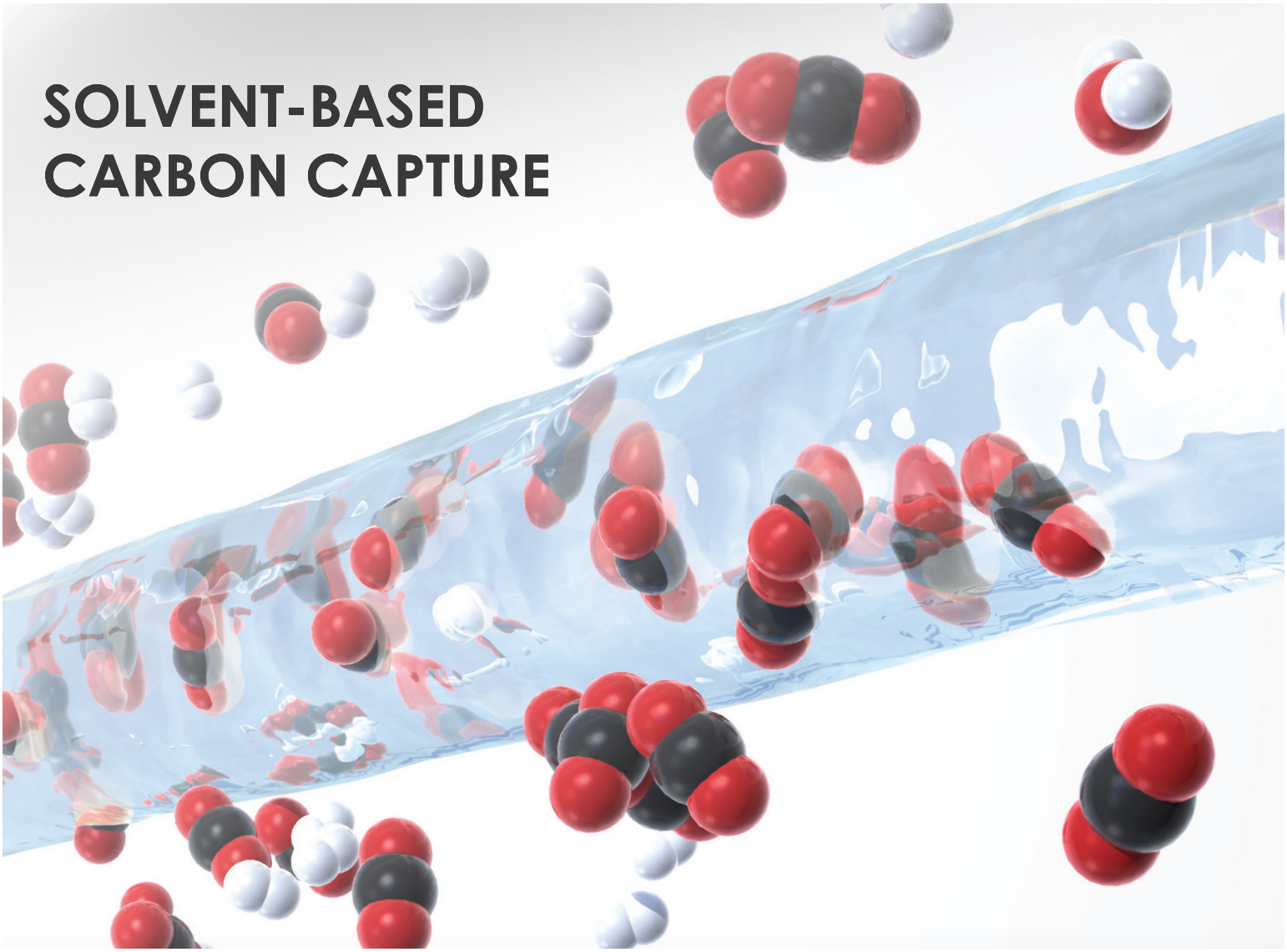
SOLVENT-BASED CARBON CAPTURE



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The removal of CO_2 from industrial gas streams is not new. The natural gas industry has been using gas absorption processes based on chemical solvents to separate CO_2 from other gases since the 1930s, and captured CO_2 continues to be used for enhanced oil recovery, urea production, and food and beverage production.

Because the maximum capacities of facilities built prior to 1999 are limited to roughly 350,000 tonnes per year, scaling up existing undersized solvent-based separation processes presents both technical and economic challenges. This is an even greater challenge for carbon capture applications -- a single 550-megawatt (MW) net output coal-fired power plant capturing 90 percent of emitted CO_2 must separate approximately 5 million tonnes of CO_2 per year.

SOLVENT-BASED CARBON CAPTURE

Solvent-based CO_2 capture research within the Carbon Capture Research Portfolio targets improved the performance and step-change reductions in the cost and energy penalties associated with today's conventional capture technologies. Advanced solvents of under investigation are those that possess high CO_2 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.

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 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 a responsible steward 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 cheaper materials of 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.

The vision for this program is to develop a 21st century America that can take advantage of our nation's abundant, sustainable fossil resources while reducing atmospheric CO_2 emissions.

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