Director of coal project faces daunting challenge

By Jeffrey Tomich
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Coal is used to generate almost half of the world's electricity and demand is projected to grow by more than 50 percent by 2030, according to the International Energy Agency's most recent projections.

But burning coal to generate electricity is one of the top two sources of carbon dioxide, the main heat-trapping gas linked to global warming.

Curbing CO2 emissions from coal-fired power plants was a central theme at the Copenhagen talks this month, and the primary driver behind the establishment of the Consortium for Clean Coal Utilization at Washington University a year ago.

Richard Axelbaum, a professor of energy, environmental and chemical engineering, leads the consortium. The goal is to bring together university researchers, industry, foundations and government to research better ways to utilize one of the nation's most abundant, but dirtiest, fuels.

The effort is partially funded by three St. Louis area companies. Peabody Energy Corp. and Arch Coal Inc., the two largest coal producers in the nation, each committed $5 million over five years and Ameren Corp., one of the nation's biggest coal-burning utilities, agreed to give $2 million.

Does clean in "clean coal" specifically mean CO2 and other greenhouse gases?

(The term) clean really goes back about 100 years, and it has meant different things at different times. Right now, the pressing issue is reducing greenhouse gases, so present perspective of the term really is focusing on ensuring that we can burn coal in a way that doesn't emit CO2.

What do you hope the consortium can accomplish? And what's the time frame?
As you know from Copenhagen, the critical issue that really faces us is that we have to be able to minimize greenhouse gases in a way that the entire world can accept. And, clearly, a critical issue is the economics of that.

So we have to develop technologies that will supply us with electricity in a way that the difference in the cost of electricity is minimal but, at the same time, minimizing greenhouse gases. So the focus of much of what we do, probably 80 percent of the consortium, is determine the best approaches to that.

When it comes to minimizing CO2 emissions from coal-fueled power plants, the technologies most often referenced are carbon capture and sequestration (separating the carbon from coal and injecting it underground). How close are we to commercializing that technology or making it economically viable?

Right now, there are some demonstration sites that are small scale versions of carbon capture and sequestration. And there's considerable investment right now both from government and industry to develop this at a larger scale.

I expect — and this is my perspective, and there are different perspectives on the time frame — but certainly in 10 years I expect we will be seeing large scale carbon capture and sequestration sites. And I believe that in 2020 to 2030 it will ramp up considerably.

What other technologies are being studied beside carbon capture and sequestration?

Other studies are what we consider carbon capture and utilization, where you would take the CO2 and, for example, one study is to grow algae from the CO2 and use that to process into useful products. It could be nutraceuticals. Also bioproducts, biodiesel products. Also you can convert CO2 into useful fuels not from algal approaches, but from catalytic processes. We're studying that as well.

What role do the consortium's international partners play?

The consortium was really founded on the principal that the challenges of clean utilization of coal and minimizing CO2 emissions were global challenges and
really would require us working together, both so that we can transfer knowledge, but also so we can understand the challenges that the rest of the world faces in addressing emissions. So we have a major effort to ensure that the research that we support is actually going to support collaborative efforts between Washington University and other institutions in China, India, in Japan, Israel and other nations.

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