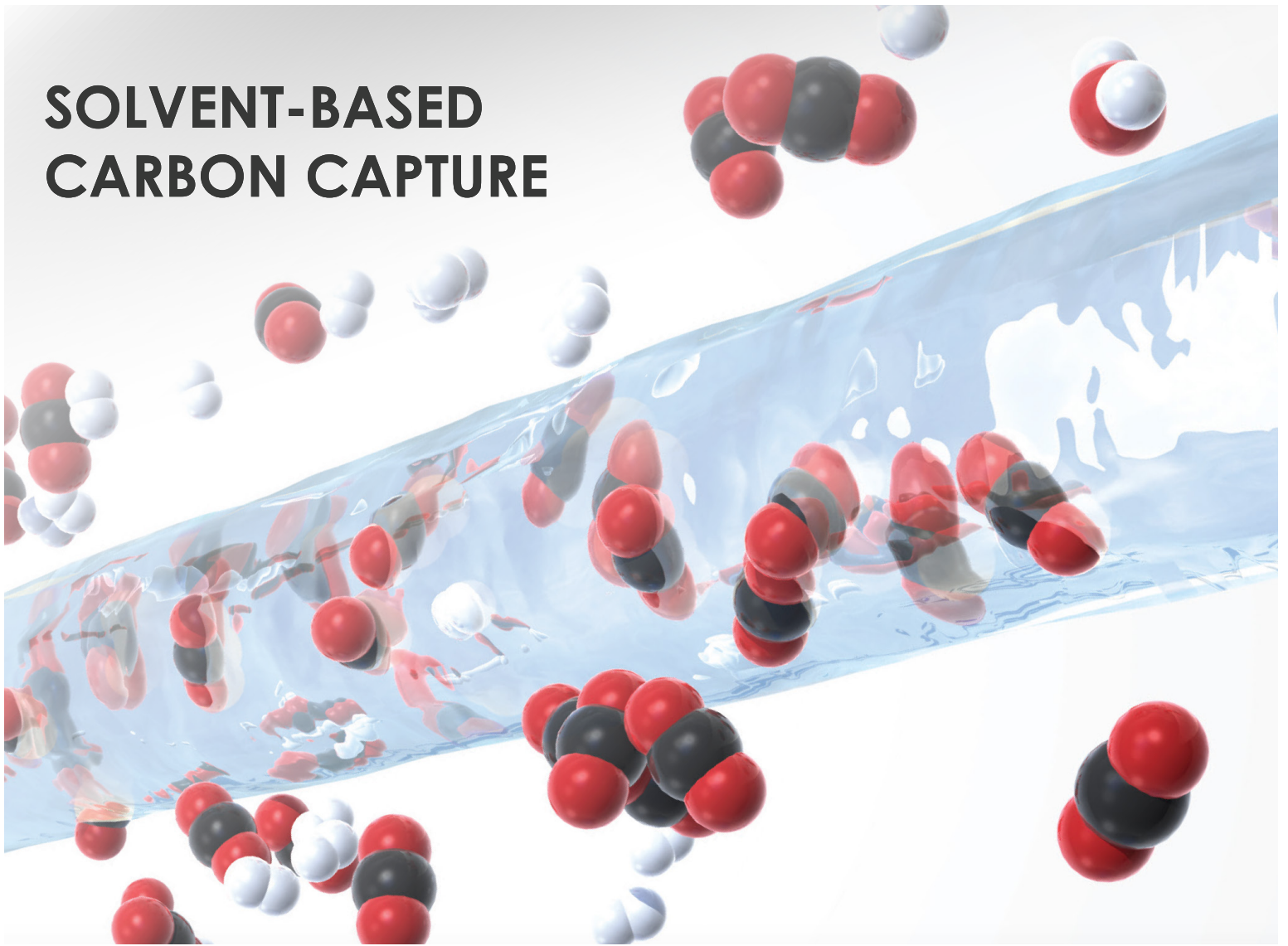


# SOLVENT-BASED CARBON CAPTURE



# NETL

NATIONAL ENERGY TECHNOLOGY LABORATORY

The natural gas industry has been using gas absorption processes based on chemical solvents to separate CO<sub>2</sub> from other gases since the 1930s, and captured CO<sub>2</sub> continues to be used for enhanced oil recovery, urea production, and food and beverage production.

As we work to develop and deploy the technologies that will move us into a decarbonized energy future, NETL researchers are hard at work advancing innovations that are accelerating our responsible transition to greater reliance on renewable and alternative energy resources. This work is especially important as NETL lends its expertise toward achieving a carbon-free power sector by 2035 and a net-zero economy by 2050 while catalyzing economic revitalization, creating good-paying jobs and supporting workers in energy communities, especially hard-hit coal, oil and gas, and power plant communities across the country.

The vision for this program is to develop a 21st century America that can make responsible use of our nation's abundant, sustainable fossil resources while reducing atmospheric CO<sub>2</sub> emissions as we move toward a sustainable energy future.

Solvent-based CO<sub>2</sub> capture research within the Carbon Capture Research Portfolio targets is improving the performance and step-change reductions in the cost and energy penalties associated with today's conventional capture technologies. Advanced solvents under investigation are those that possess high CO<sub>2</sub> loading capacities and low regeneration energies – and therefore offer the greatest potential to reduce cost, improve performance, achieve intended benefits and achieve successful commercial deployment.

This technology will apply to not only natural gas power, but also to hard-to-decarbonize industries such as cement production, steel manufacturing, and other critical consumer products.

Research in this area is combining theory, computational modeling, advanced optimization experiments, and private sector utility and industrial input to explore technology advances within, and across, each of the following three primary platforms:

**ADVANCED SOLVENT MATERIALS** — Researchers are using advanced simulation techniques in combination with a multitude of chemistry disciplines to identify, create and ultimately test innovative solvent compounds that offer superior carbon capture performance and that can be manufactured in ample quantities, all while remaining responsible stewardship of the environment.

**ADVANCED PROCESS MODELING AND EXPERIMENTATION** — Investigation is focused on reducing the extremely high current CapEx cost of today's solvent-based capture systems by gaining valuable scientific insight in areas that offer the potential for more efficient heat integration and mass transfer, advanced manufacturing and manufacturing integration to develop more economical materials for construction and packing.

**ENABLING TECHNOLOGY DEVELOPMENT** — Research in this area is identifying and examining a full range of novel advanced approaches to control solvent oxidation, corrosion, degradation and solvent emissions.

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NETL is a U.S. Department of Energy national laboratory that drives innovation and delivers technological solutions for an environmentally sustainable and prosperous energy future. Through its world-class scientists, engineers and research facilities, NETL is ensuring affordable, abundant and reliable energy that drives a robust economy and national security, while developing technologies to manage carbon across the full life cycle, enabling environmental sustainability for all Americans, advancing environmental justice and revitalizing the economies of disadvantaged communities.

Leveraging the power of workforce inclusivity and diversity, highly skilled 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 transformative science and technology solutions.

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## Contacts

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