



COMMENT ON STANDARDS OF PERFORMANCE FOR
GREENHOUSE GAS EMISSIONS FROM NEW STATIONARY
SOURCES: ELECTRIC UTILITY GENERATING UNITS
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*Institute for Energy Research**

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INTRODUCTION

The Environmental Protection Agency's (EPA) proposed Standards of Performance for Greenhouse Gas Emissions from New Stationary Sources: Electric Utility Generating Units, is a fatally flawed rule. The rule is facially arbitrary and capricious because it purports to deal with climate change, but according to the rule itself, does not reduce greenhouse gas and carbon dioxide emissions.

Because the rule does not reduce carbon dioxide emissions, this means that EPA's limitation on the rate of emissions from power plants is arbitrary. It does not matter if these new source standards are implemented or not, the result will be the same with respect to climate change according to EPA's benefits analysis.

EPA claims that carbon capture and storage (CCS) is the best system of emission reduction for coal-fired power plants, but this claim is fatally flawed. The recently released National Climate Assessment explains that CCS is an experimental technology and many issues such as cost and environmental impact remain outstanding.

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EPA arbitrarily requires CCS for coal, but not for natural gas. This is despite the fact that a report that EPA cites repeatedly states that the cost of electricity generated from natural gas plant equipped with CCS is less expensive than a coal plant equipped with CCS. EPA's decision is impermissible and arbitrary. EPA is correct not to require CCS for natural gas, but EPA should be consistent and not require CCS for coal-fired power plants.

Lastly, in EPA's regulatory impact analysis, EPA used the social cost of carbon. The social cost of carbon is impermissibly arbitrary and should not be used in regulatory analyses.

These performance standards are arbitrary standards. EPA should withdraw this rule and only impose standards if the standards will have a perceptible impact on the climate change factors, such as heat waves, precipitation events, and storm surges that EPA is concerned about.

I. THE RULE IS FACIALLY ARBITRARY AND CAPRICIOUS BECAUSE THERE ARE NO BENEFITS OR IMPACTS OF ANY SORT FROM THE RULE

EPA fails to provide any justification for this rule. EPA states that it is "proposing new standards of performance for new affected fossil fuel fired electric utility steam generating units and stationary combustion turbines", but EPA provides no justification for these standards of performance. This is facially arbitrary and capricious.

EPA asks, "Why is the EPA issuing this proposed rule?"¹ The answer EPA gives is that:²

Greenhouse gas (GHG) pollution threatens the American public's health and welfare by contributing to long-lasting changes in our climate that can have a range of negative effects on human health and the environment. The impacts could include: longer, more

¹ Environmental Protection Agency, *Standards of Performance for Greenhouse Gas Emissions From New Stationary Sources: Electric Utility Generating Units*, 79 Fed. Reg. 1430, 1433, Jan. 8, 2014.

² Environmental Protection Agency, *Standards of Performance for Greenhouse Gas Emissions From New Stationary Sources: Electric Utility Generating Units*, 79 Fed. Reg. 1430, 1433, Jan. 8, 2014.

intense and more frequent heat waves; more intense precipitation events and storm surges; less precipitation and more prolonged drought in the West and Southwest; more fires and insect pest outbreaks in American forests, especially in the West; and increased ground level ozone pollution, otherwise known as smog, which has been linked to asthma and premature death. Health risks from climate change are especially serious for children, the elderly and those with heart and respiratory problems. [internal citation omitted]

From EPA's description of the problem, it would appear that this rule would reduce GHG emissions or have some impact on climate change issues. But this rule does not reduce greenhouse gas emissions, nor does it have any impact whatsoever on the climate change issues EPA claims to be concerned about.

According to EPA, "this proposed rule will result in negligible CO₂ emission changes, quantified benefits, and costs by 2022."³ In other words, there are no benefits from the rule despite EPA's alleged concerns about carbon dioxide emissions and climate change.

This lack of benefits or lack of impact whatsoever from the rule makes the rule facially arbitrary. According to EPA's analysis, it does not matter if this rule is promulgated or not. Therefore, EPA cannot justify its choice of emission rate. According to EPA's logic, the emission rate it set for coal-fired units does not matter. The emission limit could be 1,100 lb CO₂/MWh (as EPA proposes), 2,200 lb CO₂/MWh, 110,000 lb CO₂/MWh, 0 lb CO₂/MWh, or even -1,100 lb CO₂/MWh. According to EPA's logic, the outcome would be the same—the rule would have no impact.

II. BECAUSE THERE ARE NO BENEFITS OR IMPACTS FROM THIS RULE, THE RULE VIOLATES EXECUTIVE ORDERS—MORE EVIDENCE THE RULE IS ARBITRARY AND CAPRICIOUS

By failing to produce any benefits, this rule violates Executive Order 12866 and 13563. President Obama signed Executive Order 13563⁴ to safeguard

³ *Id.*

⁴ President Barak Obama, *Executive Order 13563 of January 18, 2011: Improving Regulation and Regulatory Review*, <http://www.gpo.gov/fdsys/pkg/FR-2011-01-21/pdf/2011-1385.pdf>.

against this kind of arbitrary rulemaking. In Executive Order 13563, President Obama states:⁵

Section 1. General Principles of Regulation. (a) Our regulatory system must protect public health, welfare, safety, and our environment while promoting economic growth, innovation, competitiveness, and job creation. It must be based on the best available science. It must allow for public participation and an open exchange of ideas. It must promote predictability and reduce uncertainty. It must identify and use the best, most innovative, and least burdensome tools for achieving regulatory ends. It must take into account benefits and costs, both quantitative and qualitative. It must ensure that regulations are accessible, consistent, written in plain language, and easy to understand. It must measure, and seek to improve, the actual results of regulatory requirements.

This rule fails this basic test. A rule without benefits will only harm economic growth, innovation, competition, and job creation because it adds to regulatory requirements without providing any benefit. Furthermore Executive Order 13563 further states:

As stated in that Executive Order and to the extent permitted by law, each agency must, among other things:

- (1) propose or adopt a regulation only upon a reasoned determination that its benefits justify its costs (recognizing that some benefits and costs are difficult to quantify);
- (2) tailor its regulations to impose the least burden on society, consistent with obtaining regulatory objectives, taking into account, among other things, and to the extent practicable, the costs of cumulative regulations;
- (3) select, in choosing among alternative regulatory approaches, those approaches that maximize net benefits (including potential economic, environmental, public health and safety, and other advantages; distributive impacts; and equity)

It is arbitrary and capricious for EPA to adopt a regulation when there are no benefits because it cannot therefore justify its costs, it cannot be tailored to not impose the least burdens, and it cannot maximize net benefits.

⁵ *Id.*

Executive Orders exist to guide federal agencies and protect against arbitrary actions. In this rule, but violating these Executive Orders, EPA is proposing a rule that is arbitrary and capricious.

III. EPA'S RULE ARBITRARILY PROPOSES CCS AS "BEST SYSTEM OF EMISSION REDUCTION" FOR COAL, BUT NOT NATURAL GAS

EPA explains that the key factors for determining the best system of emission reduction (BSER) is "emission reductions, technical feasibility, costs, and encouragement of technology."⁶

A. Because the rule results in "negligible" carbon dioxide emission reductions, the emission rate is impressively arbitrary for coal-fired and natural gas-fired power plants

EPA states that the purpose of section 111 of the Clean Air Act is to provide "as much [emission reduction] as practicable."⁷ This rule does not do that. According to EPA, "this proposed rule will result in negligible CO₂ emission changes, quantified benefits, and costs by 2022."⁸ The rule does not reduce carbon dioxide emissions.

EPA's determination of CCS as BSER for coal is therefore arbitrary because, according to EPA, the amount of CO₂ emissions would be the same regardless of whether or not new sources use CCS or not. The emission limit itself is arbitrary because the same emissions occur if the emission limit is 1,000 lb CO₂/MWh, 10,000 lb CO₂/MWh, or zero CO₂/MWh, or even -1,000 lb CO₂/MWh.

EPA solicits comments on whether the emission limit may be more appropriately set at a different level.⁹ First, EPA provides no evidence that it should set an emission limit because EPA's limit, according to this rule itself, will do nothing. If EPA chooses to set an emission limit, then the limit should be set at a level that has discernible impact on the climate change factors EPA identifies, namely "heat waves; more intense

⁶ Environmental Protection Agency, *Standards of Performance for Greenhouse Gas Emissions From New Stationary Sources: Electric Utility Generating Units*, 79 Fed. Reg. 1430, 1468, Jan. 8, 2014.

⁷ *Id.* at 1468.

⁸ *Id.* at 1433.

⁹ *Id.* at 1470.

precipitation events and storm surges, less precipitation and more prolonged drought in the West and Southwest, more fires and insect pest outbreaks in American forests, especially in the West; and increased ground level ozone pollution.”¹⁰ If the rule cannot discernibly impact these factors, there is no reason for the rule, and EPA should not impose an emission limit.

B. CCS is not adequately demonstrated for coal or natural gas

According to EPA, the second factor is whether the BSER is technically feasible. But the statutory language does not require mere technical feasibility, but rather whether it has been “adequately demonstrated.”¹¹

In *Portland Cement Association v. Ruckelshaus*,¹² the D.C. Circuit stated that the technology must be “available” and not technology “which constitutes a purely theoretical or experimental means of preventing or controlling air pollution.” The court further explained, “The Administrator may make a projection based on existing technology, though that projection is subject to the restraints of reasonableness and cannot be based on ‘crystal ball’ inquiry.”¹³

Furthermore, in *National Lime Association v. EPA*, the D.C. Circuit considered whether EPA’s pollution control regulations for lime kilns had been “adequately demonstrated.”¹⁴ The court held that EPA must consider “the representativeness for the industry as a whole of the tested plants on which it relies.”¹⁵

In the current rule, EPA fails these tests for the requirement that CCS is BSER for coal plants. First, contrary to EPA’s position in this rule, stating that CCS is BSER is a forbidden “crystal ball inquiry” prohibited by *Portland Cement*. Furthermore, EPA provides no evidence CCS is representative technology for the industry as a whole as required by *National Lime*.

The recently released National Climate Assessment (which EPA contributed to) explains why requiring CCS is a crystal ball inquiry with

¹⁰ *Id.* at 1433.

¹¹ *See Clean Air Act*, §111.

¹² *Portland Cement Ass’n v. Ruckelshaus*, 486 F.2d 375 (D.C. Cir. 1973).

¹³ *Portland Cement Ass’n v. Ruckelshaus*, 486 F.2d 375, 391 (D.C. Cir. 1973).

¹⁴ *Nat’l Lime Ass’n v. EPA*, 627 F.2d 416, 431 (D.C. Cir. 1980).

¹⁵ *Nat’l Lime Ass’n v. EPA*, 627 F.2d 416, 431, 433 (D.C. Cir. 1980).

many, critical unknowns. According to the National Climate Assessment:¹⁶

CCS facilities for electric power plants are currently operating at pilot scale, and a commercial scale demonstration project is under construction. Although the potential opportunities are large, many uncertainties remain, including cost, demonstration at scale, environmental impacts, and what constitutes a safe, long-term geologic repository for sequestering carbon dioxide.

EPA played a substantial role in the National Climate Assessment. According to EPA:¹⁷

The National Climate Assessment (NCA) is an ongoing activity, with required reports to the President and Congress that integrate, evaluate, and interpret the findings of the U.S. Global Change Research Program (USGCRP). EPA is one of thirteen federal agencies that comprise the USGCRP and has been a substantial contributor to the NCA.

EPA cannot, in this current rule, argue that CCS for coal is adequately demonstrated, while on the other hand, in the National Climate Assessment state there are issues regarding “cost, demonstration at scale, environmental impacts,” and long term storage of carbon dioxide.

Furthermore, the statement on CCS in the National Climate Assessment raises implies that EPA has not conducted enough research on the rule, specifically on the “cost, demonstration at scale, [and] environmental impacts” as stated in the National Climate Assessment.

In *Portland Cement Association v. Ruckelshaus* the D.C. Circuit held “section 111 of the Clean Air Act, properly construed, requires the functional equivalent of a NEPA impact statement.”¹⁸ But EPA has not conducted such an analysis given the fact that the National Climate Assessment states there are significant outstanding issues.

¹⁶ U.S. Global Change Research Program, *Climate Change Impacts in the United States*, U.S. National Climate Assessment, http://nca2014.globalchange.gov/system/files_force/downloads/low/NCA3_Climate_Change_Impacts_in_the_United%20States_LowRes.pdf?download=1.

¹⁷ Environmental Protection Agency, *National Climate Assessments*, <http://www.epa.gov/research/climatescience/climate-nationalassessments.htm>.

¹⁸ *Portland Cement Ass'n v. Ruckelshaus*, 486 F.2d 375 (D.C. Cir. 1973).

More evidence that requiring CCS is an impermissible “crystal ball inquiry” is the fact that there is not a single utility scale power plant in the world that is using CCS. Furthermore, there isn’t a single power plant EPA among those it alleges are “commercial” that did not take over \$100 million in subsidies from the government. All plants so far are experimental and none are operating, contrary to the requirement of *Portland Cement*. EPA discusses four plants.

- The Kemper County Energy Facility received a \$270 million grant from the Department of Energy and \$133 million in investment tax credits approved by the IRS. Originally it was projected to cost \$2.4 billion project but is now estimated to cost \$5.5 billion.¹⁹
- SaskPower’s Boundary Dam project is estimated to cost \$1.24 billion to build a small 110 MW power plant. The project received \$240 million from the Canadian federal government in 2010²⁰ and as of October 2013, the project was \$115 million over budget.²¹
- The Texas Clean Energy Project received \$450 million from the Department of Energy under the DOE’s Clean Coal Power Initiative. This project is still in the planning phase and ground has not been broken for the plant. In fact the plant lost its power purchase agreement with CPS Energy because of delays.²²
- Hydrogen Energy California is funded in part by a \$408 million grant from the U.S. Department of Energy and \$437 million of tax credits.²³ The project is still in the planning phase.

All of these plants are experimental and only Kemper and SaskPower

¹⁹ See e.g. Christa Marshall, *\$5.5B Kemper carbon capture project to be delayed until 2015*, ClimateWire, Apr. 30, 2014.

²⁰ Carbon Capture & Sequestration Technologies @ MIT, *Boundary Dam Fact Sheet*, Carbon Dioxide Capture and Storage Project, http://sequestration.mit.edu/tools/projects/boundary_dam.html.

²¹ *Id.*

²² CPS Energy, *CPS Energy’s purchase power agreement with Texas Clean Energy Project expired Dec. 31*, Jan. 6, 2014, <http://newsroom.cpsenergy.com/blog/traditional-fuels/coal-traditional-fuels/cps-energys-ppa-texas-clean-energy-project-expired-dec-31/>.

²³ Carbon Capture & Sequestration Technologies @ MIT, *Hydrogen Energy California Project (HECA) Fact Sheet: Carbon Dioxide Capture and Storage Project*, <http://sequestration.mit.edu/tools/projects/heca.html>. Carbon Capture & Sequestration Technologies @ MIT, *Plant Barry Fact Sheet: Carbon Dioxide Capture and Storage Project*, https://sequestration.mit.edu/tools/projects/plant_barry.html.

Boundary Dam are even under construction.²⁴

Both Kemper and Boundary Dam are not representative of the nation as a whole because both “rely on special circumstances.”²⁵ Plants that rely on “special circumstances” cannot be used as a model for the rest of the nation. As noted above, *National Lime* requires EPA to consider “the representativeness for the industry as a whole” and special circumstances are not representative of the industry as a whole.

Furthermore, according to Howard Herzog, senior research engineer with the MIT Energy Initiative, these plants only exist because they possibly could sell the CO₂ for enhanced oil recovery. Herzog states, “If they couldn’t sell the CO₂ for enhanced oil recovery, the project wouldn’t have been economic.”²⁶

The following is a chart from the Oil and Gas Journal showing CO₂-EOR operations.²⁷ From many locations for coal-fired power plants, such as in the mid-west, there are no CO₂ pipelines and none proposed. This means that requiring CCS fails the *National Lime* test because the CCS-EOR technology cannot be representative.

²⁴ EPA also points to Alabama Power Plant Barry. This plant is a small CCS experiment which received \$67 million from the federal government.

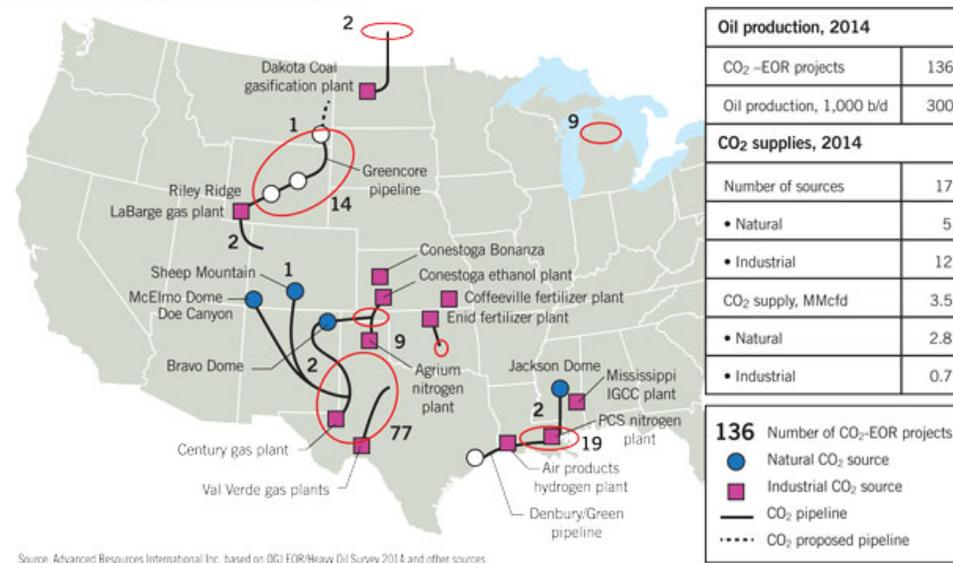
²⁵ See Peter Fairley, *Two Carbon-Trapping Plants Offer Hope of Clean Coal*, MIT Technology Review, May 5, 2014, <http://www.technologyreview.com/news/527036/two-carbon-trapping-plants-offer-hope-of-cleaner-coal/>.

²⁶ See Peter Fairley, *Two Carbon-Trapping Plants Offer Hope of Clean Coal*, MIT Technology Review, May 5, 2014, <http://www.technologyreview.com/news/527036/two-carbon-trapping-plants-offer-hope-of-cleaner-coal/>.

²⁷ CO₂-EOR set for growth as new CO₂ supplies emerge, Oil & Gas Journal, May 5, 2014, <http://www.ogj.com/articles/print/volume-112/issue-5/drilling-production/co-sub-2-sub-eor-set-for-growth-as-new-co-sub-2-sub-supplies-emerge.html>.

CO₂-EOR OPERATIONS, CO₂ SOURCES: 2014

FIG. 1



C. EPA arbitrarily considers CCS costs from NETL for coal, but does not consider that according to NETL, electricity generated from natural gas CCS plants is less expensive than coal

As outlined above, in determining BSER, after considering the emission reductions and whether the technology has been adequately demonstrated, the next consideration is costs.²⁸

In the current rule, EPA states that the proposed emission limit is 1,100 lb CO₂/MWh for coal.²⁹

This action proposes a standard of performance for utility boilers and IGCC units based on partial implementation of carbon capture and storage (CCS) as the BSER [best system of emission reduction]. The proposed emission limit for those sources is 1,100 lb CO₂/MWh. This action also proposes standards of performance for natural gas-fired stationary combustion turbines based on

²⁸ See Environmental Protection Agency, *Standards of Performance for Greenhouse Gas Emissions From New Stationary Sources: Electric Utility Generating Units*, 79 Fed. Reg. 1430, 1462, Jan. 8, 2014.

²⁹ *Id.* At 1433.

modern, efficient natural gas combined cycle (NGCC) technology as the BSER. The proposed emission limits for those sources are 1,000 lb CO₂/MWh for larger units and 1,100 lb CO₂/MWh for smaller units.

To justify the costs of these limitations, EPA states, “The cost assumptions and technology configurations for these cost estimates are provided in the DOE/NETL ‘Cost and Performance Baseline’ reports.”³⁰

EPA heavily relied on this report from DOE/NETL. EPA cited this study five times on six different pages.³¹ For example, in arguing that CCS is technically feasible for coal, EPA states, “In addition, DOE/NETL has prepared other reports—in particular their “Cost and Performance Baseline” reports, including one on partial capture—that further support our proposed determination of the technical feasibility of partial capture.”³²

EPA, however, arbitrarily omits the fact that according to this DOE/NETL study, natural gas with CCS produces less expensive electricity than coal with CCS. DOE/NETL states:³³

- Total overnight cost (TOC) for the non-capture plants are as follows: **NGCC [natural gas combined cycle], \$718/kW; PC [pulverized coal], \$2,010/kW (average); IGCC [integrated gasification combined cycle (coal)], \$2,505/kW (average)**. With CO₂ capture, capital costs are: NGCC, \$1,497/kW; PC, \$3,590/kW (average); IGCC, \$3,568/kW (average).
...
- When today’s technology for CO₂ capture and sequestration (CCS) is integrated into these new power plants, the resultant COE [cost of electricity], including the cost of CO₂ TS&M [transporting, storing, and monitoring], is: **86 mills/kWh for NGCC; 108 mills/kWh (average) for PC; and 112 mills/kWh (average) for IGCC.** [emphasis added]

To further put this study in context, DOE/NETL explains the objective of

³⁰ *Id.* at 1435.

³¹ See EPA, *Standards of Performance*, 79 Fed. Reg. at 1435, 1468, 1471, and 1476.

³² *Id.* at 1471.

³³ National Energy Technology Laboratory, *Cost and Performance Baseline for Fossil Energy Plants Volume 1: Bituminous Coal and Natural Gas to Electricity*, Revision 2a, Sept. 2013, DOE/NETL-2010/1397, at vi, http://www.netl.doe.gov/File%20Library/Research/Energy%20Analysis/OE/BitBase_FinRep_Rev2a-3_20130919_1.pdf.

this study as is to provide an accurate, independent assessment of the costs of the technology. DOE/NETL states:³⁴

To establish baseline performance and cost estimates for today's fossil energy plants, it is necessary to look at the current state of technology. Such a baseline can be used to benchmark the progress of the Fossil Energy RD&D portfolio. This study provides an accurate, independent assessment of the cost and performance for Pulverized Coal (PC) Combustion, Integrated Gasification Combined Cycles (IGCC), and Natural Gas Combined Cycles (NGCC), all with and without carbon dioxide (CO₂) capture and sequestration assuming that the plants use technology available today.

When EPA provides the rationale for emissions standards for natural gas-fired stationary combustion turbines, however, EPA does not cite the DOE/NETL study.³⁵ In fact, EPA does not cite a single study, paper, or even a technical support document in making its determination on natural gas. In justifying EPA's position not to require CCS for natural gas, despite the fact that the NETL study explains that it is cheaper than coal, EPA bases its conclusions on mere assertions.

For example, EPA asserts, "We do not consider full or partial capture CCS to be BSER because of insufficient information to determine technical feasibility and because of adverse impact on electricity prices and the structure of the electric power sector."³⁶

EPA also states, "it is not clear that full or partial capture CCS is technically feasible for this source category. There are significant differences between natural gas-fired combustion turbines and solid fossil fuel-fired EGUs that lead us to this conclusion."³⁷ This may or may not be true, but EPA does not provide any justification for this nor does EPA explain why DOE/NETL's assessment is incorrect on the issue of CCS and natural gas.

³⁴ National Energy Technology Laboratory, *Cost and Performance Baseline for Fossil Energy Plants Volume 1: Bituminous Coal and Natural Gas to Electricity*, Revision 2a, Sept. 2013, DOE/NETL-2010/1397, at v, http://www.netl.doe.gov/File%20Library/Research/Energy%20Analysis/OE/BitBase_FinRep_Rev2a-3_20130919_1.pdf.

³⁵ EPA, *Standards of Performance*, 79 Fed. Reg. at 1485.

³⁶ EPA, *Standards of Performance*, 79 Fed. Reg. at 1485.

³⁷ *Id.*

IV. USING CAPTURED CO₂ FOR EOR WOULD RESULT IN A NET INCREASE IN CO₂ EMISSIONS

EPA believes that the CO₂ captured from power plants would be used for enhanced oil recovery (EOR). EPA states:³⁸

Identifying partial CCS as the BSER also promotes further use of EOR because, as a practical matter, we expect that new fossil fuel-fired EGUs that install CCS will generally make the captured CO₂ available for use in EOR operations. The use of EOR lowers costs for production of domestic oil, which promotes the important goal of energy independence.

As has been explained by others,³⁹ using the CO₂ captured from CCS for EOR will likely lead to an increase in net CO₂ emissions. The reason is simple—the CO₂ from the power plant may be stored, but only by aiding in the production of oil. Much of the oil will be turned into fuel with resulting CO₂ emissions. The CO₂ emissions from the oil would be greater than the stored CO₂ emissions.

EPA's justification for this rule is because "Greenhouse gas (GHG) pollution threatens the American public's health and welfare."⁴⁰ Taking EPA's statement at face value along with EPA's statement about using CO₂ for EOR, this rule itself threatens the American public's health and welfare.

V. EPA INAPPROPRIATELY USED THE SOCIAL COST OF CARBON IN THE REGULATORY IMPACT ANALYSIS FOR THIS RULE

In EPA's Regulatory Impact Analysis for this rule, EPA uses the social cost of carbon.⁴¹ The social cost of carbon is an arbitrary metric that should not be used for regulatory impact analysis as we have previously explained.⁴²

³⁸ EPA, *Standards of Performance*, 79 Fed. Reg. at 1480.

³⁹ See William Yeatman, *EPA's Carbon Pollution Standard May INCREASE CO₂ Emissions!*, GlobalWarming.org, Sept. 25, 2013, <http://www.globalwarming.org/2013/09/25/epas-carbon-pollution-standard-may-increase-co2-emissions/>.

⁴⁰ EPA, *Standards of Performance*, 79 Fed. Reg. at 1433.

⁴¹ EPA, *Regulatory Impact Analysis for the Proposed Standards of Performance for Greenhouse Gas Emissions for New Stationary Sources: Electric Utility Generating Units*, Sept. 2013, <http://www2.epa.gov/sites/production/files/2013-09/documents/20130920proposalria.pdf>.

⁴² Institute for Energy Research, Comment on the Technical Support Document:

But a quick review is important because of the arbitrary nature of the social cost of carbon. The social cost of carbon is generated by using three Integrated Assessment Models (IAMs). To explain the arbitrary nature of these models, here is a quote from the abstract of a peer-reviewed article by MIT economist Robert Pindyck:⁴³

A plethora of integrated assessment models (IAMs) have been constructed and used to estimate the social cost of carbon (SCC) and evaluate alternative abatement policies. **These models have crucial flaws that make them close to useless as tools for policy analysis:** certain inputs (e.g. the discount rate) are arbitrary, but have huge effects on the SCC estimates the models produce; the models' descriptions of the impact of climate change are completely *ad hoc*, with no theoretical or empirical foundation; and the models can tell us nothing about the most important driver of the SCC, the possibility of a catastrophic climate outcome. **IAM-based analyses of climate policy create a perception of knowledge and precision, but that perception is illusory and misleading.** [Bold added.]

Later in the paper, Pindyck explains the arbitrary nature of the damage functions, which of course underlie the SCC estimates generated by the computer models:

When assessing climate sensitivity, we at least have scientific results to rely on, and can argue coherently about the probability distribution that is most consistent with those results. When it comes to the damage function, however, we know almost nothing, so **developers of IAMs [Integrated Assessment Models] can do little more than make up functional forms and corresponding parameter values. And that is pretty much what they have done.** [Pindyck p. 11, bold added.]

Pindyck then goes on to say:

Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866, <http://www.instituteforenergyresearch.org/wp-content/uploads/2014/02/IER-Comment-on-SCC.pdf>.

⁴³ Robert Pindyck, (2013) "Climate Change Policy: What Do the Models Tell Us?" *Journal of Economic Literature*, Vol. 51, No. 3, September 2013, pp. 860-72.

Most IAMs (including the three that were used by the Interagency Working Group to estimate the SCC) relate the temperature increase T to GDP through a “loss function” $L(T)$, with $L(0) = 1$ and $L'(T) < 0$. For example, the Nordhaus (2008) DICE model uses [an] inverse-quadratic loss function...

Weitzman (2009) suggested the exponential-quadratic loss function...which allows for greater losses when T is large. But remember that **neither of these loss functions is based on any economic (or other) theory. Nor are the loss functions that appear in other IAMs. They are just arbitrary functions, made up** to describe how GDP goes down when T goes up.

The loss functions in PAGE and FUND, the other two models used by the Interagency Working Group, are more complex but equally arbitrary...[T]here is no pretense that the equations are based on any theory. [Pindyck p. 11, bold added.]

EPA cannot base policy on equations that are not based on any theory. Such is the social cost of carbon.

CONCLUSION

These proposed performance standards for greenhouse gas emissions from new generation units are impermissibly arbitrary. The simple fact that the rule has no benefits and does not reduce the greenhouse gas emissions EPA is concerned about means the rule is arbitrary.

EPA should withdraw this rule and only re-propose it if EPA can show that the rule produces discernable benefits to the climate change factors that EPA has identified as concerning.