

Researchers look at fossil fuel impacts

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A team of Carnegie Mellon University researchers report that the choices U.S. officials make today could limit how the nation's future energy needs are met and could cost consumers billions in idle power plants and associated infrastructure systems.

In the upcoming Sept. 1 edition of the journal *Environmental Science and Technology*, Carnegie Mellon researchers Paulina Jaramillo, W. Michael Griffin and H. Scott Matthews show that liquefied natural gas (LNG) imported from foreign countries and used for electricity generation could have 35 percent higher lifecycle greenhouse gas emissions than coal used in advanced power plant technologies.

“Investing in LNG infrastructure today could make sense if it helps moderate natural gas prices and keeps existing natural gas power plants running. But making this investment ultimately locks us into certain technologies that make it harder for us to change paths in an increasingly carbon-constrained world,” said Matthews, an associate professor in Carnegie Mellon's Civil and Environmental Engineering Department.

The 1990s saw a surge in construction of natural gas power plants, fueled by cheap natural gas, low investment requirements and the idea that natural gas was less carbon-intensive than coal. Since these plants were constructed, natural gas prices have skyrocketed as the North American natural gas supply has become more limited. These gas plants are now operating at a very low capacity, fueling the energy industry's interest in increasing gas supply by using LNG.

Those decisions are complicated by the fact that natural gas prices may stay high because of maturing North American gas fields. Natural gas production in North America has been flat or down in each of the past six years, according to the federal government's Energy Information Administration. Increasingly, domestic natural gas will be drawn from nontraditional and more expensive sources that require the development of more complex networks to extract and deliver it to the U.S. market.

However, the increased imports of LNG and all of its indirect impacts could eliminate the environmental benefits of natural gas over coal when future carbon mitigation technologies are adopted.

The researchers point out that LNG has many indirect impacts compared to domestic gas. LNG is extracted in a foreign country, liquefied, put into a tanker to cross oceans, and then regasified and put into pipelines when it reaches the U.S. Each of these steps leads to indirect environmental impacts, such as carbon dioxide emissions from changing from gas to liquid and back. In addition, the facilities and tankers necessary to liquefy, move and regasify the natural gas expected are not plentiful and those in the works will not be up-and-running for several years.

“We continue to see that all emerging energy choices have indirect impacts,” said Jaramillo, a graduate researcher in the Department of Civil and Environmental Engineering.

The Carnegie Mellon research team also argues that the U.S. shouldn't rush to invest large amounts in a new infrastructure, such as the LNG infrastructure, without analyzing all the indirect implications of those investments compared to alternative supply options. In addition, utilities and the government should put more effort into conservation and energy efficiency that could help reduce the need for large investments. “As the options grow more complicated, the choices become harder and harder,”

said Griffin. “We just want to make certain that all the choices — and their impacts — are understood.”

Source: Carnegie Mellon University

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