



**March 18, 2019**

**Via: [Http://www.regulations.gov](http://www.regulations.gov)**

**Re: Docket ID No. EPA-HQ-OAR-2013-0495; Review of Standards of Performance for Greenhouse Gas Emissions from New, Modified, and Reconstructed Stationary Sources: Electric Utility Generating Units; 83 FR 65424**

### **COMMENTS OF THE COMPETITIVE ENTERPRISE INSTITUTE**

Thank you for the opportunity to comment on the Environmental Protection Agency's (EPA) review of its carbon dioxide (CO<sub>2</sub>) performance standards for new coal-fired power plants.<sup>1</sup> The Competitive Enterprise Institute (CEI) strongly supports EPA's proposed revisions of the standards and the analysis—the best system of emission reduction (BSER) determination—on which the standards are based.

#### **I. Introduction**

EPA sets emission performance standards for new (future) sources in numerous industrial categories under Section 111 of the Clean Air Act. Such standards are to reflect “the degree of emission limitation achievable through the application of the best system of emission reduction which (taking into account the cost of achieving such reduction and any non-air quality health and environmental impact and energy requirements) the Administrator determines has been adequately demonstrated.”

Under the Obama administration, EPA determined that partial carbon capture and storage (CCS) is the best system of emission reduction for CO<sub>2</sub> emitted by new coal power plants. Based on that determination, EPA required new units to meet an emission performance standard of 1,400 lbs. CO<sub>2</sub>/MWh.<sup>2</sup>

In the present rulemaking, EPA proposes to revise its BSER determination and the associated performance standards. EPA finds that partial CCS is too costly and geographically limited to be the adequately demonstrated BSER. Instead, EPA proposes to determine that BSER is “the most efficient demonstrated steam cycle (e.g.,

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<sup>1</sup> EPA, Review of Standards of Performance for Greenhouse Gas Emissions From New, Modified, and Reconstructed Stationary Sources: Electric Utility Generating Units; Proposed Rule, 83 FR 65424, December 20, 2018, <https://www.govinfo.gov/content/pkg/FR-2018-12-20/pdf/2018-27052.pdf>

<sup>2</sup> EPA, Standards of Performance for Greenhouse Gas Emissions From New, Modified, and Reconstructed Stationary Sources: Electric Utility Generating Units; Final Rule, 80 FR 64512, October 23, 2015, <https://www.govinfo.gov/content/pkg/FR-2015-10-23/pdf/2015-22837.pdf>

supercritical steam conditions for large units and subcritical steam conditions for small units) in combination with the best operating practices.” Based on that determination, EPA proposes to set performance standards of 1,900 lbs. CO<sub>2</sub>/MWh for new large coal power plants, 2,000 lbs. CO<sub>2</sub>/MWh for new small units, and 2,200 lbs. CO<sub>2</sub>/MWh for new coal refuse-fired units.<sup>3</sup>

## II: Overview of Key Points

1. EPA is correct: Partial carbon capture and storage is too costly and geographically limited to provide uniform (industry-wide) performance standards for new coal power plants.
2. EPA’s October 2015 final rule is a *de facto* ban on investment in new coal generation—a policy Congress never authorized and would reject if put to a vote. EPA’s proposed revisions will both repair a breach in the separation of powers and help keep electricity prices affordable for consumers.
3. Although EPA’s 2014 and 2012 proposed rules are not the focus of the current rulemaking, those actions are relevant to the larger policy discussion. The 2015 standard evolved from more aggressive proposals that are inexplicable apart from an unlawful ambition to kill the future of coal-based power.
4. EPA’s review of D.C. Circuit Court of Appeals case law should include additional discussion of *National Lime Association v. EPA*. *Lime’s* ruling that new source standards must be “achievable” in all parts of the country strengthens EPA’s argument that CCS is not an appropriate BSER because its water-intensity makes it prohibitively expensive in arid regions.
5. Another geographic constraint, although not discussed by EPA, may be even more critical. Only two utility-scale commercial CCS power plants exist in the entire world. Selling CO<sub>2</sub> to nearby enhanced oil recovery (EOR) projects is central to their business plans. Only twelve states have EOR projects.
6. EPA should review whether CCS in commercial practice—that is, in partnership with EOR—is a bona system of emission reduction. National Energy Technology Laboratory (NETL) estimates indicate that the combination of CCS and EOR emits 1.4-2.6 times more CO<sub>2</sub> than a conventional coal power plant.

## III: Carbon capture and storage is too costly to qualify as an adequately demonstrated best system of emission reduction.

Absent subsidies, few if any utilities will invest in new coal generation with carbon capture and storage. CCS adds significantly to both the capital and operating costs of

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<sup>3</sup> 83 FR 65431

new coal power plants, and the levelized cost of new conventional coal generation already tends to exceed that of natural gas combined cycle generation.<sup>4</sup>

PREDICTED COST AND CO<sub>2</sub> EMISSION LEVELS FOR A RANGE OF POTENTIAL NEW GENERATION TECHNOLOGIES  
FROM THE 2015 RULE

Technology	Emissions (lb CO <sub>2</sub> /MWh-gross)	LCOE* (\$/MWh)
SCPC—no CCS (bit) .....	1,620	76–95
SCPC—no CCS (low rank) .....	1,740	75–94
SCPC + -16% CCS (bit) .....	1,400	92–117
SCPC + - 25% CCS (low rank) .....	1,400	95–121
Nuclear (EIA) .....	0	87–115
Nuclear (Lazard) .....	0	92–132
Biomass (EIA) .....		94–113

PREDICTED COST AND CO<sub>2</sub> EMISSION LEVELS FOR A RANGE OF POTENTIAL NEW GENERATION TECHNOLOGIES  
FROM THE 2015 RULE—Continued

Technology	Emissions (lb CO <sub>2</sub> /MWh-gross)	LCOE* (\$/MWh)
Biomass (Lazard) .....		87–116
IGCC .....	1,430	94–120
NGCC .....	1,000	** 52–86

\* The emissions and LCOE (2011 \$) for the SCPC cases, IGCC, and NGCC are based on the NETL “Sensitivity to CO<sub>2</sub> Capture Rate” report. The nuclear and biomass LCOE (2011 \$) are based on data from EIA and Lazard. The LCOE ranges include an uncertainty of -15%/+30% on capital costs for SCPC and IGCC cases and an uncertainty of -10%/+30% on capital costs for nuclear and biomass cases. LCOE estimates displayed in this table for SCPC units with partial CCS as well as for IGCC units use a higher financing cost rate in comparison to the SCPC unit without capture.

\*\* This range represents a natural gas price from \$5/MMBtu to \$10/MMBtu.

Although carbon capture systems can substantially increase power plant construction costs, EPA is most concerned about the increase in operating costs. In deregulated markets, where units with the lowest operating costs are the first to be “dispatched,” CCS power plants would often go to the back of the queue, rendering them uncompetitive or even unable to recover their capital costs.<sup>5</sup>

Consequently, the current standards function as a *de facto* ban on investment in new coal generation. That is a policy Congress never authorized and would reject if put to a vote. EPA’s proposal will repair a breach in the separation of powers. It may also benefit consumers by preserving the option to utilize America’s vast coal reserves for electric power generation should changes in fuel prices or technology improve the economics of new coal generation.

#### IV: The 2015 Standards Derive from an Unlawful Agenda

Although the Obama EPA’s 2014 and 2012 proposed rules are not the focus of the current rulemaking, those actions are relevant to the larger policy discussion. The 2015

<sup>4</sup> 83 FR 65436, Table IV

<sup>5</sup> 83 FR 65438

standard evolved from more aggressive proposals that are inexplicable apart from an unlawful ambition to kill the future of coal-based power.

### 2012 Rulemaking

In April 2012, EPA proposed to determine that natural gas combined cycle (NGCC) is the adequately demonstrated best system of emission reduction for new coal power plants. EPA proposed a performance standard of 1,000 lbs. CO<sub>2</sub>/MWh for new coal power plants, because that is the “degree of emission limitation achievable through natural gas combined cycle generation.”<sup>6</sup> EPA acknowledged that no existing coal plants came close to meeting the standard. The agency estimated that the most efficient units, on average, emit 1,800 lbs. CO<sub>2</sub>/MWh.<sup>7</sup>

EPA speculated that a coal power plant equipped with CCS could meet the standard. However, EPA rejected carbon capture as BSER because “today’s CCS technologies would add around 80 percent to the cost of electricity for a new pulverized coal (PC) plant, and around 35 percent to the cost of electricity for a new advanced gasification-based (IGCC) plant.”<sup>8</sup> In short, the 2012 rulemaking proposed a standard that no commercially-viable coal plant could meet.

The proposal was too clever by half because it was downright weird. Performance standards are supposed to reflect the best “system of emission reduction.” But natural gas combined cycle is not a system of emission reduction. It is a type of power plant. Or, if it is a system of emission reduction, it is only so for gas-fired electricity. EPA was not actually proposing that new coal power plants reduce emissions to 1,000 lbs. CO<sub>2</sub>/MWh. Rather, EPA proposed to set a standard that would require utilities planning to build new coal power plants to build new NGCC power plants instead.

Claiming that natural gas combined cycle is the adequately demonstrated BSER for coal power plants is no more reasonable than claiming that zero-carbon nuclear-, hydro-, wind-, or solar-generation is best system for NGCC power plants. The 2012 proposal was the first time EPA ever defined a performance standard such that one type of source can comply only by being something other than what it is.

To make it look legal, EPA proposed to redefine source categories in the Code of Federal Regulations. Up to that point, EPA regulated coal and NGCC power plants under different parts of the Code—Subpart Da for coal boilers, and Subpart KKKK for gas turbines. The 2012 rulemaking proposed to regulate coal boilers and gas turbines as a single source category—fossil-fuel electric generating units (EGUs)—under a new subpart numbered TTTT. But only for carbon dioxide! Coal boilers and gas turbines

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<sup>6</sup> EPA, Standards of Performance for Greenhouse Gas Emissions for New Stationary Sources: Electric Utility Generating Units, Proposed rule, 77 FR 22394-22395, April 13, 2012,

<sup>7</sup> 77 FR 22417

<sup>8</sup> 77 FR 22415

would continue to be regulated as separate source categories for criteria and toxic pollutants under Subparts Da and KKKK.<sup>9</sup>

Why continue to regulate coal boilers and gas turbines as separate categories for those pollutants? EPA's answer: "This is because although coal-fired EGUs have an array of control options for criteria and air toxic air pollutants to choose from, those controls generally do not reduce their criteria and air toxic emissions to the level of conventional emissions from natural gas-fired EGUs."<sup>10</sup>

That reasoning should also preclude imposing the same carbon dioxide standard on coal boilers and natural gas turbines. As the proposal's rejection of CCS as BSER implied, coal plants have no "adequately demonstrated" options to match the CO<sub>2</sub> emissions profile of new NGCC power plants.

### 2014 Rulemaking

The rebooted proposal published in January 2014 was still a de facto ban on investment in new coal generation, just not as blatantly so. This time EPA proposed two separate standards: 1,000 lbs. CO<sub>2</sub>/MWh for new natural gas combined cycle, and 1,100 lbs. CO<sub>2</sub>/MWh for new coal power plants.<sup>11</sup> That was a distinction without a difference, because commercially-viable coal power plants, which emit 1,800 lbs. CO<sub>2</sub>/MWh, were still not within hailing distance of the standard.

EPA now proposed to determine that carbon capture and storage was the BSER for new coal power plants. EPA claimed that during the period between the original and revised proposals, several utility-scale CCS projects had made significant progress towards completion, so the technology now qualified as "adequately demonstrated."<sup>12</sup>

That assessment was unpersuasive then and is even less so now. None of the utility-scale CCS projects EPA cited were built without substantial subsidies. For example, the 2014 proposal cites the Kemper County IGCC/CCS plant on 10 different pages. Once the pride of the American fleet, Kemper received a \$270 million grant from the Department of Energy, \$133 million in tax credits from the IRS (although construction delays caused Mississippi Power to forfeit the IRS credits in October 2013),<sup>13</sup> and \$800 million in rate hikes to offset construction costs.<sup>14</sup> Yet those massive ratepayer and

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<sup>9</sup> 77 FR 22406

<sup>10</sup> 77 FR 22411

<sup>11</sup> EPA, *Standards of Performance for Greenhouse Gas Emissions From New Stationary Sources: Electric Utility Generating Units*, Proposed Rule, 79 FR 1433, January 8, 2014, <https://www.govinfo.gov/content/pkg/FR-2014-01-08/pdf/2013-28668.pdf>

<sup>12</sup> 79 FR 1434

<sup>13</sup> MIT Kemper County IGCC Fact Sheet: Carbon Dioxide Capture Project, <https://sequestration.mit.edu/tools/projects/kemper.html>

<sup>14</sup> Stephen Mufson, "'Clean coal' plant suspends work as Trump administration celebrates 'energy week,'" Washington Post, June 29, 2018, <https://www.chicagotribune.com/business/ct-southern-clean-coal-plant-shuts-down-20170629-story.html>

taxpayer subsidies could not make Kemper economically viable. On June 28, 2017, with Kemper three years behind schedule and \$4 billion over budget, Mississippi Power announced it was abandoning its “clean coal” project and planned to build a new natural gas combined cycle power plant instead.<sup>15</sup>

The Department of Energy has been funding research and development of CCS since 1997. Congress has “provided more than \$5 billion total in appropriations for DOE CCS-related activities” since fiscal year 2010.<sup>16</sup> The European Union has spent nearly \$500 million on CCS R&D.<sup>17</sup> The governments of Canada, Japan, and China also support CCS projects.<sup>18</sup> Reuters reports that public and private sources worldwide have invested \$20 billion in CCS.<sup>19</sup>

Yet today only two utility-scale commercial CCS power plants exist in the entire world: Petra Nova in Texas, which received \$167 million from DOE,<sup>20</sup> and Boundary Dam, in Saskatchewan, which received \$240 million from Canada’s federal government.<sup>21</sup> Given those facts, the claim that CCS is “adequately demonstrated”—and already was so in 2014—is preposterous.

The key point here is that EPA’s 2014 proposal was profoundly anti-coal, even if less brazen than the 2012 proposal. Any policy that makes the construction of new coal generation contingent on the receipt of substantial taxpayer and ratepayer subsidies increases the already formidable financial and political risks facing coal companies.

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<sup>15</sup> Katie Fehrenbacher, “Carbon Capture Suffers a Huge Setback as Kemper Plant Suspends Work: It’s the latest U.S. government-supported boondoggle around CCS,” Greentech Media, June 29, 2017, <https://www.greentechmedia.com/articles/read/carbon-capture-suffers-a-huge-setback-as-kemper-plant-suspends-work#gs.1yk659>; Jamie Condliffe, “Clean Coal’s Flagship Project Has Failed: A plan to slash emissions from coal burning by 65 percent has proved too problematic at the beleaguered Kemper power plant,” MIT Technology Review, June 29, 2017, <https://www.technologyreview.com/s/608191/clean-coals-flagship-project-has-failed/>

<sup>16</sup> Peter Folger, Carbon Capture and Sequestration (CCS) in the United States, Congressional Research Service, August 9, 2018, <https://fas.org/sgp/crs/misc/R44902.pdf>

<sup>17</sup> Akshat Rathi, “The EU has spent nearly \$500 million on [CCS] technology to fight climate change, with little to show for it,” Quartz, October 23, 2018, <https://qz.com/1431655/the-eu-spent-e424-million-on-carbon-capture-with-little-to-show-for-it/>

<sup>18</sup> MIT, Canada CCS Financing Overview, [https://sequestration.mit.edu/tools/projects/canada\\_ccs\\_background.html](https://sequestration.mit.edu/tools/projects/canada_ccs_background.html); Tomakomai Project Fact Sheet: Carbon Dioxide Capture and Storage Project, <https://sequestration.mit.edu/tools/projects/tomakomai.html>; Daqing Fact Sheet: Carbon Dioxide Capture and Storage Project, <https://sequestration.mit.edu/tools/projects/daqing.html>

<sup>19</sup> Aaron Sheldrick, “Japan carbon capture site shows promise in industrial use,” Reuters, April 19, 2018, <https://www.reuters.com/article/us-japan-carbon-storage/japan-carbon-capture-site-shows-promise-for-industrial-use-idUSKBN1HQ0WZ>

<sup>20</sup> MIT, Petra Nova W.A. Parish Fact Sheet: Carbon Dioxide Capture and Storage Project, [https://sequestration.mit.edu/tools/projects/wa\\_parish.html](https://sequestration.mit.edu/tools/projects/wa_parish.html)

<sup>21</sup> MIT, Boundary Dam Fact Sheet: Carbon Dioxide Capture and Storage Project, [https://sequestration.mit.edu/tools/projects/boundary\\_dam.html](https://sequestration.mit.edu/tools/projects/boundary_dam.html)



It is often said that the superior economics of gas caused the recent wave of coal plant retirements and coal company bankruptcies. That is largely correct, but the “war on coal” was nonetheless real and it took a heavy toll.<sup>22</sup> Through the mercury rule,<sup>23</sup> the saline effluent rule,<sup>24</sup> the stream buffer zone rule,<sup>25</sup> the coal leasing moratorium,<sup>26</sup> EPA’s takeover of state regional haze programs,<sup>27</sup> the 2015 new source rule, and, of course, the so-called Clean Power Plan,<sup>28</sup> the Obama administration pursued a shoot-the-wounded policy towards the U.S. coal industry.

Few investors are willing to park their capital in an industry the U.S. Government seeks to handicap, shrink, and, ultimately, eliminate. The 2012 and 2014 new source proposals reveal with shocking clarity the prior administration’s determination to preclude any revival of coal-based power in America regardless of how market conditions might change.

**V: EPA’s review of D.C. Circuit Court of Appeals case law should include additional discussion of *National Lime Association v. EPA*.**

D.C. Circuit case law holds that an adequately demonstrated BSER is “one which has been shown to be reasonably reliable, reasonably efficient and which can reasonably be expected to serve the interests of pollution control without becoming exorbitantly costly in an economic or environmental way.”<sup>29</sup> EPA finds that the significant water consumption requirements of most CCS systems make them “prohibitively expensive” to deploy in arid regions of the country.<sup>30</sup> That renders CCS

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<sup>22</sup> William Yeatman, “Yes, America, There Is a War on Coal,” GlobalWarming.Org, September 23, 2012,

<http://www.globalwarming.org/2012/09/23/yes-america-there-is-a-war-on-coal/>

<sup>23</sup> Marlo Lewis, William Yeatman, and David Bier, All Pain and No Gain: The Illusory Benefits of the Utility MACT, Competitive Enterprise Institute, June 12, 2012, <https://cei.org/issue-analysis/all-pain-and-no-gain>

<sup>24</sup> William Yeatman, “Update on EPA’s War on Coal: Trading Jobs for Bugs in Appalachia,” GlobalWarming.Org, July 23, 2011, <http://www.globalwarming.org/2011/07/23/update-on-epa%E2%80%99s-war-on-coal-trading-jobs-for-bugs-in-appalachia/>

<sup>25</sup> William Yeatman, “Obama Administration Plans Second Front in War on Appalachian Coal Production,” GlobalWarming.Org, February 2, 2011, <http://www.globalwarming.org/2011/02/02/obama-administration-plans-second-front-in-war-on-appalachian-coal-production/>

<sup>26</sup> Joby Warrick and Juliette Eilperin, “Obama announces moratorium on new federal coal leases,” Washington Post, January 15, 2016, [https://www.washingtonpost.com/news/energy-environment/wp/2016/01/14/obama-administration-set-to-announce-moratorium-on-some-new-federal-coal-leases/?utm\\_term=.d95384b1dc45](https://www.washingtonpost.com/news/energy-environment/wp/2016/01/14/obama-administration-set-to-announce-moratorium-on-some-new-federal-coal-leases/?utm_term=.d95384b1dc45)

<sup>27</sup> William Yeatman, “EPA Imposes 54<sup>th</sup> Clean Air Act Federal Takeover of a State Program (previous three presidents imposed 5 total among them),” GlobalWarming.Org, December 9, 2015, <http://www.globalwarming.org/2015/12/09/epa-imposes-54th-clean-air-act-federal-takeover-of-a-state-program-previous-3-presidents-imposed-5-total-among-them/>

<sup>28</sup> Marlo Lewis, CEI Comments on EPA’s Proposal to Repeal the Clean Power Plan, April 26, 2018,

<https://cei.org/content/comments-submitted-free-market-groups-epas-proposed-rule-repeal-clean-power-plan>

<sup>29</sup> 83 FR 65433, quoting *Essex Chem. Corp. v. Ruckelshaus*, 486 F.2d 427, 433 (D.C. Cir. 1973), cert. denied, 416 U.S. 969 (1974)

<sup>30</sup> 83 FR 65443

ineligible as BSER due to its high cost, but also due to its limited “geographic availability.”<sup>31</sup>

EPA does not spell out the premise of that criticism, which may be expressed as follows. New source performance standards are uniform, hence are intended to be achievable by any new facility built anywhere in the United States. Therefore, such standards must reflect emission reduction systems that are available at reasonable cost in all parts of the country.

In the final rule, EPA should include additional discussion of *National Lime Association v. Environmental Protection Agency* (1980). In *Lime*, the court held that new source performance standards must be “achievable” by the regulated “industry as a whole” under the “most adverse conditions” that may recur “anywhere in the country.”<sup>32</sup>

The case dealt with the lime industry’s challenge to the representativeness of the data on which EPA set particulate matter standards. The court stated, inter alia:

- EPA’s test data for determining BSER must be “representative” to ensure that the associated standards are “achievable by the industry as a whole.”
- Although an achievable standard “need not be one already routinely achieved by the industry,” a “uniform standard must be capable of being met under most adverse conditions which can reasonably be expected to recur.”
- BSER determinations should consider “variable conditions . . . that affect the efficiency of the emissions control systems considered.”
- EPA should provide “some assurance of the achievability of the standard for the industry as a whole, given the range of variable factors found relevant to the standards’ achievability.”
- “EPA itself acknowledged that standards of performance . . . must . . . meet these conditions for all variations of operating conditions being considered anywhere in the country.”

The relevance to EPA’s review of the 2015 standards is clear. Because water-intensive CCS systems are prohibitively expensive to deploy in arid regions, CCS-based

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<sup>31</sup> 83 FR 65426

<sup>32</sup> *National Lime Association, Petitioner, v. Environmental Protection Agency and Douglas M. Costle, Administrator of Environmental Protection Agency*, 627 F.2d 416 (D.C. Cir. 1980)



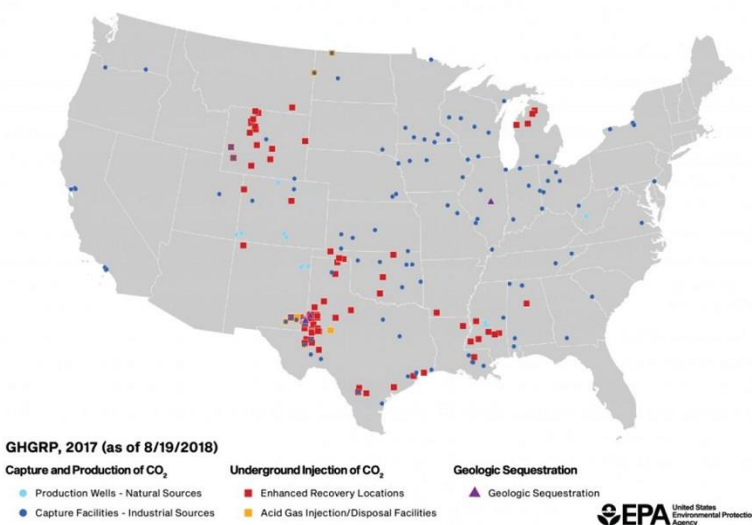
standards are not achievable in “all variations of operating conditions being considered anywhere in the country.”

As former CEI analyst William Yeatman argued in his comment letter on the 2014 proposal, “achievability” has a “geographical component.” An “adequately demonstrated” technology must be available at reasonable cost in “all parts of the country” if the associated standards are to be “achievable.”<sup>33</sup> Yeatman noted that CCS-based standards are not achievable because CCS power plants depend financially on CO<sub>2</sub> sales to enhanced oil recovery projects, which do not exist in all parts of the country. We turn to that issue next.

## **VI: CCS power plants depend financially on access to EOR projects, which do not exist in 38 states.**

As noted above, Petra Nova in Texas and Boundary Dam in Saskatchewan are the only utility-scale commercial CCS power plants in the world. Generating revenue from CO<sub>2</sub> sales to nearby EOR projects offsets the expense of their CCS systems and is a central feature of their business plans.

Many potential sites of new coal power plants are not near EOR projects. As of August 2018, twelve states had EOR projects: Montana, Wyoming, Colorado, Utah, New Mexico, Texas, Oklahoma, Louisiana, Arkansas, Mississippi, Alabama, and Michigan.<sup>34</sup>



<sup>33</sup> William Yeatman, Competitive Enterprise Institute, Initial Comments on EPA’s Proposed Standards of Performance for Greenhouse Gas Emissions from New Stationary Sources: Electricity Generating Units Docket EPA-HQ-OAR-2013-0495 RIN 2060-AQ91, January 1, 2014, <https://www.scribd.com/document/197288541/Comments-to-EPA-in-Proposed-Carbon-Pollution-Standard-on-January-1-2014>

<sup>34</sup> EPA, Capture, Supply, and Underground Injection of Carbon Dioxide, <https://www.epa.gov/ghgreporting/capture-supply-and-underground-injection-carbon-dioxide>.

Growing global petroleum demand, technological advancements, and government incentives may increase the number of states with EOR projects and pipeline networks connecting oil fields to natural and industrial CO<sub>2</sub> sources. Nonetheless, CCS cannot be adequately demonstrated when its financial viability depends on partnering with a type of petroleum production absent from 38 states.

Yeatman put it this way: “CCS without access to EOR is much more expensive than CCS with access to EOR, perhaps ‘exorbitantly’ so, and therefore unachievable.”<sup>35</sup>

## **VII. EPA should review its assessment that CCS in actual commercial practice reduces emissions.**

Yeatman was the first to spot this problem. EOR projects inject CO<sub>2</sub> captured from natural or industrial sources into older wells. That builds pressure within the field and reduces the oil’s viscosity. As a result, more oil flows to the well bore and production increases.

When the recovered oil is combusted, it emits CO<sub>2</sub>, which raises an obvious question: What is the *net change* in emissions when CCS and EOR are combined?

In a 2011 report, DOE’s National Energy Technology Laboratory (NETL) estimated that injecting 20 billion tons of CO<sub>2</sub> underground for EOR would increase U.S. oil production by 67 billion barrels.<sup>36</sup> According to EPA emissions data, combusting one barrel of oil emits, on average, 0.43 metric tons of CO<sub>2</sub>.<sup>37</sup> Plugging that conversion factor into NETL’s analysis, injection of 20 billion metric tons of CO<sub>2</sub> produces 67 billion barrels of oil that, when combusted, emit 28.81 billion metric tons of CO<sub>2</sub>. In other words, CCS combined with EOR emits 1.41 tons of CO<sub>2</sub> for every ton injected underground.

In another report, an EOR primer, NETL summarizes a Montana Tech University study of a potential CCS-EOR operation:

For example, a study by Montana Tech University found that CO<sub>2</sub> flooding of Montana’s Elm Coulee and Cedar Creek oil fields could result in the recovery of 666 million barrels of incremental oil and the storage of 2.1 trillion cubic feet (109 million metric tons) of CO<sub>2</sub>. All of the CO<sub>2</sub> required for the flood could be supplied

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<sup>35</sup> Quoting *National Asphalt Pavement Association v. Train*, 539 F.2d. 775, at 786 (D.C. Cir. 1976), which held that the cost of a best system of emission reduction may not be “exorbitant.”

<sup>36</sup> NETL, Improving Domestic Energy Security and Lowering CO<sub>2</sub> Emissions with “Next Generation” CO<sub>2</sub>-Enhanced Oil Recovery (CO<sub>2</sub>-EOR), June 20, 2011, [https://www.netl.doe.gov/projects/files/FY11\\_ImprovingDomesticEnergySecurityLoweringCO2EmissionsNextGenCO2EOR\\_060111.pdf](https://www.netl.doe.gov/projects/files/FY11_ImprovingDomesticEnergySecurityLoweringCO2EmissionsNextGenCO2EOR_060111.pdf)

<sup>37</sup> EPA, Greenhouse Gas Equivalencies Calculator—Calculations and References,

<https://www.epa.gov/energy/greenhouse-gases-equivalencies-calculator-calculations-and-references>

by a nearby, coal-fired power plant, and would equate to 7 years of the plant's CO<sub>2</sub> emissions.<sup>38</sup>

Again, using EPA's emission conversion factor, when combusted, the 666 million barrels of oil recovered would emit 286 million metric tons of CO<sub>2</sub>—more than twice the quantity (109 million metric tons) injected and sequestered. That implies an even bigger net increase than NETL's 2011 report indicates—about 2.6 tons of CO<sub>2</sub> emitted for every ton stored underground.

The standard rejoinder to such calculations is that all or most recovered oil does not increase total oil supply but simply displaces higher-cost production that would otherwise occur somewhere else. However, that assumes oil markets are perfectly “competitive” in the textbook economic theory sense.<sup>39</sup> In other words, it assumes oil producers are price takers who are powerless to influence the prices to which they respond.

If that described reality, Saudi Arabia would have reduced output barrel-for-barrel as U.S. oil production from shale surged. Instead, the Saudis increased output in hopes of driving oil prices down below U.S. firms' production costs. Or, conversely, if oil were a textbook market, U.S. firms would have decreased production as Saudi output increased. Instead, the most disciplined and resourceful increased efficiency to lower their production costs.

In the long run, because EOR enables oil companies to produce more oil at lower cost, it will tend to increase production, which will tend to hold down oil prices, which will tend to increase consumption, which will tend to increase emissions.

The 2014 proposal and 2015 rule assumed uncritically that CCS is a bona fide system of emission reduction. There is good reason to doubt that it is so in actual commercial practice. EPA should examine this set of issues.

## **VIII: Conclusion**

CEI strongly supports EPA's proposed revisions of its BSER determination and new source performance standards for coal-fired power plants.

Carbon capture and storage is too costly and geographically limited to establish uniform (industry-wide) performance standards for new coal power plants. EPA's proposed revisions will both repair a breach in the separation of powers and help keep electricity prices affordable for consumers.

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<sup>38</sup> NETL, Carbon Dioxide Enhanced Oil Recovery: Untapped Domestic Energy Supply and Long-Term Carbon Storage Solution, [https://www.netl.doe.gov/sites/default/files/netl-file/CO2\\_EOR\\_Primer.pdf](https://www.netl.doe.gov/sites/default/files/netl-file/CO2_EOR_Primer.pdf)

<sup>39</sup> Will Kenton, “Perfect Competition,” Investopedia, <https://www.investopedia.com/terms/p/perfectcompetition.asp>

Additional discussion of *National Lime Association v. EPA* would strengthen EPA's argument that CCS is an inappropriate BSER because its water-intensity renders it prohibitively expensive in arid regions.

EPA should also develop the case that CCS cannot be the BSER for new coal power plants because its commercial viability depends on access to EOR projects, which do not exist in most of the country.

Finally, EPA should review the core premise of the 2015 rule, namely, that CCS in actual commercial practice is a system of emission reduction. Lifecycle analysis based on NETL production estimates and EPA emission factors indicates that CCS combined with EOR emits more CO<sub>2</sub> than a conventional coal power plant.

Respectfully Submitted,

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