Re: American Chemical Society: EPA National Recycling Strategy RFI Response
Docket ID No. EPA-HQ-OLEM-2020-0462
December 4, 2020

The American Chemical Society (ACS) is a not-for-profit scientific society representing over 150,000 chemists and chemical engineers worldwide. Created in 1876, ACS received a national charter in 1937 from the U.S. Congress which was signed into law by President Franklin Delano Roosevelt. ACS' mission is to advance the broader chemistry enterprise and its practitioners for the benefit of Earth and its people. As the lead voice for the chemistry enterprise, the ACS is dedicated to bringing members of the chemistry community together to collaborate and advance their science. ACS commends the Environmental Protection Agency (EPA) for pursuing a national recycling strategy for the United States, agrees with the Agency's three strategic objectives within the bounds of current statutory authority, and welcomes the opportunity to provide feedback on the Agency's objectives below.

Overall, ACS encourages EPA to take a stronger leadership role in promoting needed investment for research, development, and deployment of advances in sorting and other material processing as well as in working with producers to take back used packaging to close the loop. These are important steps toward developing a circular economy to repurpose product materials after end of first life and will help achieve a sustainable and prosperous future for the United States.

While recognizing that the focus of this strategy and RFI is limited to traditional mechanical recycling, ACS strongly encourages EPA to consider advanced chemical recycling processes in developing a holistic approach for addressing plastic waste. Advanced recycling, which uses a variety of chemistry processes and catalysts to synthesize "new" plastics from recycled materials, represents an important opportunity to transform post-use plastics that are unsuitable for mechanical recycling. Though not all advanced recycling techniques have equal energy, environmental, and economic impacts, they offer promising, alternative avenues to preserve the original value of plastic and should not be overlooked as a means of making environmental gains while improving manufacturing and processing efficiencies.

A copy of the ACS policy statement on Sustainability and the Chemical Enterprise is included at the end of this document with further recommendations to address the challenges posed in shifting in policies from a linear "take make waste" economy toward an economy where products are designed to enable the waste of one product system to serve as the raw material of another.

Objective 1: Reduce Contamination in the Recycling Stream

Objective 1.1. Enhance education and outreach to consumers on the value of recycling and how to recycle properly

Significant and immediate impact on the US recycling strategy can be achieved by enhancing education and outreach to consumers on the value of recycling and how to recycle properly. Consumers need significantly clearer recycling insignia on packaging to be able to readily discern which specific materials are designated for recycling and how to properly recycle those materials. Several non-profit and industrial consortia have developed clear insignia; specifically, Design for Discard (D4D, https://erefdn.org/d4d/) labelling developed by the Environmental Research and Educational Foundation (EREF) and How2Recycle (https://how2recycle.info/). EPA is in the ideal position to advocate on behalf of the consumer with material producers who apply such insignia and labelling.

EPA should also consider if the resources required to remove consumer-derived residues outweigh impacts on water use and other potential disincentives perceived by the consumer. A comparative analysis of water usage, energy, and resultant grey water quality is critical here. A comprehensive public service campaign, utilizing social media, is needed to educate consumers with accurate information on recycling practices such as pre-cleaning recyclables prior to disposal in homes and businesses.

In addition, ACS advises clear guidelines and methods to control contamination in both virgin resins and secondary feedstock that can affect material sustainability for initial use and as a post-consumer resin (PCR).

Objective 1.2. Increase coordination, availability and accessibility of information on recycling programs and policies at the federal, state, tribal and local levels.

ACS supports EPA's attention to the Agency's important role of tracking and assessing recycling resources at all levels. Two of the chief goals of information coordination, availability, and accessibility should be to influence (1) consumer behavior in a positive way to encourage further recycling progress and (2) material producers to facilitate greater actual recyclability. This requires publicizing achievements and shortcomings at both the consumer level and the material producer level. The latter is key to fostering public pressure for improvement as has been achieved through EPA's successful Toxics Release Inventory.

EPA should study and disseminate best practices for incentivizing materials recovery (e.g. bottle deposits) that work at the local/municipal level. It should also study and compare approaches to collection, sorting, and comingled recyclables that increase accessibility and result in maximizing recoverable materials for recycling feedstocks. This ties into improved labelling, as municipal recycling regulations and infrastructure vary, so ways to properly collect and direct materials to the appropriate materials recycling facility (MRF) need to be determined on the appropriate local level and tie into federal and state policies.

As a large part of the EPA statutory authority is under the Resource Conservation and Recovery Act (RCRA), ACS encourages EPA to coordinate with other federal agencies that have direct mission space related to national recycling and use of post-consumer resins (PCR), specifically:

- The Food and Drug Administration and the United States Department of Agriculture for regulatory guidelines and best practices for recycled materials to be considered GRAS (general regarded as safe) for use in medical applications and food packaging.
- The Department of Energy (BES, EERE, BETO) for considerations in energy minimization and use, in addition to ongoing DOE efforts in bioenergy and upcycling.

<u>Objective 2: Increase Processing Efficiency</u>

Objective 2.1. Improve understanding of available recycling infrastructure and needs.

Developing guidelines for energy, carbon footprint, and water reclamation for MRF recycling processes is crucial to understanding the environmental impacts of increasing national recycling rates beyond the current 9% baseline and to enacting engineering controls and processes to ensure the increase of mechanical recycling remains environmentally sustainable. International engagement will be critical to build needed infrastructure in the United States.

Objective 2.2. Increase awareness of available public and private funding and incentives and effective strategies to access the funding.
Objective 2.3. Continue to fund research and development of new technologies and processes the result in environmental gains from improvements in manufacturing and processing efficiencies.

ACS agrees that "investment and innovation are needed to increase the efficiency of materials processing infrastructure and create a more resilient recycling system." A laudable example of such investment is the EPA's Sustainable and Healthy Communities (SHC) Research program which supports resources to provide technical solutions for waste and materials management, including developing techniques and technologies to beneficially reuse products and materials traditionally sent to landfills. However, EPA can and should do

more when it comes to funding for research and development (R&D) of more efficient recycling technologies and processes. One approach would be to emulate the scale of, or collaborate with, R&D Consortia based in other agencies, such as the Department of Energy's Clean Energy Manufacturing Innovation Institute for Reducing Embodied-energy And Decreasing Emissions (REMADE) in Materials Manufacturing, which focuses on applied research towards innovations to improve overall manufacturing efficiency through increased material reuse, recycling, and manufacturing.
Furthermore, ACS urges EPA to use its influence with major material producers to significantly increase the amount of funding available from these producers for external recycling R&D. ACS would welcome the opportunity to partner with EPA to convene producers to further discussions in this arena: One approach worth considering is development of a new Plastic Recycling Research Fund building on the success of the Petroleum Research Fund administered by ACS. Additionally, ACS encourages EPA to seek expansion of the Agency budget to significantly increase extramural public funds to support material recycling R&D.

Objective 2.4. Increase consideration of the sorting process in the design of new products.

Sorting is an exciting area for increased innovation. ACS recommends that EPA expand objective 2.4 to assure inclusion of promising new sorting-related technologies such as the use of magnetic ink for labels printed on containers and of new separation techniques such as magnetic density separation of plastics for improved MRF efficiency. EPA should also prioritize rapid recognition and sorting equipment, especially spectroscopic methods that can overcome challenges with highly pigmented and filled resins, such as carbon black. For longer term sustainability efforts, it is important to support research funding that facilitates incorporation of post-consumer recycled materials as feedstocks to work toward replacement of virgin, petrochemical-based feedstocks.

Objective 2.5. Develop and implement national recycling systems definitions, measures, targets, and performance indicators.

ACS encourages EPA to engage ASTM International, the National Institute of Standards and Technology, and other standards organizations as appropriate (for instance, the International Organization for Standardization for international engagement) for documentary standards and reference materials. Further development of accurate life cycle analysis (LCA) and materials flow analysis (MFA) is critically needed to benchmark and improve current recycling capacity and efficiency beyond the current 9% level of recycling in the United States. This also enables meta-analysis of current best practices and targeted recycling approaches that help maximize efficiency and minimize environmental impacts.

Objective 3: Improve Markets

Objective 3.2. Produce an analysis of different types of end markets that consider resilience, environmental benefits, and other relevant factors for decision makers.

In analyzing different types of end markets, EPA should give special consideration to "fit for purpose" materials that are especially challenging to recycling streams, such as thin films and bags (interferes with machinery in mechanical recycling), pill bottles (incompatible drug contaminates), laminated pouches (incompatible polymers contaminate PCR), and coated cardboard (inseparable plastic and paper refuse). Alternatives to these materials should be sought that either obviate recycling limitations or have an end-of-life cycle with environmentally benign effects.

Objective 3.3. Increase data availability and transparency about recyclable materials generated and the materials manufacturers need.

Effective solutions will be achieved with increased availability and transparency of data, which, regrettably, is currently limited to sporadic data and non-standardized methods and practices. EPA should facilitate tracking across the supply chain, which will be critical to understand the environmental impact of locally sourced and processed PCR (e.g. impact on carbon footprint, municipal water and air quality, etc.). This will also be useful in analyzing economies of scale for collection, sorting, and recycling.

Objective 3.5. Increase demand for recycled materials through policies, programs, initiatives, and incentives focusing on materials with less mature markets.

ACS agrees that "there is a need to improve domestic markets for recyclable materials and recyclable products" and supports EPA's efforts to "increase demand for recycled materials through policies, programs, initiatives, and incentives, focusing on materials with less mature markets." Given that such markets are less mature in comparison to paper, glass, aluminium, and other metals, the appropriate focus here is plastics and plastic-comingled. EPA can and should do more than what the Agency has traditionally achieved through "policies, programs, initiatives, and incentives". ACS urges EPA to capitalize on its environmental leadership role by partnering with plastic producers up the supply chain to close the loop on plastic packaging to promote return of used materials as appropriate replacement for virgin feedstocks (bottle-to-bottle) and long-term vision to both improve conventional recycling (now) and developing full materials circularity in the future.

Such partnerships can be facilitated through public challenge programs such as the EPA's successful Resource Conservation Challenge of the early 2000s and through development of national guidelines for extended producer responsibility (EPR). Until such time as the Agency has statutory authority for national EPR regulations, EPA should work with the Association of State and Territorial Solid Waste Management Officials (ASTSWMO) and industrial stakeholders to develop national EPR guidelines in the spirt of the successful EPA/ASTWMO partnership that issued *The Guide for Industrial Waste Management* in 2003. This is another area where ACS is poised to assist with convening stakeholders to facilitate meaningful progress.

ACS appreciates the opportunity to provide feedback to on the EPA's National Recycling Plan by offering input from the stakeholder community, and looks forward to continued collaboration to that end. ACS would welcome the opportunity to further discuss with EPA the topics touched on in this response as well as to provide further information the Agency might find useful as it finalizes its National Recycling Plan. If you have further questions, contact Caroline Trupp Gil (C_TruppGil@acs.org).

SUSTAINABILITY AND THE CHEMISTRY ENTERPRISE

Earth's resources, while vast, are finite. Increasingly, humans have come to realize that we must be better stewards of those resources and that economic activity must be carried out in ways that do not compromise the ability of future generations to prosper. The sustainability challenge is to develop innovations and policies that allow humanity to meet current and future environmental, human health, economic, and societal needs.

The chemistry enterprise has many roles in sustainability. It provides chemicals, materials, and technologies that improve the safe and efficient use of energy and natural resources and is responsible for delivering them in a way that protects human and environmental health. Chemistry—in labs, classrooms, and industry—is a central science for the development of sustainable technologies and innovations. Industry is responsible for the natural resource and environmental impacts of its actions. Government sets standards for resource and environmental performance through the policies it enacts and enforces.

Policies have consequences. Sustainable development requires shifts in policies from a linear "take make waste" economy toward an economy where products are designed to enable the waste of one product system to serve as the raw material of another.

The American Chemical Society recognizes the importance of environmental sustainability and that modern civilization depends on it. Environmental considerations and economic growth are not mutually exclusive. We believe the chemistry enterprise must continue to provide leadership in forging the science and technology that will provide humanity with a sustainable path into the future.

The global competitiveness of the U.S. chemistry enterprise depends on governmental policies that contribute to the environmental progress required for sustainable development. Other countries embracing a sustainability agenda are making economic inroads on the U.S.; they see the vast market opportunities implicit in achieving the UN Sustainable Development Goals. Federal government participation in global environmental treaties is vital to the interests of American business. ACS believes well-constructed environmental policy fosters business competitiveness globally.

ACS Recommendations

The chemistry enterprise has a key role in advancing sustainability. Necessary progress on this path requires the cooperation of the federal government. Modest adjustments in federal policies can have a large impact on advancing sustainability within the chemistry enterprise and the society it supports. Recommended government actions include:

- Preserve core science-based environmental protections afforded by current regulatory programs under the Clean Water Act and the Clean Air Act
- Prioritize sustainability when investing public funds in infrastructure
    - Promote electrification of transportation

The American Chemical Society (ACS) Board of Directors Committee on Public Affairs and Public Relations adopted this statement on behalf of the Society at the recommendation of the Committees on Environmental Improvement and Science. ACS is a non-profit scientific and educational organization, chartered by Congress, with nearly 157,000 chemical scientists and engineers as members. The world's largest scientific society, ACS advances the chemical enterprise, increases public awareness of chemistry, and brings its expertise to state and national matters.

    - Use recycled and benign materials in construction of roads and other infrastructure projects
    - Adopt full cost accounting (including long-term financial, social, and environmental costs) in procurement of goods and services
- Lead by example
    - Promote energy policies that consider full life cycle costs of energy sources and minimize environmental impacts
    - Endorse adoption of the UN Sustainable Development Goals (https://sustainabledevelopment.un.org/sdgs)
    - Demonstrate the use of sustainable technologies in government functions (e.g., non-crop derived biofuels in military applications)
    - Specify sustainable materials in procurement guidelines
    - Make decisions based on reliable data sources, e.g., peer-reviewed science
- Sponsor fundamental research to enable long-term advances for sustainable manufacturing toward improving resource (e.g., energy, water) efficiency
- Facilitate adoption of more sustainable technology
    - Increase federal funding for sustainable chemistry research and development
    - Ensure government support for demonstration of sustainable chemistry at industrial scale to promote its adoption
    - Implement tax incentives to early adopters of sustainable manufacturing technology
    - Promote preferential hiring of scientists and engineers educated in sustainability principles and practices
- Support global competitiveness of U.S. business leaders in sustainability
    - Engage other nations in the formulation and implementation of global environmental agreements (e.g., Stockholm Convention, accords under the UN Framework Convention on Climate Change, Minimata Convention)
    - Advocate the interests of more sustainable American businesses in these negotiations
- Provide new national-level economic instruments to foster:
    - Cradle-to-grave environmental accountability for products introduced into the market
    - Development of a circular economy to repurpose product materials after end of first life
    - Consideration of preserving ecosystem services, such as natural water filtration, food production, and flood mitigation in governmental decision-making
- Reform economic policies and structures to internalize the externalities of pollution into business decisions (e.g., establish a price for CO2 emissions)
- Track and publicize sustainability progress

    - Engage business and academic community to collaboratively define practical national sustainability metrics
    - Conduct environmental sensing to observe ambient environmental conditions and monitor changes in them (e.g., NOAA, USGS)
    - Collect and publicly distribute emissions data through Toxic Release Inventory and greenhouse gas reporting to track progress
- Assure resources and support for developing and implementing curricula integrating sustainability and green chemistry concepts across all levels of education
- Maintain award programs, such as the USEPA Green Chemistry Challenge Awards, that recognize businesses and academic researchers for significantly advancing sustainability.