NW Energy Coalition

New Coal Technologies
Frequently Asked Questions

What are "new coal technologies"?

Conventional U.S. coal-fired power plants burn coal to boil water into steam. The steam turns a turbine to produce electricity. More than 35 new or expanded coal plants are under consideration in the interior West. A handful of the proposed plants might incorporate advanced technologies that reduce emissions of certain pollutants. The most promising new coal technology is integrated gasification combined cycle or IGCC.

An IGCC or "clean coal" plant actually combines three distinct technologies – a gasifier, a combustion turbine and a steam turbine. In the first phase, gasification, coal is heated to produce a gas. In phase two the gas turns a turbine (similar to a high-powered airplane engine) to make electricity. In phase three the excess heat from the turbine is captured and used to boil water to make steam, which is then used to make electricity.

Is IGCC a new technology?

Gasification technology dates to the 1890s; what's new is using coal as the fuel. Oil refineries and chemical manufacturing plants have used petroleum coke (a byproduct of refining oil) to fuel gasification systems for many years.

Are IGCC plants better than conventional ones?

Preliminary data from the only two currently operating IGCC projects in the United States confirm proponents' expectations of significantly reduced emission levels of criteria pollutants -- such as sulfur dioxide, nitrogen oxides, particulates and carbon monoxide -- compared to conventional coal plants. In addition, a plant not fitted to capture carbon emissions can reduce water use 40 to 50 percent and cut solid-waste volumes in half compared to a conventional coal plant.

Does IGCC reduce carbon dioxide emissions?

Coal remains our most carbon-intensive fuel, creating more carbon dioxide (CO_2) per unit of energy than any other fossil fuel. Because gasification increases fuel efficiency, an IGCC plant will emit about 20 percent less CO_2 than a traditional coal plant producing the same amount of electricity. However, this is still 20-30 percent more than would be created by a natural gas combined cycle plant producing an equivalent amount of electricity.

Can IGCC plants capture CO_2?

Yes, expensive carbon capture technology can be added to an IGCC plant, and a plant built with full carbon capture and separation technology can harvest 90-95 percent of the CO_2. Unfortunately, the capture process consumes a lot of energy itself, reducing the plant's efficiency and requiring more coal to be mined and burned. Carbon separation and capture also significantly increase water consumption because more steam is required to convert carbon monoxide to carbon dioxide in the syngas stream.

So, what DO we do with all that carbon?

Capturing $CO_2$is one thing, putting it somewhere is quite another. Sequestration -- permanently storing CO_2 rather than releasing it into the atmosphere -- is an immense technical challenge, especially when you consider the 30- to 60-year operating life of a typical facility. For example, one medium-sized facility such as the 600-megawatt IGCC plant proposed in Kalama, Wash., would need to capture approximately *2.2 million tons* of carbon a year. Over a 50-year operating life, that's *110 million tons!*

And it's not just a question of quantity. Long-term storage technology is yet unproven, and we do not know the environmental impacts of pumping millions of tons of carbon dioxide underground. Some IGCC oil refineries and chemical plants now capture CO_2 for injection into oil and natural gas fields to increase fuel harvest. The Pacific Northwest has no oil industry to create a market for captured carbon, though various sequestration technologies applicable in the West are currently being studied.

What other challenges face carbon sequestration?

Beyond the technological issues, sequestration must overcome a host of legal, regulatory and financial hurdles. Few states have established a regulatory framework for carbon storage siting and oversight, and important questions remain unresolved: Since sequestration is "forever," who will be responsible for managing and monitoring disposal sites, and how can we assign ongoing financial obligations and liability?

How does IGCC compare cost-wise to other resources?

As an emerging technology, IGCC is more expensive to build than other power generation (except for nuclear power). Electricity from a new, conventional coal plant costs, on average, about 4 cents per kilowatt-hour (kWh). Power from a new IGCC coal plant with full carbon capture and sequestration should cost 7.3-9.6 cents per kWh (factoring in the capture-related efficiency losses and sequestration expenses).

Rail transport reliability is a serious concern. Track problems often delay coal deliveries today, especially from the Powder River Basin. Relying more heavily on coal would heighten the possibility of supply disruption-related rate spikes and of utilities turning to dirtier coal supplies. The Northwest rail system is already strained; adding additional rail capacity will be costly.

Are other environmental issues associated with IGCC?

Yes. All coal extraction damages ecosystems and produces tons of hazardous wastes. Many proposed IGCC plants, including those proposed for Kalama, Wash., and Clatskanie, Ore., are located away from mines, so the coal would have to be shipped hundreds of miles by rail or barge. This creates pollution from coal dust and diesel exhaust.

For more information on the Northwest's clean and affordable energy future, contact: NW Energy Coalition, 219 1st Ave S, Suite 100, Seattle, WA 98104, (206) 621-0094, nwec@nwenergy.org