Financial Risks of Carbon Capture for Coal-Fired Power Plants

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Much ado has been made over the potential of Carbon Capture and Storage (CCS) technology to lower CO_2 emissions and store or recycle them in Enhanced Oil Recovery (EOR). To date, only two CCS projects at coal plants have become operational globally and at much lower capacity than promised.

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Moderator: Liz Stanton, Director and Senior Economist, Applied Economics Clinic

Archived presentation:

https://youtu.be/OHAljNxSz8s

PowerPoint Slides

https://ieefa.org/wp-content/uploads/2020/06/Carbon-Capture-IEEFA-Pre-Conference-Presentation-17-June-2020.pdf

Q & A*

1) What is your take on CCUS technologies that transform emissions into commercial products - for example, synthetic gas?

Answer – Some new technologies seem to look promising but more research is needed and cost/economics will be a significant issue.

https://blogs.ei.columbia.edu/2019/05/29/co2-utilization-profits/

2) How are utility commissions evaluating CCS proposals? Are there lessons that have been learned to better protect ratepayers?

Answer: The New Mexico Public Regulation Commission has considered the proposal to retrofit the San Juan Generating Station as part of its analysis of whether to allow [utility] PNM to retire the coal plant. That's the only example I know of in which a utility commission recently has evaluated CCS. The retrofitted San Juan plant would be a merchant generator, so ratepayers would not be at risk unless PNM or some other investor-owned utility either voluntarily signed or was required by the commission to sign a power purchase agreement (PPA) with the new owners of the plant and the prices for power in that PPA were significantly above market prices or the prices of alternate renewable PPAs.

3) Can you describe enhanced oil recovery a bit more?

Answer: With Enhanced Oil Recovery (EOR), the captured CO_2 is piped to an oil field and then injected into the ground to produce additional oil that would otherwise not be produced. This oil is then burned or used as a chemical feedstock. There's a debate on whether EOR results in any savings in emissions of CO_2 into the atmosphere because the burning of oil or its use as a chemical feedstock results in additional CO_2 emissions.

The financial viability of EOR depends on what oil drillers are willing to pay for CO_2 which, in turn, depends on the price of oil.

4) Can [carbon capture] be profitable with just the 45Q tax credit?

Answer: Not likely. Our analyses for the San Juan Generating Station [in New Mexico] show that with reasonable assumptions about future plant operating costs and operating performance, the retrofit project would put investors at risk of losing hundreds of millions of dollars – and our analyses don't include all possible future [cost increases]. By way of contrast, you know what the future costs will be with solar and wind and solar+storage and wind+storage PPAs.

5) What's the opportunity for American companies to develop carbon capture for coal and make money by selling that technology overseas?

Answer: The opportunity for American companies to make money by selling the carbon capture technologies overseas will depend on how well it works, what it costs and how the costs of carbon capture compare to renewable prices in other countries. Although we haven't yet done the analyses, based on what we're seeing in renewables price deflation around the world and estimates of the costs of retrofitting existing coal plants with carbon capture, or building new coal plants with the technology, our expectation is that adding renewables will be a more cost-effective solution than using capture technologies to divert the CO_2 from coal plants. As my presentation indicates, we believe that research on capturing CO_2 from natural gas power plants and industrial sources should continue, as should research into the direct capture of CO_2 from the atmosphere.

6) You talk about the San Juan Generating Station competing with solar from California, however, solar is not available at night and utilities like PNM have been cautious about investing heavily in long-term battery storage. Proponents of the San Juan Generating Station say it can help balance the grid. What do you see as the best way to balance the grid while developing long-term battery storage technology?

Answer: Storage technology is already here and the prices are declining rapidly. As I noted in my presentation, the price for a solar+storage PPA in New Mexico already is about 2/3 the cost of generating power at San Juan. And that doesn't reflect expected further declines in solar and storage prices in coming years or the additional costs that introducing carbon capture will add to the cost of generating power at San Juan.

Here's a link to an excellent report on storage by my colleague Dennis Wamsted. https://ieefa.org/ieefa-report-advances-in-electricity-storage-suggest-rapid-disruption-of-u-s-electricity-sector/

7) How do you see the rentability of carbon capture from coal plants compared with carbon capture from the air (and from industries such as concrete [production])?

Answer: As I've noted, we believe that the jury is still out on the technical and financial feasibility of capturing CO_2 from natural gas plants, industrial sources, and the atmosphere – and that future research is appropriate. However, it is clear that the same is not true of capture from coal-fired generators. The industry already is rendering its verdict as it is shrinking at an accelerating pace.

8) Isn't CCS on coal plants parasitic?

Answer: Yes. As the chart on the left side of Slide 13 shows, carbon capture has higher parasitic loads – which means the internal loads needed to run the capture equipment + a higher heat rate (which means that the retrofitted plant burns fuel less efficiently).

9) Enchant says that CCS will cost $1.3 billion to build. Is that accurate?

Answer: No. As Slide 8 shows, proponents of retrofitting San Juan are claiming that the retrofit cost will be 72%, on a dollar per kilowatt basis, compared with the actual cost of adding the carbon capture facility at Petra Nova. As I've explained, we don't believe that to be a reasonable estimate.

10) Farmington joined the SPP and, ironically, a major percentage of the SPP resource mix is wind and the current market cost to buy from them is $30.43/MW.

Answer: It's hard to see any credible scenario where the cost of power from San Juan could compete with market prices in the Southwest Power Pool.

**Note that these questions were submitted by attendees during the live session but for technical reasons, were not provided to the presenter until after the event. For further information, please contact IEEFA Director of Resource Planning Analysis David Schlissel (david@schlissel-technical.com).*

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