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

**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 subsurface 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.

- **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.

**IMPORTANT FACTS About Water & Fossil Energy**

- In 2015, U.S. fossil fueled thermoelectric power accounted for 26% or 281 billion gallons of fresh water withdrawn daily.
- Thermoelectric power plants withdraw large volumes of fresh water, but less than three 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.

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**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.**