strategies

1A.2) Which barriers do you feel are most important to address first?

ACC sees regulatory and permitting reform and substantial investment into pipelines and other infrastructure to connect lower emissions energy and manufacturing value chains and markets as a priority as there may be risks associated with early adoption of unproven technologies. That coupled with the significant capital and operating budget constraints creates an unstable environment making it difficult for companies to make investments into new technology abatement pathways.

1A.3) How would you recommend government engage to address these (or other) industrial decarbonization barriers?

Increase interagency coordination and sector specific engagement to bring government agencies together. Continue to look for and develop opportunities to consult with industry and consider streamlining or clarifying the process for interested stakeholders to seek guidance, technical support, or questions. Often times, it is confusing or difficult to ascertain which government programs or grants are optimal for stakeholder projects.

1A.4) Aside from cost, what vulnerabilities/challenges do facilities face when adopting new technologies?

As noted in the question, the cost of technology adoption is always a challenge, as even the best technologies will fail if companies cannot compete in the global marketplace, shifting production to higher emission markets. Looking beyond the economic considerations, ACC continues to highlight the urgent need to address the lack of adequate infrastructure and uncertain regulatory landscape to encourage increasing investment and scaling on newer emission abatement pathways. In tandem with cultivating a stable regulatory environment is the need to create certainty regarding incentives and accessibility challenges. Many of the newer technologies may not be mature enough for widespread adoption in the near term and the uncertainty around tax incentives for certain technologies may have a chilling effect on the growth of newer technologies.

1A.5) What are the blind spots or unknowns when transferring technology from the bench-scale to commercial scale?

While technology developers would be familiar with the intricacies of their product, when upsizing an entire operation there are bound to be unforeseen factors due to the pervasive nature of the business of chemistry across the entirety of the value chain.

At a broader level, ACC sees market demand, availability of critical infrastructure, reliable access to supply chain inputs and an uncertain regulatory framework as blind spots that chemical manufacturers continue to face when evaluating emissions abatement strategies and investments.

1B: Cross-Cutting Decarbonization Strategies

1B.1) What are the most impactful cross-cutting and systems-wide strategies needed to decarbonize industry and why?

Reviewing and streamlining the permitting processes for lower-emissions technologies (e.g., hydrogen, carbon capture, and zero-emissions electricity) and providing more clarity on tax incentives for reduced emissions fuel sources and feedstocks coupled with policies that continue to strengthen and maintain strong domestic supply chains.

1B.3) Given the breadth of available and emerging technologies, which cross-cutting technologies are most in need of RD&D funding?

ACC supports an all-of-the-above technology strategy rather than picking winners and losers. Evaluating technologies that can work but at different scales, with different chemistries, and in different regions with access to key resources and inputs. One particular area of concern is the pending final guidance and eligibility requirements for the 45V Clean Hydrogen tax credit. ACC has supplied comment to Treasury and DOE regarding the need to ensure the final 45V tax credit guidance incentivizes investment in all forms of clean hydrogen production technologies that can meet the GHG emissions standards, regardless of the energy source, feedstock or process. DOE should consider providing a pilot tech center for clean hydrogen technologies similar to the National Carbon Capture Center.

1B.7) What approaches are needed to reduce or overcome the risk of deploying new crosscutting technologies, catalyze uptake, and accelerate technology adoption?

ACC supports decoupling environmental permitting from federal social and economic development policy outside the scope of applicable public health, safety, and environmental law. These issues are important societal issues to address in their own right, and they should be addressed through policy mandates specifically designed to address these issues without undermining or impeding work on other time-sensitive policy priorities.

Category 2: Framework for Industrial Decarbonization Pathways

2.1) How does your organization approach planning for different pathways to decarbonization?

The business of chemistry is large and varied in terms of manufacturing footprint, emissions profile, resource needs, and cost to transform operations when necessary. ACC works with members to identify the broader array of pathways and supporting policies needed for solution adoption and development of markets for chemical climate solutions. Different members have different approaches, but what is consistent is that chemical manufacturing facilities are constantly evaluating emission reduction options.

2.2) Given the uncertainty around considerations like cost and regulations, how does your organization make decisions under such uncertainty?

Again, different chemical manufacturers will approach cost and regulatory uncertainty differently, while some may be able to make a reasonable assumption in their project plans, others may opt to abstain or wait from engaging further or investing capital into the project until such a time that the regulatory uncertainty is improved.

2.3) What strategic frameworks do you find helpful for your organization's decision making?

Since there is significant variance amongst chemical manufacturers, no single framework exists that appropriately satisfies or addresses all chemical-centric nuances found in the chemical manufacturing sector.

2.4.3) Is anything missing in the decision tree?

Please include inflection points for access to necessary inputs and value chain infrastructure as they are requisite components of a successful chemical manufacturing project.

2.5) How can we differentiate "bridge" investments that produce emissions savings in the near/medium-term but are at least neutral for the path to net-zero emissions (e.g., installing new electrified equipment) versus the "dead-end" investments that produce emissions savings in the near/medium-term but delay or deviate from the path to net-zero emissions (e.g., efficiency improvements to fossil-fuel based systems), often causing stranded assets?

Emissions reduction requires a holistic and long-term approach to achieving 2050 net-zero outcomes for a specific industrial process and product, including an understanding of the early technology, market, and infrastructure investment evolutionary steps required to build a technologically, physically, and economically viable path net-zero systems. There is no simple way to determine which technology pathway will work without understanding the market specific opportunities and operational constraints individual manufacturers may face.

Indeed, the question itself appears flawed, as it implies that fossil-fuel based systems would be inherently "dead-end" technologies on the road to a longer-term zero-emissions economy. This assumption is both misguided and counter-productive, discouraging early investments in systems that may be critical elements of an evolving, functioning lower-emissions economy that works for all regions.

In other words, determining whether a specific technology investment is a "bridge investment" versus a dead-end investment requires consideration of multiple factors, as well as predictions as to the future legal, financial, technology, market, and resource conditions. ACC defers to its individual members to speak to which metrics they may use in making their case-by-case go/no-go decisions on projects.

2.7) What factors are important to include in projecting long-term investment needs or technology transition needs?

Incorporating the time required to build out nationwide infrastructure and complete the requisite permitting, as well as the costs and uncertainties associated with that process.

2.10) Are there current policies or interventions that are hindering implementing different decarbonization pathways?

Failure to recognize the critical role of chemistry and plastics in current and future decarbonization or lower-emissions technologies and supply chains is short-sighted and will contribute to making it more difficult for the chemical manufacturing sector to abate emissions and more difficult to decarbonize its products. Factoring in regulatory restrictions on advanced recycling also contributes to impeding decarbonization throughout the sector at scale.

Category 3: Impacts and Evaluation Criteria for Industrial Decarbonization Pathways

3.7) Some criteria are harder to quantify. What criteria should DOE prioritize for future research to develop new quantification tools?

DOE should invest in sector-specific tools to assess the whole lifecycle impacts of manufactured products, considering use, water, and end-of-life impacts. DOE should also design its LCA models and tools to allow industrial manufacturers to incorporate validated company, process, or product specific data into its models rather than forcing the use of default, behind-the-wall assumptions.

3.13) What threshold (for example monetary, energy intensity, throughput, emissions, etc.) does new technology need to meet to be worth the investment over existing technology (both from a company's perspective and at the national level)?

While this is an important question, it is also highly subjective and depends on the product type, chemistry, emissions profile, and price sensitivity of customers and markets. ACC defers to members on specific figures but applauds DOE's recognition that technological feasibility is only one aspect of determining a technology's viability.

Category 4B: Net-Zero Emissions Decarbonization Pathways for Specific Industrial Subsectors, Chemical Questions

4b.1 How do you expect the U.S. demand and production of specific chemicals or classes of chemicals to change by 2050 and why?

The IEA projects significant increased demand for chemicals and plastics making it critical that the US, one of the lowest emission manufacturing markets compared to other parts of the world, has the flexibility to scale operations to meet this demand. As global demand increases, US

production will become even more important as manufacturers invest in more sustainable operations and methods, driven by:

- An acceleration of the industry's sustainability efforts in pursuit of net-zero goals.
- Continued growth of renewable energy as the industry transitions to cleaner energy such as renewable energy and hydrogen.
- Evolving supply chains and increased sourcing of circular manufacturing inputs across the chemical value chain.

4B.3. What do you think are the primary production routes needed to decarbonize the chemicals subsector between now and 2050 (specific chemical or classes of chemicals)?

Chemical manufacturers face different challenges across different chemical types, chemical processes, and manufacturing locations. ACC supports technology, energy, and feedstock-neutral policies that offer multiple pathways to net-zero economy. In seeking the next generation of emission-reduction technologies, it is critical that the US not erase the significant gains in emissions efficiency and reduction obtained through the transition from higher-emissions fossil inputs (coal, naphtha, etc.) to natural gas, without which US emissions would increase significantly.

Beyond that overarching principle, ACC received a member comment projecting the greatest impacts will come from process-oriented solutions that allow a full switch to green technologies for manufacturing and a circular economy. Based on the technologies incentivized through the IRA and BIL incentives, will see increased commercialization and adoption of lower-emissions manufacturing processes, biobased and circular inputs, and broader deployment of CCUS.

ACC also received feedback identifying the following technology pathways as essential for chemical manufacturing:

- Lower-emissions electricity and heat:
- Direct & indirect heat integration:
- Alternative fuels and feedstocks:
- Carbon Capture & Storage:

4B.4 What technical and/or technology solutions does the subsector need that are not currently available?

While these considerations apply across industries, regions, and countries, there are examples that are more appropriate for demonstration in the U.S., under current regulatory and marketplace conditions. These include,

- Green ammonia based on renewable/low carbon hydrogen.
- Bio-based raw materials.
- CCU to produce green hydrocarbons.
- Advanced recycling.
- Energy efficiency measures in production/manufacturing.

While promising, all of these pathways will require leadership by policymakers through smart regulation and permitting, technology acceptance, and targeted incentives during the development of markets.

4B.7 Are there any other subsector-specific barriers, criteria, metrics, or targets that DOE should be aware of as a decarbonization strategy for this subsector is developed?

We see limiting factors of today fall into three broad categories:

- The first is the **consistency of government support and smart regulation**. Political, financial, and regulatory factors must be stable and consistent over the long term. Governments must commit to follow through with incentives programs, particularly where the programs were used to drive early capital investments in emerging technologies and markets. These must be in place, and secured, prior to any company making decisions impacting plant planning and technology investment priorities that have long-term impacts on their business strategy and competitiveness. Without a stable public environment, return on investment and profitability will be unclear. Because they invest up-front, companies rely on compensation through their value chain over the long-term. Similarly, government regulatory policies must be predictable and reasonable with respect to both project and infrastructure permitting and renewals.

- The second limiting factor is **increased cost and relative unreliability of alternative energy sourcing**. Wind and solar, for instance, are highly dependent on weather conditions, with large variations in energy output outside of human control. We would like to highlight that with a fast build-up of renewable energy supply, production and storage are key.

- The third limiting factor is the **existing infrastructure**. For example, feedstocks require pipelines to bring them to the sites using them. CCU/S transport infrastructure and storage sites; water electrolysis, renewable energy supplies; and power grids are also limited in their ability to support decarbonization efforts adequately. This includes an efficient supply of energy through grid expansion.

To address these issues, DOE could leverage ACC member's expertise in planning infrastructure and capacity. DOE could support and facilitate an industry-wide dialogue to develop recommendations on industrial planning and build-out in the U.S. We would welcome the opportunity to discuss DOE's *Pathways for U.S. Industrial Transformations: Unlocking American Innovation* vision study further. If you have any questions or would like more information, please feel free to contact me at (202) 249-6212 or charles_franklin@americanchemistry.com.

Sincerely,

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