Technologies Our Energy Infrastructure Needs

ADVANCED COAL TECHNOLOGIES

Advanced coal technologies — also referred to as clean coal technologies — are state-of-the-art emission control devices and boiler improvements that over several decades have led to steady increases in energy efficiency and lower emissions from coal electricity generation.

Today's power plants emit more than 90 percent fewer pollutants (SO_2, NO_X, particulates and mercury) per unit of electricity generated than the plants they replace from the 1970s.

High efficiency, low emissions (HELE) technologies eliminate nearly all regulated emissions and significantly reduce CO_2 emissions.

Examples of Advanced Coal Technologies:

High Efficiency, Low Emissions (HELE) technologies such as Supercritical and Ultra-supercritical combustion technologies are used in new pulverized coal combustion systems to operate at increasingly higher temperatures and pressures and achieve higher efficiencies than conventional units, and with significant CO_2 reductions. Using available HELE technologies will increase the current average efficiency rate of the coal fleet from 33 to 40 percent and reduce emissions by between 14 and 21 percent.

Fluidized-bed combustion utilizes limestone and dolomite during the combustion process to mitigate sulfur dioxide formation. Hundreds of these units were deployed in the U.S. and throughout the world.

Integrated Gasification Combined Cycle (IGCC) plants utilize heat and pressure to convert coal into a gas or liquid that can be further refined and used cleanly. The heat energy from the gas turbine also powers a steam turbine to generate power. IGCC has the potential to raise coal's fuel efficiency rate to 50 percent.

Low Nitrogen Oxide (NO_X) Burners reduce the creation of NO_X, a cause of ground-level ozone, by restricting oxygen and manipulating the combustion process. Low NO_X burners were installed on most coal power plants.

Electrostatic Precipitators remove particulates from emissions by electrically charging particles and then capturing them on collection plates.

Flue Gas Desulfurization (also called "scrubbers") removes large quantities of sulfur, other impurities and particulate matter from emissions to prevent their release into the atmosphere.

Selective Catalytic Reduction (SCR) achieves NO_X reductions of 80-90 percent or more and were deployed on approximately one third of U.S. coal plants.

In addition to what exists today, other technological advancements can further increase efficiency and reduce emissions. Ultra-supercritical technologies are continually being improved, resulting in units operating at even higher efficiencies than the current ultra-supercritical systems, potentially up to an efficiency rate above 50 percent.

Carbon Capture and Storage (CCS) technology also holds promise. CCS captures CO_2 emissions from the use of fossil fuels in electricity generation and industrial processes, and stores them in geologic formations or deep in the ocean where they dissolve under pressure. CCS technologies under development include: post-combustion capture from flue gas using an a mine solvent and chilled ammonia; pre-combustion capture using IGCC to isolate and capture CO_2 before it is released; and oxy-coal combustion using pure oxygen in the boiler to significantly reduce the dilution of CO_2 in the exhaust gas stream.

Like renewable energy sources such as wind and solar in their early days, these technologies require substantial investment to become commercially viable, and should receive the same kinds of investment, policy parity and support.