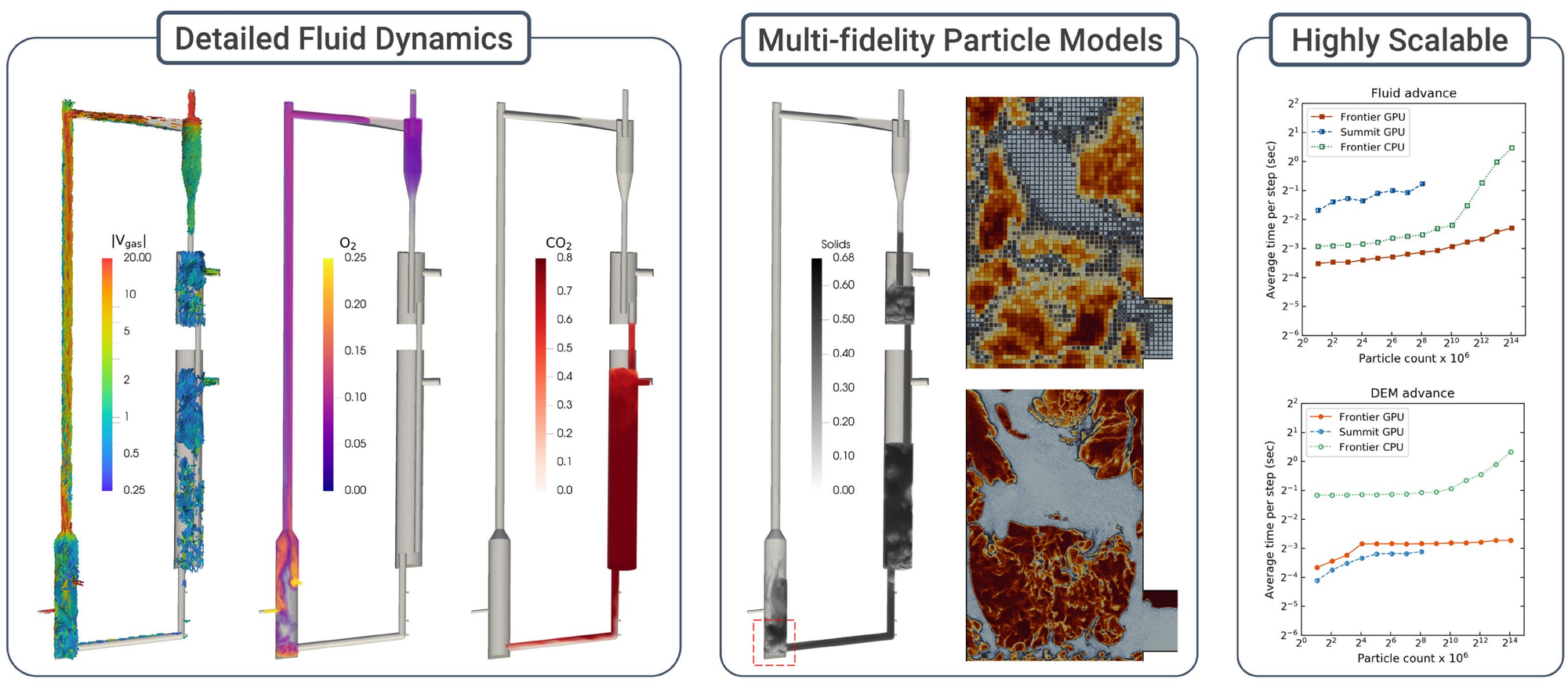
MFIX-Exa Demonstrates High-Performance Computing Capability on Nation's First Exascale Machine

MFIX-Exa is an exascale-capable multiphase computational fluid dynamics code developed by NETL to minimize risk and accelerate the deployment of emerging decarbonization technologies.



MFIX-Exa simulation of NETL's 50kW chemical looping reactor.

Key accomplishments include:

- The MFIX-Exa team successfully conducted a first-of-its-kind computational fluid dynamics-discrete element method (CFD-DEM) science run using over 80% of Frontier, the United States' first exascale-capable supercomputer. MFIX-Exa has since been used to secure several competitive awards: three Energy Research Computing Allocations to investigate industrial scale post-combustion decarbonization and catalytic fast pyrolysis of biomass; an ASCR Leadership Computing Challenge allocation of 100K compute node-hours to conduct high-fidelity simulations for scientific discovery using machine learning; and an HPC4EnergyInnovation award to improve the efficiency of a bioreactor.
- Large-scale demonstrations on DOE leadership supercomputers have established MFIX-Exa as a tool for leveraging high-performance computing to model complex multiphase flows.

DOE PROGRAM

Advanced Scientific Computing Research

NETL PARTNERS

EXASCALE COMPUTING PROJECT

BERKELEY LAB

U.S. Department of ENERGY | NATIONAL ENERGY TECHNOLOGY LABORATORY | 25 Years Powering Energy Innovation

NETL-R&D-SC-ASCR-000058