



# Coal: the cleanest energy source there is?

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Researchers have discovered a stunning new process that takes the energy from coal without burning it -- and removes virtually all of the pollution.

The clean coal technique was developed by scientists at The Ohio State University, with just \$5 million in funding from the federal government, and took 15 years to achieve.

"We've been working on this for more than a decade," Liang-Shih Fan, a chemical engineer and director of OSU's Clean Coal Research Laboratory, told FoxNews.com, calling it a new energy conversion process. "We found a way to release the heat from coal without burning."

The process removes 99 percent of the pollution from coal, which some scientists link to global warming. Coal-burning power plants produced about one-third of the nation's carbon dioxide total in 2010, or about 2.3 billion metric tons, according to the Environmental Protection Agency (EPA).

Retrofitting them with the new process would be costly, but it would cut billions of tons of pollution.

"In the simplest sense, conventional combustion is a chemical reaction that consumes oxygen and produces heat," Fan told FoxNews.com. "Unfortunately, it also produces carbon dioxide, which is difficult to capture and bad for the environment."

And simply put, the new process isn't.

## Heating, Not Burning, Coal

Fan discovered a way to heat coal, using iron-oxide pellets for an oxygen source and containing the reaction in a small, heated chamber from which pollutants cannot escape. The only waste product is therefore water and coal ash -- no greenhouse gases. As an added benefit, the metal from the iron-oxide can be recycled.

"Oxidation" is the chemical combination of a substance with oxygen. Contrast this with old-fashioned, coal-fired plants, which use oxygen to burn the coal and generate heat. This in turn makes steam, which turns giant turbines and sends power down electric lines.

The main by-product of that old process — carbon dioxide, known chemically as CO<sub>2</sub> — is released through smokestacks into the earth's atmosphere.

Fan's process, called "coal-direct chemical looping," has been proven in a small scale lab at OSU. The next step is to take it to a larger test facility in Alabama, and Fan believes the technology can be commercialized and used to power an energy plant within five to 10 years, if all goes smoothly. The technology generated 25 kilowatts of thermal energy in current tests; the Alabama site will generate 250 kilowatts.

## Can Coal Ever Be 'Clean'?

Some environmentalists are skeptical of the technology, and of the idea of clean coal in general.

"Claiming that coal is clean because it could be clean -- if a new technically unproven and economically dubious technology might be adopted -- is like someone claiming that belladonna is not poisonous because there is a new unproven safe pill under development," wrote Donald Brown at liberal think tank Climate Progress.

Yet the federal Department of Energy believes that the process can create 20 megawatts to 50 megawatts by 2020, said Jared Ciferno, the agency's director of coal and power-production research and development, in a statement.

The government plans to continue to support the project, as well as the concept of "clean coal" in general.

Meanwhile, Fan is exploring the possibility of establishing a start-up company and licensing the process to utilities, and has the potential to patent 35 different parts of the process.

Other scientists and experts are enthused about the prospects for this technology.

Yan Feng with Argonne National Laboratory's Environmental Science Division, Climate Research Section, called it "an advancement in chemical engineering. "It is very important that we act on CO2 capturing and sequestration as well as emission controls of other warming agents like tropospheric ozone and black carbon."

Adds a spokesman for Kingsport, Tenn.-based Eastman Chemical Company, a global Fortune 250 chemical manufacturer that works in clean energy, "researchers continue to uncover innovative ways to use coal efficiently/sustainably."

Concludes Dawei Wang, a research associate at OSU, the technology's potential benefits even go beyond the environment and issues like sustainability.

"The plant could really promote our energy independence. Not only can we use America's natural resources such as Ohio coal, but we can keep our air clean and spur the economy with jobs," he said.