

# SUSTAINABLE WATER USE FOR FOSSIL ENERGY

## RESEARCH & DEVELOPMENT PROGRAM

Water is a critical component of coal, oil and natural gas extraction, production and use from hydraulic fracturing to power generation to carbon sequestration.

### IMPORTANT FACTS About Water & Fossil Energy

In 2015, U.S. fossil fueled thermo-electric power accounted for:

**26%** OF THE TOTAL OR **281** BILLION GALLONS

OF FRESH WATER WITHDRAWN DAILY

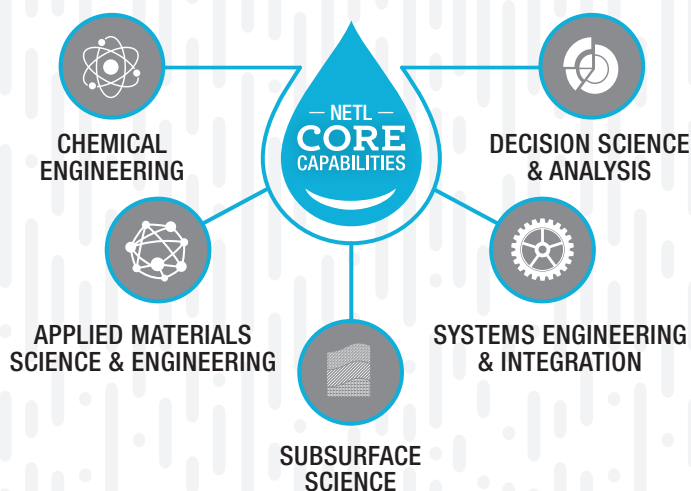
Thermoelectric power plants withdraw large volumes of fresh water but less than 3 percent is actually consumed. Most of the water is returned to its source.

Between 2012 and 2014:

**4.54** BILLION GALLONS OF WATER WAS USED ANNUALLY IN U.S. OIL AND GAS PRODUCTION

U.S. oil and gas operations also generated an estimated

**890** BILLION GALLONS OF "PRODUCED WATER" ANNUALLY



NETL applies its research and program management capabilities to solve water problems associated with coal-based power generation, oil and gas development, carbon capture and storage and other issues related to fossil energy extraction and use.

### NETL's Water-Energy R&D Thrusts



#### Advanced Cooling Technology

Focused on technology innovations that reduce evaporative loss and enhance performance associated with wet, dry, and hybrid cooling systems for thermoelectric power production.



#### Non-Traditional Water Use

Directed at characterization and treatment of non-traditional sources of water, like mine water, for power generation and oil and gas recovery.

#### Water Treatment and Detection Technology



Focused on advanced sensors, wireless networks, novel sorbents, and innovative technologies for detecting, removing, and/or recovering contaminants from oil and gas production, coal mining discharge, and effluents from fossil-based power generation.

#### Decision Science and Modeling



Engaged in development and deployment of a range of modeling, analysis and decision-making tools to evaluate the impact of fossil energy development on surface and sub-surface water resources.

### PROGRAM & PROJECT EXAMPLES

Since 2000, NETL has funded more than **150 water-energy** projects, many of which resulted in commercial technologies like cooling tower recovery processes and new ways to treat and reuse produced water.

**30 ACTIVE PROJECTS**

are currently active in water-energy areas that are worth more than **\$100 million**.

#### SPX ClearSky® Plume-Abatement System:

Recovers a significant fraction of water lost through evaporation in cooling towers.

**Recovering Rare Earth Elements from Acid Mine Drainage:** West Virginia University led development of a cost-effective and environmentally benign process to recover rare earth elements from sludge generated during acid mine drainage treatment.

#### Handheld Environmental Monitoring System:

NETL designed a new handheld laser induced breakdown spectroscopy system to measure water quality characteristics.

#### Water-Energy Modeling:

NETL developed a prototype model for the National Energy Modeling System that estimates the impact of fossil energy technologies on water resources.



U.S. DEPARTMENT OF  
**ENERGY**

