

## SUSTAINABILITY AND THE CHEMISTRY ENTERPRISE

A sustainable society is one that meets the needs of today's population without jeopardizing the ability of future generations to thrive. Achieving a sustainable society requires broad social and economic change for a more equitable and just society, one that will meet basic human needs while maintaining ecosystem health.

The 17 United Nation's Sustainable Development Goals illustrate the complexities inherent in addressing sustainability challenges aimed to eliminate human suffering and preserve the health of the planet. Meeting sustainability goals will require bolstered social resilience through strengthened support networks. Slowing and reversing environmental degradation will require fundamental changes in the global economy. Failure to embrace significant change will only exacerbate the current crisis, increasing competition for ultimately finite resources. The convergence of basic and applied research to understand the integrated nature of society and the natural world can address these challenges. An inter-disciplinary systems-level approach across the sciences, industry, educators, and government will be essential to understanding how human activities impact the Earth, and how our limited resources can be best utilized to sustain society.

### Role of Chemistry in Sustainability

Chemists and chemical engineers have the dual roles of making materials from life's building blocks *and* understanding the impact these actions have on the environment. This duality underscores our imperative to design and implement economically and socially viable products and processes to use fewer resources and place less strain on the environment. As scientists, we measure and manipulate matter from the atomic to macroscale in a range of contexts; from creating individual compounds to transforming substances, to integrating materials and processes through complex system design. The products of these transformations are of practical commercial and beneficial value to society. The chemical sciences also quantify coupled human-ecosystem interactions across a wide range of length and timescales. As a scientific community, we must develop effective communication strategies to ensure research translation from bench to market, and seek public awareness and acceptance to achieve widespread implementation of sustainable technologies.

Chemistry plays a central role in society through its researchers, producers, and educators. As researchers, the chemical enterprise seeks to discover new knowledge to help chemistry and society meet various challenges related to sustainability. As producers, the chemical enterprise uses materials provided by supply chains as well as processes developed through research to provide materials to meet societal needs. Chemical production also requires an awareness of waste considerations and the possibilities inherent in the movement towards a circular economy. As educators, the chemical enterprise seeks to cultivate the necessary knowledge, skills and ethical awareness in the next generation of diverse scientists required for inclusive global sustainable development.

### ACS Recommendations

#### *Regulation and Engagement*

Government can amplify the beneficial impacts of the knowledge, technology, and human capital advanced by the chemical enterprise through lawmaking, regulatory processes, international agreements, and communication with the public.

#### **To this end, the U.S. Government Should:**

- Enact and enforce policies and standards to preserve the environment, boost efficiency, and protect public health. Such practices and standards include:
  - reducing greenhouse gas (GHG) emissions (see the ACS statement on Energy Policy and Climate Change) to slow and reverse climate change;

---

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.

American Chemical Society, 1155 Sixteenth Street NW, Washington DC 20036, 202-872-4386, [www.acs.org/policy](http://www.acs.org/policy)

- protecting our air, water, and land from pollutants detrimental to human and environmental health, including robust enforcement of landmark environmental laws such as the Clean Air and Clean Water Act;
- reducing waste and incentivizing a circular economy;
- promoting sustainable energy development and use;
- modeling sustainability leadership across the federal government.
- Use best available science from trustworthy, unbiased and peer-reviewed sources to inform environmental, energy, industrial and public health policy-making (see the ACS statement on Scientific Integrity in Public Policy).
- Encourage and facilitate the development of sustainability metrics for long-term adoption by private enterprise and federal agencies alike. These include environmental and toxicological impact assessments, energy consumption, and greenhouse gas and pollutant emissions.
- Join and lead international coalitions to ratify critical treaties and agreements concerning sustainability and the environment (e.g. the Paris Climate Agreement, the Kigali Amendment to the Montreal Protocol, and the Stockholm Convention on Persistent Organic Pollutants).

*Research, Development, and Deployment*

Meeting human needs globally now and in the future will require new knowledge, novel technologies, and radical collaborations. The federal government can support the chemical enterprise's role through: funding research, development, and demonstration; developing an informed workforce; and facilitating communication and collaboration between stakeholders and with the public.

***To this end, the U.S. Government Should:***

- Coordinate and increase federal support for green and sustainable chemistry.
- Encourage and incentivize conservation and substitution of critical raw materials (see ACS Critical Materials Statements), reuse and recycling of post-consumer materials in new products, and reduction of single-use, waste-generating materials such as plastics.
- Incorporate the potential to advance green and sustainable science into proposal merit review criteria for relevant programs. Issue research solicitations requiring convergence across disciplines. Fund research that both advances scientific knowledge and contributes to addressing sustainability challenges.
- Facilitate the scaling up and industrial application of nascent sustainable processes and technologies through expanding public-private partnerships, and assisting the translation of ideas from the laboratory into the marketplace.
- Support initiatives seeking to foster a culture of sustainability, both in educating the next generation of chemists and chemical engineers, and in the current workforce.
- Continue award programs and competitions to incentivize innovations, drive creativity, and share best practices to advance the sustainability of the production of molecules and materials, such as the Green Chemistry Challenge Awards.