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Carbon cloud over a green fuel

An Iowa corn refinery, open since December, uses 300 tons of coal a day to make ethanol.

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Late last year in Goldfield, Iowa, a refinery began pumping out a stream of ethanol, which supporters call the clean, renewable fuel of the future.

There's just one twist: The plant is burning 300 tons of coal a day to turn corn into ethanol - the first US plant of its kind to use coal instead of cleaner natural gas.

An hour south of Goldfield, another coal-fired ethanol plant is under construction in Nevada, Iowa. At least three other such refineries are being built in Montana, North Dakota, and Minnesota.

The trend, which is expected to continue, has left even some ethanol boosters scratching their heads. Should coal become a standard for 30 to 40 ethanol plants under construction - and 150 others on the drawing boards - it would undermine the environmental reasoning for switching to ethanol in the first place, environmentalists say.

"If the biofuels industry is going to depend on coal, and these conversion plants release their CO₂ to the air, it could undo the global warming benefits of using ethanol," says David Hawkins, climate director for the Natural Resources Defense Council in Washington.

The reason for the shift is purely economic. Natural gas has long been the ethanol industry's fuel of choice. But with natural gas prices soaring, talk of coal power for new ethanol plants and retrofitting existing refineries for coal is growing, observers say.

"It just made great economic sense to use coal," says Brad Davis, general manager of the Gold-Eagle Cooperative that manages the Corn LP plant, which is farmer and investor owned. "Clean coal" technology, he adds, helps the Goldfield refinery easily meet pollution limits - and coal power saves millions in fuel costs.

Yet even the nearly clear vapor from the refinery contains as much as double the carbon emissions of a refinery using natural gas, climate experts say. So if coal-fired ethanol catches on, is it still the "clean, renewable fuel" the state's favorite son, Sen. Tom Harkin likes to call it?

Such questions arrive amid boom times for America's ethanol industry.

With 97 ethanol refineries pumping out some 4 billion gallons of ethanol, the industry expects to double over the next six years by adding another 4.4 billion gallons of capacity per year. Tax breaks as well as concerns about energy security, the environment, and higher gasoline prices are all driving ethanol forward.

The Goldfield refinery, and the other four coal-fired ethanol plants under construction are called "dry mill" operations, because of the process they use. The industry has in the past used coal in a few much larger "wet mill" operations that produce ethanol and a raft of other products. But dry mills are the wave of the future, industry experts say. It's their shift to coal that's causing the concern.

More plants slated for Midwest, West

Scores of these new ethanol refineries are expected to be built across the Midwest and West by the end of the decade, and many could soon be burning coal in some form to turn corn into ethanol, industry analysts say.

"It's very likely that coal will be the fuel of choice for most of these new ethanol plants," says Robert McIlvaine, president of a Northfield, Ill., information services company that has compiled a database of nearly 200 ethanol plants now under construction or in planning and development.

If all 190 plants on Mr. McIlvaine's list were built and used coal, motorists would not reduce America's greenhouse gas emissions, according to an in-depth analysis of the subject to date by scientists at University of California at Berkeley, published in Science magazine in January.

Of course, many coal-fired ethanol plants on the drawing board will not be built, Mr. McIlvaine says. Others in planning for years may still choose natural gas as fuel to meet air pollution requirements in some states.

Other variations on ethanol-coal are emerging in Goodland, Kan., and Underwood, N.D., where ethanol plants are being built next to coal-burning power plants to use waste heat. Efficient, but still coal.

That could spell trouble for ethanol's renewable image.

"If your goal is to reduce costs, then coal is a good idea," says Robert Brown, director of Iowa State University's office of biorenewables. "If the goal is a renewable fuel, coal is a bad idea. When greenhouse-gas emissions go up, environmentalists take note. Then you've got a problem."

Ethanol industry officials say coal-power is just one possibility the industry is pursuing.

"I think some in the environmental community won't be all that warm and fuzzy about [coal-fired ethanol]," says Bob Dinneen, president of the Renewable Fuels Association, the national trade association for the US fuel-ethanol industry. "It's fair to say there's a trend away from natural gas, but coal is just one approach. Other technologies are part of the mix, too."

He cites, for instance, a new ethanol plant in Nebraska strategically located by a feed lot, using methane from cattle waste to fire ethanol boilers. Another new plant in Minnesota uses biomass gasification, using plant material as its fuel.

Coal for now, wood in the future

Coal may end up being merely a transitional fuel in the run-up to cellulosic ethanol, including switch grass and wood, says another RFA spokesman. While ethanol production today primarily uses only the corn kernel, cellulosic will use the whole plant.

Cellulosic ethanol, mentioned by President Bush in his State of the Union speech, could turn the tide on coal, too, by burning plant dregs in the boiler with no need for coal at all.

"It's a fact that ethanol is a renewable fuel today and it will stay that way," says Matt Hartwig, an RFA spokesman. "Any greenhouse-gas emissions that come out the tailpipe are recycled by the corn plant. I don't expect the limited number of coal-fired plants out there to change that."

Still, Hawkins insists that if ethanol is made using coal, the carbon dioxide should be captured and injected into the ground.

"We favor getting ethanol production up," Hawkins says. "But we obviously favor a cleaner process. We need large cuts in global warming emissions from transportation. It's not good enough for ethanol to simply be no worse than gasoline."

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