Mitigating New Emission Rules while Maintaining Sustainability with EB

By Rick Sanders

"In another policy switch from the Bush to the Obama administration, the Environmental Protection Agency (EPA) is taking new steps to address climate change. In April, the EPA started a process that will allow it to regulate greenhouse gas emissions from new motor vehicles and it's expected to soon do the same for emissions from factories, power plants and other industrial facilities."
—*www.inhousecounsel.com*

The way it is supposed to work is that the government will establish a "cap" on the amount of greenhouse gases a company can emit. The company must have an "emissions permit" for every ton of carbon dioxide it releases into the atmosphere. Over time, the amount of gas a company will be allowed to emit will become stricter, allowing for less and less pollution until the reduced goal is met.

With more regulations on the horizon, printers and converters will need a way to reduce emissions. Electron Beam (EB) technology — which is the most energy efficient technology for the converting world today—can help mitigate future cost increases.

Currently, the U.S. Congress is debating a significant piece of proposed legislation known as "cap-and-trade" (American Clean Energy and Security Act). What exactly is cap-and-trade? According to the Center for American Progress, the goal of cap-and-trade is to steadily reduce carbon dioxide and other greenhouse gas emissions economy-wide in a cost-effective way. The way it is supposed to work is that the government will establish a "cap" on the amount of greenhouse gases a company can emit. The company must have an "emissions permit" for every ton of carbon dioxide it releases into the atmosphere. These permits will set a cap on how much greenhouse gas pollution a company can emit. Over time, the amount of gas a company will be allowed to emit will become stricter, allowing for less and less pollution until the reduced goal is met. Companies will have to purchase credits for all the material they release into the atmosphere. The effect will be that the cost of burning fossil fuels will rise as companies pass on their cost to the consumers.

Some companies will have relatively lower emissions than the cap. They will, therefore, have surplus permits available for them to sell or trade to those organizations and companies who aren't as efficient in controlling their emissions.

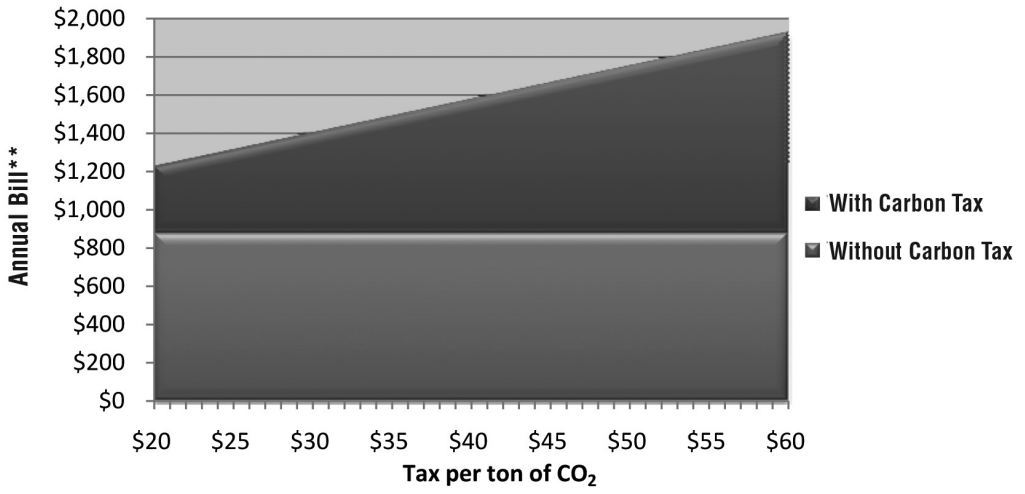
There are many articles and executive summaries on the Internet providing an assessment of the impact that cap-and-trade will have on various utilities. Below is a summary from the state of South Dakota Public Utilities Commission, April 15, 2009:[1]

In March 2009, South Dakota Public Utilities Commissioners Dusty Johnson, Steve Kolbeck and Gary Hanson requested reports from the state's investor-owned utilities and wholesale power providers on the proposed Lieberman-Warner Climate Security Act of 2007's effect on South Dakota's electric ratepayers. The primary goal of the Lieberman-Warner bill was to reduce greenhouse gas emissions 63 percent by 2050 through the enactment of a declining cap on CO_2 and other pollutants. There has been much discussion about this proposed act as well as various amendments and other versions of climate change legislation, such as the Sanders-Boxer bill, being debated in the nation's capitol. The commissioners requested the providers' analysis and asked representatives of these companies to present summaries of their findings at a Carbon Cap-and-Trade Forum held March 27 in Sioux Falls, S.D.

Those presenting at the forum made it clear that climate change legislation passed at the federal level will have a major impact on South Dakota rate payers and electric providers. The analyses provided by the power providers highlighted three major concerns. First and foremost, a cap-and-trade program would substantially increase rates, with some estimates greater than a 100 percent increase in retail rates. Second, the proposed legislation does not provide adequate time to develop effective and efficient low-carbon and carbon-capture technologies. Without sufficient commercially available tools to reduce or capture emissions, a cap-and-trade plan essentially becomes a largely unavoidable energy tax. And third, the majority of the projected revenue (as much as 80 percent) is

FIGURE 1

Estimated impact of carbon tax on annual electricity bill



*Assumes a 40 percent increase in rates per $20/metric ton tax.
**Based on the average price of retail electricty in North Dakota of $0.073 per kilowatt hour, according to data from the Energy Information Administration published January 2009 (http://www.eia.doe.gov/cneaf/electricity/epa/fig7p5.pdf). Graph assumes monthly usage of 1,000 kilowatt hours.

TABLE 1

Price per ton of CO_2

	2015	2030
Charles River Associates Institute	$48	$76
Nicholas Institute	$18	$38
Clean Air Task Force	$18	$50
Massachusetts Institute of Technology	$48	$86
National Association of Manufacturers	$55-64	$227-271
Environmental Protection Agency	$29-40	$61-83
Energy Information Administration	$30-76	$135-220

South Dakota Public Utilities Commission, "Carbon Cap and Trade: National Policy, Local Impact"

proposed to fund projects other than those devoted to carbon-capture and non-carbon emitting generation development.

As an example of the cost of CO_2 allowances, the South Dakota Public Utilities Commission projected the following price of CO_2 allowances.[1] South Dakota power providers submitted cost estimates based on several CO_2 price scenarios. As the analyses in Table 1 illustrates, allowances range from $18 to $76 per ton in 2015 for a mean of $42 per ton, and from $38 to $271 per ton in 2030 for a mean of $105 per ton.

When considering that one ton of CO_2 emissions equates almost exactly to one MWh of coal generation, the numbers in Table 1 can be used as the price per MWh for all coal generation. Most providers used the ranges given in the aforementioned studies to perform an analysis on their own generation mixes, and then derived the impact on their customers.

The North Dakota Public Service Commission projects the impact of a carbon tax on annual electricity bills (based on the assumption that a $20/metric ton tax on carbon emission) would result in a 40 percent increase[2] (Figure 1).

Conventional thinking is that the added revenue raised from the sale of these credits will be used to help develop newer and cleaner forms of energy. Ultimately, over time we will reduce our emissions of greenhouse gases.

Converters who currently use solvent- or water-based chemistries in their operation will likely have much higher emissions than the converters who don't (Figure 2). That's because after the ink and coatings are applied, they need heat and a mechanical air flow—which requires high energy demands to dry them. Plus, any released solvent-VOC must either be incinerated or captured. Not only will they have to bear the additional cost of producing electricity, they will likely have pay for any of the CO_2 emissions produced from the drying process within their plants.

For central impression flexographic (CI Flexo) printing presses, additional energy is required to manage the heat that is applied to the drum via the interstation driers. This is usually accomplished by providing a cooling capability inside the central impression drum.

In the case of CI Flexo presses, by not constantly bombarding the CI drum with heat from the interstation dryers, less energy is used for cooling the drum. As a result, print registration becomes easier to manage because you don't have the two opposing forces of heat and cooling doing battle around the drum.

FIGURE 2

Conventional central impression six-color flexo press with interstation and tunnel dryers

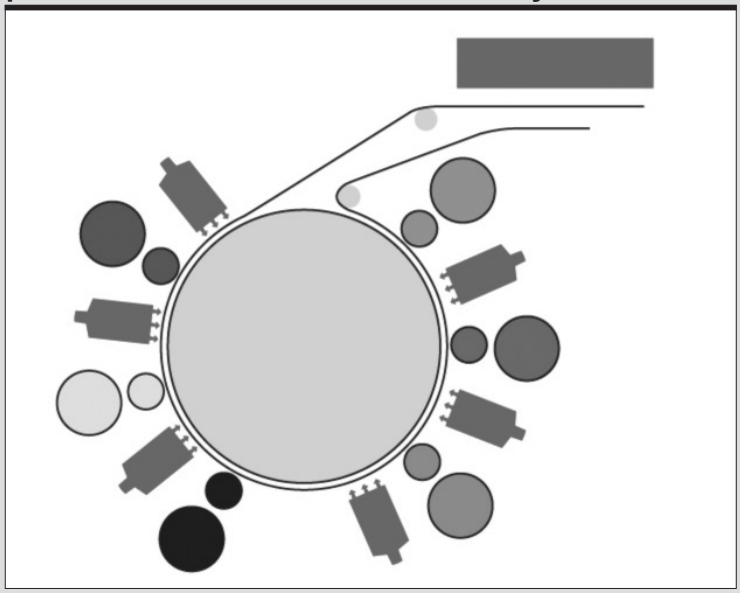


Figure 3

CI flexo press with dryers turned off

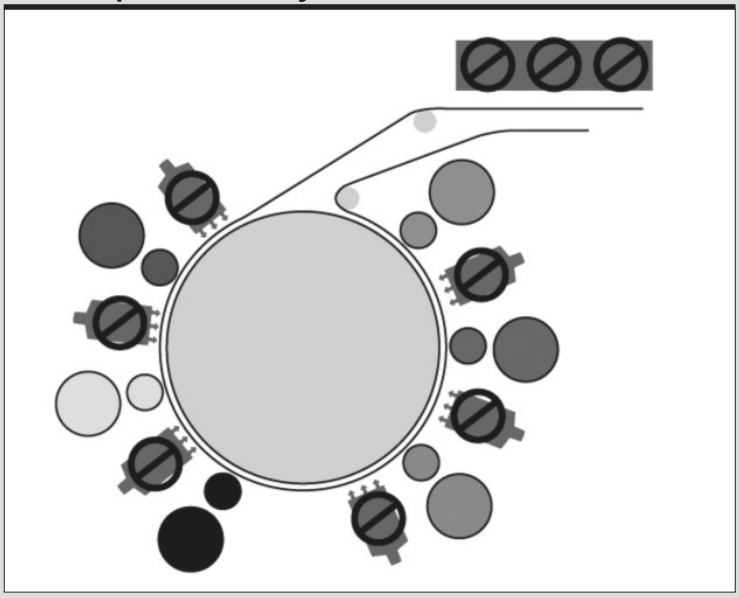
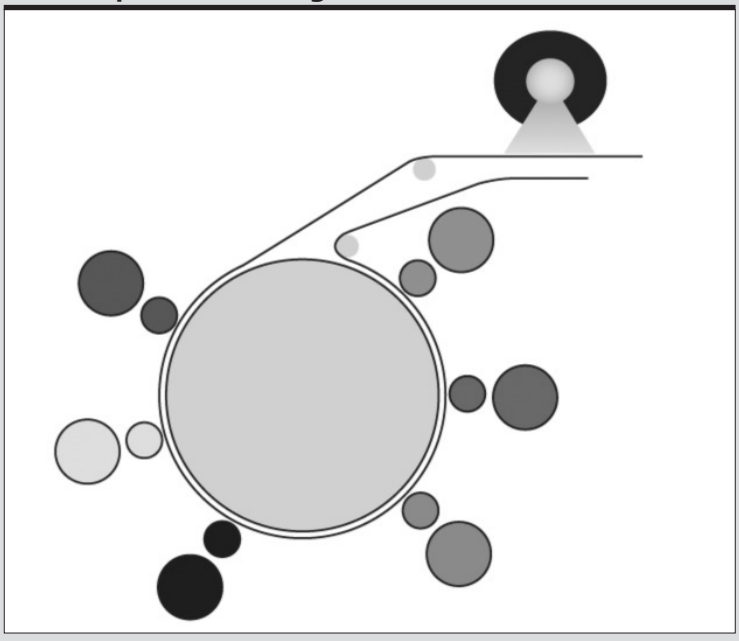


Figure 4

CI flexo press with single EB



Today's EB-curing systems are extremely energy efficient compared to conventional tunnel drying systems. There are now EB-curable inks for CI Flexo, as well as offset presses that only require a single-curing system after the last printing deck. That eliminates the need for interstation dryers and tunnel drying (Figure 3).

EB is an instant cure, high-speed technology that is environmentally friendly. Since EB-curable inks and coatings contain no solvents, they do not emit VOCs or other harmful emissions (Figure 4).

The result for those converting to EB-curing technology is that they will reduce their carbon footprint, emit fewer CO_2 emissions and use less energy than conventional curing systems. As such, they would be in a better position to sell their carbon credits to those who may need them.

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Acknowledgements

1. South Dakota Public Utilities Commission, "Carbon Cap and Trade: National Policy, Local Impact," April 15, 2009; *puc.sd.gov/commission/Events/carbonforum/CarbonCapandTradeSummaryReport.pdf*
2. North Dakota Public Service Commission, "Carbon Cap & Trade Summit, Executive Summary," April 17, 2009: *http://www.psc.state.nd.us/hottopics/Exec-Summary-Carbon-Cap-and-Trade-Summit-FinalVersion%20copy.pdf.*