pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

February 26, 2018

U.S. Environmental Protection Agency
Air and Radiation Docket and Information Center
Mail code: 28221T
1200 Pennsylvania Avenue, NW
Washington, DC 20460

Attention: Docket No. EPA–HQ–OAR–2017–0545

Re: State Guidelines for Greenhouse Gas Emissions from Existing Electric Utility Generating Units. 82 FR 61,507 (December 28, 2017)

To Whom It May Concern:

The Pennsylvania Department of Environmental Protection ("PADEP") appreciates the opportunity to provide comments on the United States Environmental Protection Agency ("EPA") Advance Notice of Proposed Rulemaking ("ANPRM") published on December 28, 2017 (82 FR 61,507).

## Introduction

In the ANPRM, EPA is considering emission guidelines to limit greenhouse gas ("GHG") emissions from existing electric generating units ("EGUs") and is soliciting information on the proper respective roles of the state and federal governments in that process, as well as information on systems of emission reduction that are applicable at or to an existing EGU, information on compliance measures, and information on state planning requirements under the Clean Air Act ("CAA"). This ANPRM does not propose any regulatory requirements.

The PADEP disagrees with a "inside the fence line" approach to reduce carbon dioxide ("$CO_2$") emissions from EGUs. EPA's own analyses indicated that even with the most optimistic assumptions, energy efficiency improvements above 6% are not possible for the existing coal-fired fleet. Implementing "inside the fence line" measures will increase the costs of reducing $CO_2$ emissions and will significantly reduce the achievable benefits. PADEP believes the way to cost-effectively lower carbon emissions is to implement an outside-the-fence line approach (such as the Clean Power Plan ("CPP")) and/or significantly increase the amount of electricity generation by zero-carbon emitting or carbon-neutral sources such as hydroelectric, wind, solar, and nuclear.

In addition, the PADEP has previously commented at length on "EPA's Proposed Standards of Performance for Greenhouse Gas Emissions for New Stationary Sources: Electric Utility Generating Units" (79 FR 1430, January 8, 2014) about the current technical issues with carbon capture and sequestration ("CCS") technology. PADEP believes that an inside-the-fence line approach for limiting $CO_2$ emissions is not consistent with the law, because such an approach will have a minor impact on reducing $CO_2$ emissions.

EPA is legally required to regulate $CO_2$ emissions from existing EGUs. The U.S. Supreme Court held in *Massachusetts v. EPA* that "if EPA makes a finding of endangerment, the Clean Air Act requires the Agency to regulate emissions" of the pollutant. 549 U.S. 497, 533 (2007). EPA's 2009 Endangerment Finding concluded that CO2 does cause or contribute to "greenhouse gas pollution that endangers public health and welfare," which triggered the Agency's obligation under the CAA to regulate emissions of $CO_2$. 74 Fed. Reg. 66,496 (December 15, 2009.) EPA has since then relied on that Endangerment Finding to issue multiple regulations of greenhouse gases, including the New Source Performance Standards for new and modified EGUs[1] and the GHG Tailoring Rule.[2] However, in the case of existing EGUs, EPA is delaying and/or abrogating any meaningful GHG reduction from this sector. PADEP not only objects to EPA's delay in addressing the urgent need to reduce GHGs, but is also troubled that the Agency is not acting consistent with its legal responsibilities.

The comments proffered below do not imply that PADEP agrees with the current EPA approach in proposing to repeal the CPP and soliciting comment through this ANPRM. However, should EPA move forward with this approach, then the comments below represent how PADEP believes EPA should proceed in its efforts to develop a new regulation.

**Comments on the ANPRM**

*Item 1 – Roles and responsibilities of the States and EPA in regulating existing EGUs. 82 FR 61,511.*

PADEP believes it would be beneficial for EPA to provide sample state plan text as part of the development of the emission guidelines. This should in no way prevent the states from adopting their own standards or prevent EPA from approving standards which do not match the sample language. The entirety of the CPP is a good example of a sample state plan template that states could have used to develop their plans. *See* 80 FR 64,662 (October 23, 2015).

Like any complicated piece of equipment, coal-fired power plants, even if built identically, will vary slightly in their efficiency. For this reason, it should be the responsibility of the states to determine if a broad-based standard is appropriate or if a case-by-case approach is warranted. A nationwide broad-based approach risks missing the most improvement potential since any inside -the-fence line improvements will likely be minimal and difficult to identify, unless each plant is viewed individually.

PADEP believes that EPA should not define presumptive emission limits, but can suggest systems which may be the best system of emission reduction ("BSER") for some plants. This will allow the states to independently determine which technologies are appropriate for each plant. However, such an approach is likely to be burdensome for states. For instance, PADEP's burden would be considerable as there are currently 18 coal-fired power facilities with 38 total EGUs in Pennsylvania (based on CAMD 2016 data). PADEP would need to determine BSER for each plant. In addition, PADEP would need to establish a heat rate limit subcategorization of the emission requirements, which would likely result in the loss of most emission improvement opportunities. Useful unit life should be a consideration in which emission control technologies

[1] Standards of Performance for Greenhouse Gas Emissions from New, Modified, and Reconstructed Stationary Sources: Electric Utility Generating Units, 80 Fed. Reg. 64,510 (Oct. 23, 2015).
[2] Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule, 75 Fed. Reg. 31,514 (June 3, 2010).

should be adopted and incorporated during the cost analysis phase of the permit modification for the affected EGU.

Both the degradation of heat rate and the changes in operations can be evaluated using a case-by-case approach. Heat rate degradation can be determined based on historical data from the plant and other similar plants. To help alleviate the anticipated burden, PADEP advises EPA to compile data from several plants and make it available to the states. Ideally, this data would include heat rates at various coal-fired power plants before and after improvements or cleanings. Variable load requirements should be based on the historical data of the plant or, if unavailable, similar plants. PADEP would again advise EPA to survey several plants to get an idea of what effect variable load has on the heat rate, if not done already, and to make the data available to the states.

PADEP does not believe a statewide $CO_2$ limit should be imposed by EPA if an inside-the-fence line approach is taken due to the extremely limited opportunity for improvements. However, should statewide limits be adopted, PADEP believes that mass-based limits should be allowed to provide flexibility to the states. In addition, mass- and rate-based systems should be allowed to trade.

PADEP does not believe presumptive limits should be set; however, if presumptive limits are set, then trading between mass- and rate-based systems should be allowed. Below is an example of emissions trading between two hypothetical states. In the example, State 1 has a rate-based limit and State 2 a mass-based limit.

- State 1 (rate-based) buying credits from State 2 (mass-based)
- State 1 currently emits at a rate of 1,580 lb/MWhr and generates 30,000 GWhr
- State 1 has a compliance limit of 1,500 lb/MWhr
- State 2 emits 24,400 thousand tons and is allowed to emit 26,000 thousand tons
- State 1 must trade with State 2 to achieve compliance and State 2 has 1,600 thousand tons of $CO_2$ to trade
- To trade convert State 1's emissions to mass as follows: 1580 lb/MWhr *30,000,000 MWhr *1 ton/2,000lb = 23,700,000 tons = 23,700 thousand tons
- State 1 is only allowed to emit 1500 lb/MWhr so 1,500 lb/MWhr *30,000,000 MWhr * 1 ton/2,000lb = 22,500,000 tons = 22,500 thousand tons
- State 1 needs (23,700-22,500) thousand tons = 1,200 thousand tons from State 2

*Item 2 – Limiting GHG emission reductions to measures that can be applied to or at a stationary source at the source-specific level. 82 FR 61,513.*

Under the proposed CPP repeal rule, EPA is interpreting section 111(d) to mean that BSER measures must be applicable inside-the-fence line of a facility. (80 FR 64662; October 23, 2015.) PADEP disagrees with EPA's interpretation on this issue and believes that BSER can support outside-the-fence line measures like those identified under the CPP. The CPP approach is supported in multiple Supreme Court decisions upholding EPA's authority to regulate $CO_2$ emissions under the CAA. *See e.g., Massachusetts v. EPA*, 549 U.S. 497 (2007); *American Electric Power v. Connecticut*, 564 U.S. 410 (2011) ("*AEP*"). In *AEP*, the court expressly held that Section 111(d) of the CAA "speaks directly" to limits on $CO_2$ emissions from existing power plants. Consequently, the CPP is a legitimate exercise of the legislative mandate under the CAA to promote public health and welfare by addressing $CO_2$ emissions from existing power

plants. However, if EPA's new interpretation of section 111(d) is applied, PADEP believes it should be applied in a similar manner as with other pollutants. This would be plant-specific and the steps would occur as follows:

Creating the rule

1. Create a list of common technologically feasible control devices which could potentially be applied to each power plant. This by necessity will include options such as fuel switching and heat rate improvements.
2. EPA must identify a cost-effectiveness threshold for the control of $CO_2$ emissions based on the modeling done for the CPP.
3. The rule should include provisions to allow for the consideration of adverse impacts which may accompany the heat rate improvements.

Implementing the rule

1. Each power plant would have to go through the improvement suggestions by the EPA and do a technical feasibility analysis.
2. Any measures technically feasible for the plant should be reviewed to determine cost-effectiveness.
3. Any cost-effective measures should be implemented, similar to a Best Available Control Technology analysis.

The ANPRM emphasizes flexibilities that would allow states to set less stringent standards than the level established by the emission guidelines. However, PADEP cautions EPA not to approve state plans that could simply shift emissions to states with weaker standards, negating the benefit of any reductions achieved in states with more stringent standards. PADEP is responsible for protecting the health of our citizens, but increases in emissions in neighboring states could impede our ability to do so.

The role of federal regulation under the CAA is to create a minimum level of environmental protection and allow states to be more ambitious if they so choose. Many states have developed, or may wish to develop, ambitious GHG reduction programs regulating emissions from fossil fuel-fired EGUs that would be covered by a rule under Section 111(d). EPA should ensure that any rule under Section 111(d) does not impede the goals or implementation of those programs and that it maintains the cooperative federalism structure of the CAA.

*Item 3a – Identifying BSER based on measures that can be applied at or to the source.*

Method 1 from section 2.5.3.1 of the Technical Support Document ("TSD") for the CPP, suggests that a heat rate improvement of about 6% can be achieved. This is a good start, but it must be followed up with an investigation to determine why plants in the past had a better heat rate than at present to establish if replicating best past performance is technically and economically feasible. Under Method 3 of the TSD, the approach to see if plants can lower heat rate is good in theory. However, investigation must determine why plants don't operate this way to see if lowering heat rate through best practices, which cause the plant to operate at ideal conditions at all times, is practical and cost-effective. In addition, Method 3 only proves that a plant can operate for a year with reduced variability. EPA needs to prove that the plant can both operate with reduced heat rate variability and do so at the low end of the plant's heat rate range.

As the EPA notes, there may be differences in regional labor and material costs. (82 FR 61,514.) This is one of the reasons PADEP recommends a case-by-case approach in determining BSER for each coal-fired power plant, because it will take these cost differences into account.

Net heat rate should be used to compare the performance of different plants as it measures the fuel input against the electricity delivered by the plant to the grid. In addition, the use of net heat rate encourages energy efficiency measures at the plant, because lowering plant energy usage lowers the net heat rate while having no effect on gross heat rate.

*Item 3b – Whether EPA should provide presumptively approvable emission limits. 82 FR 61,517.*

PADEP suggests that EPA recommend measures which would be BSER and states could then determine BSER on a plant-by-plant basis. For this reason, no presumptive emission limit would be necessary. In addition, a presumptive limit could be counter-productive. If the limit is set a few percentage points too high, no benefit will come from this rule. Likewise, if it is set a few percentage points too low, few plants will be able to meet it. However, all state plans need to be technically sound to ensure that GHG emissions are being adequately reduced.

*Item 3c – The use of carbon capture and storage technologies. 82 FR 61,517.*

PADEP agrees that CCS is not a commercially demonstrated technology at this time and therefore does not meet the definition of BSER. PADEP provided comments to this effect on EPA's "Standards of Performance for Greenhouse Gas Emissions from New Stationary Sources: Electric Generating Units." (79 FR 1430, January 8, 2014.) The lack of commercially available CCS technology is why outside-the-fence line measures to reduce emissions must be considered, because there is no way to substantially reduce emissions with a narrow inside the fence approach. If a plant does implement a successful CCS, then they should be allowed to participate in trading programs to encourage the development of CCS.

In addition to regular plant monitoring for $CO_2$, the plant should be required to monitor the flow rate of $CO_2$ to the underground reservoir. In addition, the ambient air above the reservoir should be monitored for $CO_2$ concentrations before and after activation of the plant to ensure that the reservoir is not leaking.

*Item 4 – Interactions with the NSR Program and NSPS. 82 FR 61,518.*

Various opportunities to improve the efficiency of coal-fired power plants are identified by the National Energy Technology Laboratory (NETL") in an April 1, 2014 report.[3] However, in the same report NETL identifies New Source Review as an impediment to these improvements.

Any physical change or change in the method of operation relating to efficiency improvements at an affected facility would trigger Prevention of Significant Deterioration ("PSD") and/or Nonattainment New Source Review ("NNSR") applicability determinations, which includes the establishment of baseline emissions and could pose an impediment to these improvements. This

[3] *Options for Improving the Efficiency of Existing Coal-Fired Power Plants*; National Energy Technology Laboratories; April 1, 2014; DOE/NETL 2013-1611; http://netl.doe.gov/File%20Library/Research/Energy%20Analysis/Publications/Efficiency-Upgrade-Final-Report.pdf.

baseline is used to determine if projected future actual emissions from such energy efficiency improvement projects would result in emission increases above the significance threshold that could trigger PSD and/or NNSR requirements and could require the installation of additional pollution control devices. The additional costs of these controls and the imposition of new, more stringent emission limits not only discourage the owners and operators of coal-fired EGUs from implementing such improvements, they also effectively limit the ability of the most efficient, lower-emitting units from increasing their economic opportunity in competitive markets.

In addition, if a coal plant chooses to burn natural gas to reduce the $CO_2$ emissions, it could be potentially subject to NNSR or PSD. Since the facility could not burn natural gas in the past, the emissions increase from burning natural gas would not be excluded under the phrase "could have accommodated during 24-month period." While plantwide applicability limit ("PAL") provisions may provide relief to address the PSD/NNSR issues, PAL may not be a viable option particularly for coal-fired facilities because many coal-fired units are running at historically low capacity factors since 2011, which will result in lower baseline actual emissions and lower PAL.

To encourage energy efficiency projects, NSR regulations for EGUs could be amended to redefine "major modification" as a modification that increases any regulated air pollutant emissions in terms of the lbs/MWh (net), rather than the current threshold of tons per year. A facility could be saving a certain number of $CO_2$ tons per megawatt-hour through energy-efficient retrofits and still accumulate enough pollution over a period of time to surpass the permitting limit. But if EPA changed the NSR applicability test from measuring pollutant tons per year to an output rate – tons or pounds per unit of electricity produced – this could avoid this disincentive and lower emissions of both $CO_2$ and criteria pollutants.

There are likely other provisions in the CAA that have "absurd results" when used to regulate $CO_2$ or other greenhouse gases. Those provisions should all be identified by EPA and "tailored" to provide for the greatest opportunity to avoid unintended negative consequences.

*Item 5 – Other topics. 82 FR 61519.*

According to the TSD noted under Item 3a of these comments, a typical well-run coal-fired power plant in the U.S. has a heat rate of around 9,700 BTU/kWh. Assuming the heat rate opportunities at this example plant are available (although unlikely), then it would achieve a best-case scenario total improvement of 1,401 BTU/kWh and worst case (assuming all improvements are made and they don't "interfere" with each other) of 318 BTU/kWh. These numbers represent between a 17% and 3% heat rate improvement.

This maximum heat rate improvement (17%) is unlikely in practice, because the facility is already well-run and all efficiencies are accounted for under this scenario. Moreover, the worst-case scenario (3%) may not actually be the worst case, because a well-run power plant would likely have already implemented some of these steps. However, many of these improvements probably overlap, and doing them together would lessen the impact of doing some of them alone.

Some examples of likely "improvement overlap" include:

- A neural network would likely find more opportunities for heat rate improvements at a plant which was not well run because that type of plant would require more changes to get it to run well. A well-maintained plant would likely run more consistently and require fewer changes.

- Many of the heat exchanger cleanings and part replacements would already be done. While they could be done more often, this is probably not profitable for the plant. Therefore, a cost-benefit analysis would have to be undertaken to determine how often cleanings and part replacements would be cost-effective.

- Most of these improvements are simply increasing the frequency of plant maintenance. Presumably, this is already being done at most plants to optimize power output vs. maintenance costs.

- Several of these methods boil down to replacing auxiliary equipment that wears out, such as pumps and fans, more often. This is probably being done already and it is likely that the plants are already evaluating the possibility of replacing these pieces of equipment with more energy-efficient versions.

- SCR catalyst designs would be optimized to lower pressure drop every time they are replaced unless it is not cost-effective.

- It is likely that plants are already doing these things if they are cost effective. If not, then they need to be evaluated to see if the additional impact on the environment would make some cost-prohibited items cost-effective.

Furthermore, it is unlikely that many of these improvements would be cost-effective. Consequently, the cost and benefits of inside-the-fence line measures must be evaluated alone to see if this approach is cost-effective overall.

**Conclusion**

PADEP does not endorse an "inside-the-fence line" approach to control $CO_2$ emissions. This approach will do little to address climate change and will cost more per unit of $CO_2$ removed by needlessly restricting methods of eliminating emissions. The CPP meets EPA's legal obligation to reduce GHGs and employs cost-effective emission reduction strategies. However, if EPA insists on an inside-the-fence line approach, PADEP recommends that EPA establish BSER and states can then develop a case-by-case limit for each EGU in order to reduce most $CO_2$ emissions in the most cost-effective way possible, while respecting the concept of cooperative federalism under the CAA.

Sincerely,

Patrick McDonnell
Secretary