

CENTER FOR SUSTAINABLE FUELS AND CHEMICALS



R&D233, September 2024



OVERVIEW

The chemicals industry is a keystone of the U.S. economy, converting raw materials (oil, natural gas, air, water, metals, minerals) into more than 70,000 different products. Chemicals are the building blocks of many products that meet our fundamental needs for food, shelter and health. Chemical products are vital to computing, telecommunications, biotechnology and other advanced technologies.

[Carbon management](#) is critical to the ongoing success and growth of the U.S. chemicals industry, one of the most difficult industries to decarbonize.

NETL's Center for Sustainable Fuels and Chemicals (CSFC) is a technology development and support center established to collaborate with the U.S. chemicals industry as it looks to retool its products and operations to reach net-zero emissions.



REDUCING ENVIRONMENTAL IMPACT

The development of the CSFC will enable the nation to add good-paying union jobs in a vital industry as the United States advances toward net-zero carbon emissions in the broader U.S. economy by 2050.

The CSFC focuses on developing technologies that will enable the U.S. chemicals industry to move chemical products to market with less environmental impact. In many instances, the center examines technologies that remain too risky or far-term for the private sector to develop alone.

The CSFC leverages NETL's expertise in computational sciences, including advanced approaches in process optimization and reactor design, to model low-carbon manufacturing technologies and simulate how chemical production can be scaled up faster and at less cost.

Through the CSFC, NETL will use its decades of experience with chemical conversion, carbon management and carbon intensity analysis to accelerate the identification and deployment of strategies within the chemical sector to promote sustainability. This effort includes fuel switching, increasing efficacy of conversion and separations, integration of carbon capture and chemical recycling. As manufacturers evaluate options to reduce carbon emissions, NETL will expand its research applications and life cycle analysis (LCA) capabilities to support initiatives across the spectrum of the Lab's core competencies.

NETL can also increase process efficiency using enhanced materials, conversions and separations or, in some cases, new processes, such as microwave-enhanced intensification, methane pyrolysis and chemical looping. These efforts will be undertaken to scale up new decarbonization technologies to demonstrate technical and economic feasibility. NETL will use its expertise in computational sciences coupled with the construction of pilot facilities to enable faster development of new low-carbon technologies.



NETL Director Marianne Walck participates in a tour of the NETL Pittsburgh lab in Pennsylvania Feb. 27, 2024.

WHY PARTNER WITH NETL?

Since 2020, the CSFC has operated as an NETL-led technology incubation center for collaborative partnerships to help transform the downstream chemicals sector as it looks to decarbonize its operations. The CSFC is working with industry to mature technologies that are too risky or far-term for only private-sector investment using NETL's unique capabilities and equipment. The effort is focused on scale-up, innovation, technoeconomic analysis, LCA and systems analysis and optimization.

NETL is well positioned to develop and advance the CSFC using these resources and programs:

- **Facilities and equipment** – The CSFC is composed of several facilities and advanced equipment that is best-in-class for research and development for carbon management, energy conversion, hydrogen production, process optimization, process intensification and chemical recycling.
- **Partnerships** – This NETL-led technology incubation center seeks technology development partners to assist the downstream chemicals sectors in decarbonization, carbon management and sustainability. Cost-sharing funding opportunities and partnerships are used to support these activities.
- **Experience** – NETL's comprehensive process innovation capabilities include highly skilled scientists and engineers to collaborate with and provide technical literacy. These NETL researchers are proven experts in their fields and have achieved technical breakthroughs in materials, membranes, gas separation and other discoveries related to decarbonization.
- **Funding opportunities** – The CSFC continuously monitors DOE solicitations for funding opportunity announcements that are aligned with the chemical sector decarbonization mission and connects these opportunities to organizations within the CSFC pipeline to collaborate on funding responses.



Researchers at work in the chemical looping reactor at the NETL site in Morgantown.

PARTNERSHIP OPPORTUNITIES WITH NETL

<https://netl.doe.gov/business/partnerships>



NETL is a U.S. Department of Energy national laboratory that drives innovation and delivers solutions for a clean and secure energy future by advancing carbon management and resource sustainability technologies. Through its expertise and research facilities, NETL is advancing innovations to enable environmental sustainability for all Americans. Using the power of workforce inclusivity and diversity, innovators at NETL's research laboratories in Albany, Oregon; Morgantown, West Virginia; and Pittsburgh, Pennsylvania, conduct a broad range of research activities that support DOE's mission to ensure America's security and prosperity by addressing its energy and environmental challenges through science and technology solutions.

Contacts

Charles Damianides
Executive Director
Center for Sustainable Fuels and Chemicals
Charles.Damianides@netl.doe.gov
