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Green
Energy, the Environment and the Bottom Line

Converting Coal Plants to Biomass

By John Lorinc February 1, 2010 9:32 am

Coal-powered generating stations retrofitted to run on a mixture of coal and dried wood pellets can produce cost-competitive, emission-reduced electricity even without the advent of a cap-and-trade system, according to a new biomass life cycle analysis published in the Journal of Environmental Science and Technology.

For utilities under pressure to meet renewable portfolio standards, biomass should be considered along with wind, solar and small-scale hydro, says Heather MacLean, the lead researcher and an associate professor of civil engineering at the University of Toronto.

"The study results suggest that biomass utilization in coal generating stations should be considered for its potential to cost-effectively mitigate" greenhouse gases from coal-based electricity, the paper concluded.

The team tested the life-cycle emissions and costs of "co-firing" scenarios involving fuel with 10 to 20 percent wood pellet content.

Coal accounts for a fifth of all greenhouse gas emissions worldwide, the authors noted.

If just 10 percent co-firing were to be implemented in all coal-generating stations in the United States and Canada, "electricity generation from biomass could contribute approximately 4 percent of annual generation of the two countries," the analysis found, reducing greenhouse gas emissions by 170 million metric tons each year — or about 5 percent of emissions from the two countries' electricity sectors.

The result emerges from the Ontario government's campaign to phase out coal from the province's energy portfolio by 2014. With that deadline approaching, Ontario Power Generation, the provincial utility, has been looking to partly convert some of its coal stations to biomass made from unmarketable timber from the province's northern region, which has suffered substantial job losses in the forest sector.

Ontario Power co-sponsored the study, but Ms. MacLean says the utility didn't direct the research, which has been peer-reviewed.

Ms. MacLean also stressed that for wood-based biomass to remain an environmentally attractive alternative to coal, the timber must be harvested according to sustainable forest management practices.

She also acknowledges that the carbon released into the atmosphere by burning biomass is not necessarily reabsorbed by new plant or tree growth at the same rate, which is called carbon debt.

While the technology isn't especially complicated, a handful of utilities have successfully re-engineered coal plants to run on wood biomass.

Three years ago, the Public Service of New Hampshire spent $70 million to retrofit the 50 megawatt Schiller coal plant to run on wood chips, a project that generates a revenue stream from the sale of renewable energy certificates.

The large European utility Electrabel operates a Belgian generating station that turns pulverized wood chips into a biogas, which is then burned to produce power.