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Coal plants with CCS likely to be competitive with low-carbon sources – study

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Ben Geman, E&E senior reporter

Building coal-fired power plants that trap carbon dioxide emissions for underground storage are likely to be competitive with other low-carbon energy sources, according to a new Harvard University study.

However, early movers in the sector will face substantially higher plant costs, with lower costs seen once the carbon capture and storage (CCS) technologies are more widely deployed, says the study from the Belfer Center for Science and International Affairs.

The report surveys projected costs for fossil-fuel plants equipped with CCS technologies -- including various pulverized coal, integrated gasification combined cycle and natural gas plants.

The range of CCS costs overlaps with other sources that do not emit heat-trapping gases, the researchers conclude, although a significant range is presented for all technologies.

"The estimates indicate that onshore wind at a good site is the lowest cost form of low carbon electricity generation (excluding intermittency costs). CCS costs are broadly comparable with those of nuclear plants and offshore wind," the report says. "The top end of the CCS cost range is comparable with the costs of Concentrated Solar Thermal (CST), but with a likely cost below that of solar PV."

However, the study also notes -- with a list of caveats -- that plants that control carbon will have room for significant cost reductions compared to more mature technologies, such as nuclear power.

"This pattern of costs is expected to change in the future as technology costs decline at different rates, reflecting current differences in maturity (as measured by installed capacity)," the report says. "Costs of less mature technologies such as solar and CCS may fall more rapidly than those of more mature technologies such as nuclear, and to a lesser extent, wind."

The report's estimates for 2030 show the range of CCS costs to be generally lower than the range for nuclear, although they overlap.

The report examines expected costs for first-wave plants as well as the lower costs expected when larger numbers of plants are deployed and the technology matures.

The report estimates that the costs of generating power from the first-of-a-kind coal plants is roughly 8 cents to 12 cents higher per kilowatt-hour compared to conventional plants. Controlling emissions from these first-mover plants would cost between $120 and $180 per ton of emissions.

Once the technologies are deployed more widely, the additional cost of electricity with carbon capture compared to conventional coal plants is an estimated 2 cents to 5 cents higher, with costs of avoided CO2 emissions an estimated $20 to $50 per ton.

Mohammed Al-Juaied, a co-author of the report, said in an interview that many barriers currently remain for CCS, such as liability and regulatory issues for large-scale underground storage.

Al-Juaied noted that plants with CCS will need assistance to be "deployable."

"They need government intervention and subsidies to help deploy them on a large scale," Al-Juaied said, noting that absent this support, "we will not be able to learn and reduce their costs."

The major climate bill that passed the House last month includes billions of dollars in new funding to help speed the deployment of CCS technologies and also includes provisions aimed at settling regulatory and legal questions about large-scale storage.

The report notes that the cost estimates are based on figures from 2008 -- a time of fast-rising costs for large capital projects. If costs drop to 2005-2006 levels, than carbon abatement costs would fall, too, it states.