



March 25, 2022

Submitted via www.regulations.gov

The Honorable Gina Raimondo
Secretary
U.S. Department of Commerce
1401 Constitution Avenue, NW
Washington, DC 20230

Re: DOC-2021-0010, Request for Information, Incentives, Infrastructure, and Research and Development Needs to Support a Strong Domestic Semiconductor Industry, Federal Register No. 2022-01305

Dear Secretary Raimondo:

The American Chemistry Council (ACC) is pleased submit the following comments in response to the Department of Commerce's ("Department") Request for Information ("RFI"), DOC-2021-0010, published on January 23, 2022, to inform the Department's design and implementation of programs authorized in the FY 2021 NOAA (Pub. L. 116-283), Title XCIX ("Creating Helpful Incentives to Produce Semiconductors in America", or "CHIPS Act").

The ACC represents a diverse set of companies engaged in the business of chemistry, an innovative, \$486 billion enterprise. We work to solve some of the biggest challenges facing our nation and our world and are committed to fostering progress in our economy, environment, and society.

The business of chemistry:

- Drives innovations that enable a more sustainable future.
- Provides 529,000 skilled good paying jobs—plus over 4.1 million related jobs—that support families and communities.
- Enhances safety through our diverse set of products and investments in R&D.

Every year, the chemistry industry invests tens of millions of dollars to help make the products that make modern living possible and safer for our communities and the environment. In addition to research initiatives, ACC programs focus on anticipating and preventing accidents, as well as educating the public about how to use our products safely. Chemistry makes it possible to meet the needs of a growing world population. Our products help protect our food supply, air, and water, make living conditions safer, and provide access to efficient and affordable energy sources and lifesaving medical treatments in communities around the globe. To enable these

ongoing innovations, we advocate for public policies that support the creation of groundbreaking products to improve lives, help protect our environment, and enhance the economic vitality of communities.

U.S. chemical manufacturers have supplied important chemistries to the semiconductor industry since its inception. In 2021, the business of chemistry in the United States supported 367,000 workers in the semiconductor and electronic component industry, \$45.4 billion in payroll, and \$52.5 billion in value-added. Such chemicals are essential in the manufacture of semiconductors, printed circuit boards, and other microelectronic devices. Among them are cleaners, developers, dopants, encapsulants, etchants, photoresists, specialty polymers, plating solutions, and strippers. Such products serve major markets such as computers, telecommunications equipment, automotive, and medical devices.

Minimizing contamination is a central discipline of semiconductor manufacturing. The needs for higher data transmission rates and improved signal integrity require smaller integrated circuits and contaminant-free manufacturing processes. Fluoropolymers are a key material for avoiding contaminants in semiconductor manufacturing because they exhibit a unique combination of properties, including resistance to chemical, thermal, and physical degradation that can withstand the semiconductor manufacturing process. Fluoropolymers are critical components of fab equipment (fittings, valves, wafer carriers), consumables (high purity air filters, lubricants), and chemical storage transport equipment (tanks and pipes), and are a fundamental material used for infrastructure in all fabs.

There are other chemistries used in the manufacturing process that are in need of capacity expansion in order to support continued growth in the electronics market. Such chemistries include but are not limited to P-Series Glycol Ethers, E-Series Glycol Ethers, Amines, and Oxo Solvents. Such products are sold into several markets outside of the electronics market and their availability is often constrained due to strong demand with limited production, especially for P-Series Ethers. As chips get smaller and more advanced, more process chemicals with higher purity will be required, and we hope that these programs can help with such challenges.

Incentives to Support Semiconductor Manufacturing through Chemistry

The U.S. chemistry industry will be crucial to the development of a strong domestic semiconductor industry. We would encourage the Department, in developing the Semiconductor Financial Assistance Program, the National Semiconductor Program, and the Advanced Packaged Manufacturing Program (“Programs”), to develop the correct incentives to produce chemistries crucial to semiconductor manufacturing and R&D. These incentives include:

- Tax credits and abatements;
- Expedited permitting for plant construction or upgrading;
- Programs to educate the workforce in response to industry needs;
- Facilitation of high skilled immigration;
- Access to worker training/retraining programs;
- Public-private partnerships for research and development of new materials and technologies;



- Potential cost-shared grants to support domestic capital investments for key upstream materials, including chemical inputs, as well as infrastructure; and
- Relief/insurance for domestic supply chain disruptions, e.g., hurricanes, floods, wildfires, and winter storms.

We would encourage the Department, in the development of these Programs, to work closely with the chemistry industry, state and local governments, and other U.S. Government agencies to ensure these incentives are put in place. In particular, we think it will be important to explore with the U.S. Environmental Protection Agency (EPA) the impact of ongoing assessments on chemicals relevant to semiconductor manufacturing, performance and safety. These assessments include those related to N-Methylpyrrolidone (NMP), Octamethylcyclotetra-siloxane (D4, 4,4'-(1-Methylethylidene)bis[2,6-dibromophenol] (TBBPA), Fluorinated Chemistries, Hydrofluorocarbons, and Phenol Isopropylated Phosphate (3:1) (PIP (3:1)).

Elements of an Effective Public-Private Partnership

ACC believes there are several elements that influence the competitiveness of the U.S. chemicals industry and should play a key role in an effective public-private partnership for the development of these Programs:

- *Access to inputs.* Much of the chemical industry relies on a functioning supply chain of petroleum and natural gas products for both feedstocks and for fuel and power for production processes. Affordable domestic natural gas has made the U.S. the global destination of choice for chemical manufacturers, driving billions of dollars in expansion and new plants. Natural gas provides power and remains one of the best sources of energy that chemical plants use to operate. Many ACC members are exploring alternatives like bio-based and recycled feedstocks, new low or no-emissions energy sources, and possible electrification of chemical manufacturing processes. However, wide-scale adoption of some of these alternatives is still a long way away for many members. Another key factor in the development of a U.S. chemical manufacturing industry that supports semiconductor manufacturing will be consistent and reliable access to low-cost, high quality raw materials and intermediate inputs. Some of these inputs need to be imported since it is not possible to source such inputs domestically, at least in the short and medium term. Situations of short supply can increase costs, create uncertainty, and reduce revenue for hiring new workers, capital improvements, and expansion.
- *R&D.* The chemical industry is consistently one of the largest private-sector industry investors in research and development (R&D). R&D spending includes research in the sciences, engineering, and the design and development of prototype processes and products. New products and processes are the driving force of the continued competitiveness of the business of chemistry, both domestically and internationally. In addition, ACC members are helping to enable the transition to a lower-emissions future. This transition will require a fundamental transformation of chemical manufacturing processes and factories.



We would encourage Department Programs to focus on major areas of R&D crucial to development of the chemistry industry and semiconductor manufacturing including nanotechnology, 3-D printing, metallocene and other single-site catalysis, sustainability and resource recovery, conversion technologies, bioprocesses and biocatalysts, direct oxidation of alkanes, hydraulic fracturing productivity, new/improved materials for construction applications, rare earth elements (technologies, applications), powder coatings, radiation-cured coatings, and water-based coatings, advanced materials for high-performance applications (ceramics, metal matrices, etc.), improvements in energy efficiency, chemicals and materials for microelectronics, and new solvent cleaning technologies.

We also hope that Department Programs incentivize investment in the entire value chain including incentives that foster additional capacity, such as in production technology. Additional capability will be a key driver to increase supply for the critical components mentioned above and earlier in this submission. Such investments will not only drive greater capacity; they will also incentivize further R&D which will support and advance this ever-evolving industry – with larger wafers, smaller chip sizes, etc. Such investments will be critical to maintain competitiveness, regardless of the specific chemistries used in the future.

- *High-skilled labor.* Americans employed in the business of chemistry are among the most productive in the world. The increasingly complex nature of the business of chemistry requires new and more highly developed skills and better-trained and educated workers. In plant operations, this has resulted in making technicians out of skilled workers (e.g., machinery operators) and skilled workers out of unskilled workers (e.g., laborers). In other areas, the need for chemists, chemical and industrial engineers, and other technically trained personnel (from agronomists to toxicologists to zoologists) continues to mount. Such personnel and training programs should play a role in the development of these Programs.
- *Science-Based Regulatory Standards* A well-managed regulatory system is crucial to development of a domestic industry and helps to ensure that regulators consider comments from stakeholders, including those representing disadvantaged and under-represented populations, and creates rules that set high, science-based standards for EHS protections and maximize net benefits to society. Such rules, including those related to approvals for new chemicals and uses and the review of existing chemicals, should be administered fairly, efficiently, and consistently.
- *A 21st century physical and digital infrastructure for the safe, secure, sustainable, competitive, reliable, and efficient transportation of chemicals in the United States.* A chemical industry that supports semiconductor manufacturing will need to rely on a modern and efficient U.S. transportation infrastructure to transport energy inputs, raw materials, and chemical products. ACC members are strong supporters of permitting improvements, both for permits specifically required for chemical manufacturing, such as under the Clean Air Act and Clean Water Act, but also for those required for the transportation, mining, and energy



infrastructure vital to the chemical manufacturing industry. Onerous and lengthy permitting processes that increase cost, add uncertainty, and inhibit investment in new and existing manufacturing, mining, transportation, and energy facilities directly impact chemical manufacturing operations and output.

A large volume of chemistry products is moved within the U.S. and to foreign destinations every year, playing an especially important role in the transportation services industry. Chemicals are transported over roads, by rail, by water and/or by air, generating revenues for trucking companies, railroads, barge operators, and other logistics suppliers. A strong transportation network is critical to the business of chemistry, and ACC believes that Department Programs should encourage the adoption of policies that will improve the efficiency of transportation permitting, including for rail and pipeline transportation infrastructure, create greater supply chain visibility to improve efficiency and predictive abilities, and address systemic congestion issues.

- *Predictable, rules-based trade policy.* Trade policy must be balanced and consistent with multilateral obligations to prevent retaliatory actions that create additional trade barriers in critical export markets and impact U.S. jobs. Policy must be strategic to avoid taking trade actions that damage U.S. competitiveness and hinder U.S. exports and must be formulated with a view to ensuring that U.S. workers benefit. Governments should cooperate with trusted trading partners and in international and regional fora, and forge agreements, where necessary, to improve supply chain resilience, including with regard to external shocks.
- *Enabling incentives to facilitate greater U.S. production.* The business of chemistry is a capital-intensive industry. There are numerous factors that contribute to high capital costs: the large plant capacities often needed to obtain economies of scale in producing chemicals; the intricate nature of the equipment and processes used; the high degree of process automation; the large amounts of equipment needed; and technology requirements. Incentives from the federal government and States that do not distort trade and investment are critical to strengthening the resilience of U.S. supply chains for chemicals, as well as for the key supply chains and industrial bases for a semiconductor industry that is served by the business of chemistry

Conclusion

To summarize, these Department Programs should seek to maximize performance on the above elements through a coordinated, whole-of-government approach. Because of the chemical industry's large footprint across major economic sectors, doing so will pay dividends across all critical supply chains and industrial bases of concern to U.S. policymakers, not just for semiconductor manufacturing, will enhance supply chain resilience, and meet other Administration objectives.



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The ACC stands ready and willing to help the Department further develop these Programs and can provide the technical wherewithal to develop both domestic production and markets abroad. We hope that the Department will use ACC as a source of information and experience regarding the role of the business of chemistry in enabling a more vibrant, resilient, and secure semiconductor manufacturing industry in the United States.

Sincerely,



Jason Bernstein
Director, Global Affairs
American Chemistry Council

