

LEADERSHIP

We have the courage to lead and do so through inspiration, innovation, collaboration and execution.

The Role of Advanced Coal Technologies in the Future of Energy

Energy is essential. It is part of our global economy and an engine of human and environmental progress. Every day, our world needs more energy delivered safely, reliably, affordably and cleanly. Today, the world uses twice as much electricity as it did 25 years ago.¹

Access to affordable energy is crucial for improved family budgets and economic prosperity, and a balanced energy portfolio is vital given growing electricity demand. The need for power becomes even more pronounced when one considers the billions of people in emerging economies that still have inadequate or no access to modern energy. For these families, there is no enduring light, no refrigerators to keep food fresh and no clean or safe way to heat homes.

Peabody believes that safe, environmentally responsible, high-tech coal mining and power generation offer a widely available and cost-competitive means to meet the energy needs of both developing and industrialized nations. Advanced coal technologies are a ready-today solution to satisfy global energy needs and accelerate the transition to low-carbon energy systems. There are three core steps toward this goal:

1. Continue to use coal to generate electricity, which can lift hundreds of millions from energy poverty, poor health and other hazards caused by cooking and heating with open fires.
2. Use today's high-efficiency, low-emissions (HELE) coal-fueled generation technologies to drive down carbon dioxide (CO₂) levels and regulated emission rates. There is a large build-out of these plants underway globally, with more than 800 gigawatts of advanced coal generation on line or under construction.²
3. Advance policies and investments to commercialize next-generation carbon capture, use and storage (CCUS) technologies, which offer a large-scale solution to capture CO₂ from power generation as well as industrial processes.

Peabody has long held the belief that when we put people first, we put energy first. As energy leaders, our charge is to expand energy access for families living without power, maintain a reliable supply to satisfy existing needs and plan for long-term growth. All of this points to coal's important role in the mix of fuels given its scale, availability and low cost.

¹ International Energy Agency, *World Energy Outlook*, 2016.

² Platts World Electric Power Plant Database, December 2016.

Near-Zero Emissions and Low-Carbon Projects

Peabody advocates for clean coal technologies to reduce carbon and other emissions. We have invested \$300 million over the past two decades in global partnerships and projects in Australia, China and the U.S. to deploy today's clean coal technologies and advance next-generation solutions toward the ultimate goal of near-zero emissions from coal-fueled power plants.

GreenGen

The GreenGen power plant and carbon research center in Tianjin, China, commissioned its first 250-megawatt gasification unit in 2012. GreenGen's integrated gasification combined cycle (IGCC) plant operated smoothly throughout 2016. The dry pulverized coal gasifier successfully conducted the single-brand coal gasification operation, and GreenGen completed the 72-hour full-load test on the CO₂ capture device. In later phases of development, GreenGen is expected to increase electricity generation to 650 megawatts and capture CO₂ for enhanced oil recovery in the nearby Dagang oil field. At full build, GreenGen will be among the world's largest near-zero emissions coal plants. It is a global model of ready-today technology, and Peabody is the only non-Chinese equity partner.

COAL21 Fund

Peabody is a founding member of Australia's A\$1 billion COAL21 Fund, an industry effort to pursue a collection of low-carbon technologies. This world-first, whole-of-industry funding approach is designed to support greenhouse gas abatement and is based on a voluntary levy on coal production. To date, Peabody has committed more than A\$27 million to the COAL21 Fund, which has so far directed more than A\$300 million to demonstration projects in Queensland, New South Wales and nationally, covering CO₂ capture, geological storage and methane emissions abatement at operating underground coal mines.

COAL21 was established in 2006 to help finance the pre-commercial demonstration work needed for key technologies, including research on CO₂ capture and storage. COAL21's flagship initiative is the Callide Oxyfuel Project in central Queensland, which successfully demonstrates how oxyfuel and carbon capture technology can be applied to existing power stations to generate electricity from coal with low emissions. More than two years of testing under "live" power station conditions shows that the technology is ready for application at full-scale commercial power stations, and when linked with carbon capture and storage, has the potential to reduce CO₂ emissions from coal-fueled power stations by up to 90 percent.³

U.S.-China Energy Cooperation Program

Peabody is a founding member and the co-chair of the U.S.-China Energy Cooperation Program, which includes Fortune 500 companies pursuing clean coal technology development and clean energy projects in coordination with key government agencies of both countries. The U.S. Department of Energy and the Chinese National Energy Administration are the coordinating agencies. Participants are advancing a variety of projects, including coal-based power generation with CCUS, smart power grid development and clean transportation.

Consortium for Clean Coal Utilization

Peabody is a founding member of the Consortium for Clean Coal Utilization, which is progressing research in advanced coal and carbon capture technologies at Washington University in St. Louis. Operating under the umbrella of the International Center for Advanced Renewable Energy and Sustainability, the consortium fosters partnership between universities, industry leaders and government agencies to advance clean coal technologies.

³ *Callideoxyfuel.com. Callide Oxyfuel Project, March 2017.*

Capturing Carbon on Campus

Just a few miles from Peabody's headquarters in downtown St. Louis, researchers at the Consortium for Clean Coal Utilization (CCCU) are working to score major breakthroughs in low-carbon technology. Housed within Washington University's Advanced Coal & Energy Research Facility is a functional one megawatt thermal coal-fueled power plant test site, a state-of-the-art facility where early-stage technologies conceived in laboratories and developed into pilot projects are evaluated to determine their scalability. Industry, faculty and students test carbon capture, emission controls, biomass combustion and co-firing, oxy-coal combustion, novel burner designs and process efficiency improvements. Among the facility's innovative features are the large-scale photobioreactors used to produce algae. As algae undergo the natural process of photosynthesis, the growing organisms work to capture and consume CO₂ from the exhaust gas coming from the test furnace.

The CCCU was established in 2008 with seed money from Peabody, St. Louis-based Arch Coal and St. Louis regional utility, Ameren, with a goal of advancing technologies that foster clean utilization of coal through creation of an international partnership between universities, industries and government organizations. The Consortium is helmed by Richard Axelbaum, Ph.D., the Jens Professor of Environmental Engineering Science, who believes coal will continue to be an important part of the future energy scenario, even in a carbon-constrained world.

"We need more emphasis on policy development and implementation for use of coal in a cleaner manner, particularly in developing countries. These nations need to eliminate household use of coal for heating and cooking, and instead promote its use in larger centralized plants. The resulting lower electricity costs will drive increased economic development in those regions," stated Dr. Axelbaum.



A view overlooking the Advanced Coal & Energy Research Facility at Washington University in St. Louis, where the Consortium for Clean Coal Utilization engages the world's best minds in clean coal research and aims to improve public understanding of coal as a source of energy. Peabody is a founding member of the consortium and has committed \$6.5 million since its inception.

Policies Matter, Fuel Choices Matter

When it comes to energy, we need it all. Peabody believes coal must be recognized as an essential part of a balanced energy portfolio.

Coal fuels more than 40 percent of the world's electricity,⁴ the most of any single fuel type, and is one of the primary fuels with the scale, reliability and affordability to meet demand. Each day, hundreds of millions of people around the world wake up to the benefits of coal-fueled electricity, which enables longer and better lives.

Yet, activists call to move away from use of coal, oil and natural gas, even though fossil fuels are the backbone of the world's energy supply, providing about 80 percent of total global energy consumed.⁵ Such extreme measures would leave families in the dark by turning away access to modern, affordable energy. A world without fossil fuels also would destroy the hope of a better future for billions who lack proper electricity right now.

During this time of heightened discussion about the world's use of fossil fuels, Peabody has called on industry to embrace sustainable mining, energy access and clean coal technologies. We believe that technology is the best path toward reducing greenhouse gas emissions over time, and we will continue to work with industry, government and nongovernmental organization participants on a technology path to achieve our energy, economic and environmental goals.

Peabody's senior leaders are represented on prominent industry and association boards and committees, spearheading advocacy of a technology path for long-term improvement in carbon emissions that will enable the world to use more energy, while keeping electricity reliable and affordable. They lend constructive and responsible voices, with leadership in organizations like the National Coal Council, the International Energy Agency Coal Industry Advisory Board, the Carbon Utilization Research Council, the National Enhanced Oil Recovery Initiative, the Global Carbon Capture and Storage Institute and the Australian Coal Association Low Emission Technologies Coal21 Fund.

The U.S. Presidential Election and Energy

The U.S. presidential election in November 2016 resulted in sweeping changes to the country's political climate, with Republican nominee Donald Trump winning the presidency and Republicans retaining control of both the U.S. Senate and House of Representatives.

In its America First Energy Plan, the Trump administration has stated it is committed to reviving America's coal industry and advancing clean coal technology. It also commits to energy policies that lower costs and maximize the use of American resources, including coal.⁶

Peabody is energized by the administration's goal of putting coal miners back to work and that coal is being recognized as an essential part of a balanced energy portfolio. The company plans to work with the administration and other stakeholders in both the public and private spheres on an all-of-the-above energy strategy that will advance HELE and CCUS technologies, both of which are necessary to help achieve the goal of increasingly low-carbon energy systems.

⁴ International Energy Agency, *World Energy Outlook*, 2016.

⁵ *Ibid.*

⁶ The White House, "An America First Energy Plan," March 2017.

Investment Principles for Best-in-Class Coal Companies

We expect coal to be an essential source of global electricity generation and steelmaking for many decades to come. The world needs coal to meet growing energy demand at a time when urban populations are projected to increase by 1.4 billion over the next 20 years and people embrace lifestyles powered by modern energy.

With energy being vital to life, and future energy needs heavily reliant on coal, we submit that investors consider the following principles to assess whether their target investment companies meet the vast majority of the following standards consistent with best-in-class coal companies. A set of questions to determine alignment may be reviewed in our Appendix section titled [Investment Principles Questionnaire](#).

The following best-in-class principles are core to our company and an embedded part of our culture. View Peabody's self-assessment of alignment to the Investment Principles at [PeabodyEnergy.com](#).

Sustainable Mining

- Operate safe workplaces, commit to continuous improvement in incidence rates and establish safety as a top priority principle.
- Maximize resource recovery.
- Seek ongoing improvement in environmental performance.
- Disclose which mines provide mountaintop-removal-free production.
- Commit to restoring mined lands for generations that follow.
- Respect human rights and indigenous people who are potentially impacted by mining activities.

Energy Access

- Drive partnerships and policy to achieve universal access to modern electricity.
- Engage with government, academia and other stakeholders to address major energy challenges.

Clean Coal Technologies

- Support greater deployment of advanced coal technologies and next-generation carbon capture, use and storage technologies.
- Support and drive policies to achieve the goal of near-zero emissions in the world's next-generation coal-based electricity generation fleet.

Advanced Coal Technologies: An Environmental Success Story

We believe coal is an essential part of the world's energy mix and is needed to achieve the three-part goals of energy security, economic progress and environmental solutions. Since 1970, coal-based electricity generation in the U.S. has increased about 75 percent, while regulated power plant emissions have decreased nearly 92 percent per megawatt hour.⁷

Advanced coal technologies continue to build on this progress and are broadly used today in the U.S. and around the world, making coal-fueled power plants cleaner than ever before. Today's clean coal technologies enable substantial further improvements in air quality by reducing the vast majority of sulfur dioxide (SO₂), nitrogen oxides (NO_x), particulate matter, mercury and other emissions.

⁷ U.S. Energy Information Administration, *Electric Power Monthly*, February 2017; U.S. Environmental Protection Agency, *National Air Pollutant Emission Trends & Air Market Program Database*.

SAFETY

CUSTOMER FOCUS

LEADERSHIP

PEOPLE

EXCELLENCE

INTEGRITY

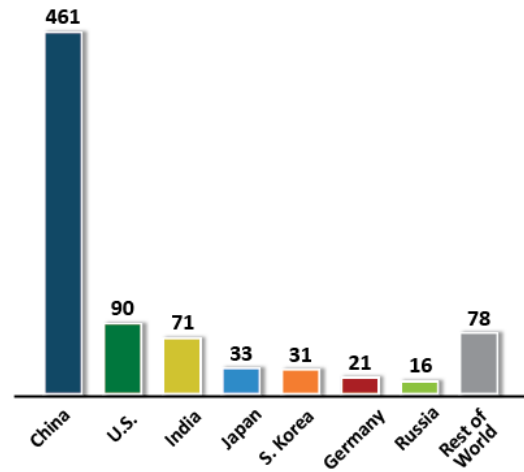
SUSTAINABILITY

During the past five years, approximately one new 500-megawatt coal-fueled power plant came on line every three days, and the majority of these plants have been developed with HELE technology.⁸ These technologies result in a smaller environmental footprint, achieving as much as a 25 percent reduction in a plant's CO₂ emission rate. Notably, when HELE plants are equipped with advanced emission controls, they achieve regulated emission rates that are 55 to 70 percent below the existing U.S. coal fleet.⁹

Since 2010, 43 countries have added over 520 gigawatts of new coal generation capacity, and a large build-out of high-efficiency coal plants is underway globally. More than 800 gigawatts of advanced coal generation are currently in operation or under construction.¹⁰

Over 800 GW of Advanced Coal Generation Currently On Line or Under Construction

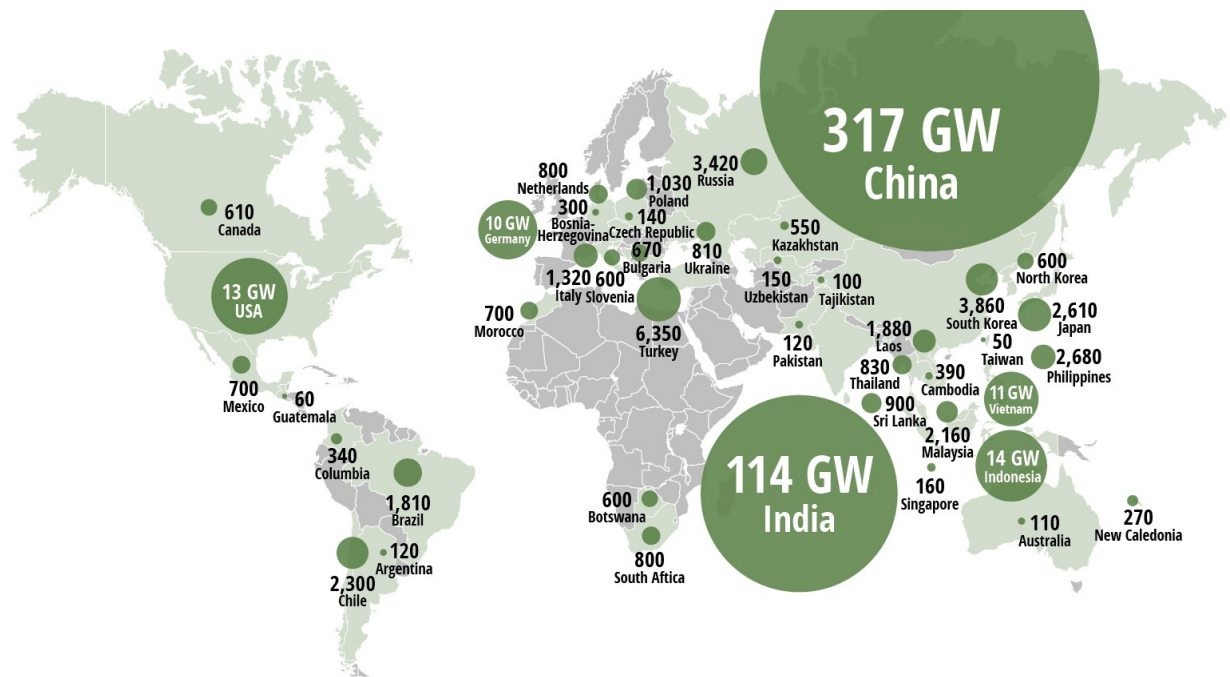
Supercritical and Ultra-supercritical Plants Operating or Under Construction.



Moving the current average global efficiency rate of coal-fueled power plants to supercritical levels could deliver the environmental benefit of reducing India's annual CO₂ emissions to zero.

Sources: Platts World Electric Power Plant Database, December 2016; World Coal Association, Platform for Accelerating Coal Efficiency concept paper, January 2015.

Since 2010, More Than 1,200 New Coal Generating Units Have Come On Line in 43 Countries



Generation capacity is represented in megawatts, with the exception of China, Germany, India, Indonesia, U.S. and Vietnam, represented in gigawatts.

Source: Platts World Electric Power Plant Database, December 2016.

⁸ Platts World Electric Power Plant Database, December 2016.

⁹ SNL from Environmental Protection Agency Database, CY2016.

¹⁰ Platts World Electric Power Plant Database, December 2016.

Peabody Honors Cleanest Coal-Fueled Plants

Through our third annual Peabody Clean Coal Awards, Peabody seeks to honor quality work to advance HELE generation and low-carbon systems. Awards are based on data available from the Environmental Protection Agency for the lowest SO₂ and NO_x emissions rates, in addition to the best efficiency (as measured by heat rate), which results in a lower carbon footprint. Starting in 2016, Peabody also recognized industry pioneers advancing modern, large-scale CCUS projects, with review by an independent panel of CCUS subject matter experts.

The 2016 winners showcased tremendous environmental success and progress toward large-scale CO₂ capture technologies that Peabody believes are essential for meeting environmental goals. The following U.S. coal-fueled power plants were recognized for top environmental performance:

Dynegy's Coffeen Plant: Best SO₂ emissions rate among U.S. coal plants. The Coffeen plant has a SO₂ emissions profile that is 99 percent better than the U.S. coal fleet average. The 915-megawatt power plant operates in central Illinois and is over 50 years old. Coffeen uses low-sulfur Powder River Basin coal and added a wet scrubber in 2009.

Southwestern Electric Power Company's (SWEPCO) John W. Turk Jr. Plant: Best NO_x emissions rate among U.S. coal plants. The Turk plant has a NO_x emissions profile that is 79 percent better than the U.S. coal fleet average. The 600-megawatt ultra-supercritical power plant was built in Fulton, Arkansas, by SWEPCO, a unit of American Electric Power, and began commercial operation in 2012.

Longview Power LLC's Longview Power Plant: Lowest heat rate among U.S. coal plants. The Longview plant operates at a level of efficiency 15 percent better than the U.S. coal fleet average. Longview's best-in-class heat rate of 9,003 Btu per kilowatt hour in 2015 continues to improve, and the company's current efficiency performance is on track to be below 8,900 Btu per kilowatt hour. The 705-megawatt supercritical power plant located in Madsville, West Virginia, was commissioned in 2011.

Mississippi Power's Kemper County Energy Facility: CCUS Pioneer. The 582-megawatt Kemper facility located in Kemper County, Mississippi, employs Transport Integrated Gasification technology that is expected to reduce CO₂ emissions by 65 percent. Judges applauded the facility's innovation in the areas of ash removal and CO₂ separation, noting "the technology holds great promise for future new electric power plants."

NRG Energy and JX Nippon Oil & Gas Exploration's Petra Nova Carbon Capture Project: CCUS Pioneer. The Petra Nova project demonstrates commercial-scale deployment of post-combustion carbon capture and is designed to capture approximately 90 percent of CO₂ emissions from a 240-megawatt equivalent slipstream of flue gas from the W.A. Parish plant in Thompsons, Texas. Judges commended the project's innovative capture technology, observing that it "represents the first large-scale retrofit of an existing coal-fired power plant."



Kevin Ziegler of Dynegy Coffeen is pictured with Russell Ray, Chief Editor of Power Engineering magazine. The Dynegy Coffeen plant has the best SO₂ emissions rates in the U.S. and uses Peabody's Powder River Basin coal.

Peabody People, Leading People

Peabody focuses on building its leadership pipeline by identifying and developing key talent throughout the organization. The company develops leaders so they have the skills to lead courageously based on the company's four leadership pillars – Inspiration, Innovation, Collaboration and Execution. Each pillar is comprised of core competencies and behavioral descriptions that assist employees across all levels to better understand leadership expectations.

Using this framework, talent review meetings are held with leadership teams across the business to discuss current and potential leaders and steps to accelerate their development. Programs like the Manager and Supervisor Development Program support the leadership pipeline down through the first-line supervisor.

Learn more about employee development and training initiatives in our [People](#) section.

