

# Compliance Timing for EPA’s Power Sector Rules for Coal-Fired Power Plants

## Regulating Greenhouse Gases and Air, Water, and Land Pollution

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On April 25, 2024, EPA released four rules to address air, water, and land pollution from power plants:

- 1) [Greenhouse gas \(GHG\) emission standards for power plants including existing coal-fired power plants and new natural gas-fired power plants](#) (under section 111 of the Clean Air Act)
- 2) Updated emission standards for [mercury and other hazardous air pollutant \(HAP\) emissions](#) from coal- and oil-fired power plants based on EPA’s revised residual risk and technology review (under section 112 of the Clean Air Act);
- 3) [Effluent Limitations Guidelines \(ELGs\) revising wastewater discharge requirements](#) for coal-fired power plants (under the Clean Water Act); and
- 4) [Coal Combustion Residuals \(CCR\) regulations](#) that add requirements for areas with coal ash that were previously unregulated (under the Resource Conservation and Recovery Act).

Each of the rules recognizes that coal-fired power plants have been retiring since their peak capacity in 2011, and many owners and operators have announced their intent to retire additional plants in the coming decade.<sup>1</sup> The timing for requirements in EPA’s finalized rules reflects the agency’s statutory obligations as well as a recognition of market conditions leading to retirement decisions, including the lower cost of natural gas and renewable energy sources, the aging coal fleet, and federal and state regulations.<sup>2</sup>

There is already litigation against the rules in the DC Circuit—Republican states and industry groups have asked the court to stay GHG emission standards and have challenged the mercury and air toxics standards (MATS), environmental and industry groups have challenged the ELGs, and municipally-owned utilities have challenged the CCR regulations.<sup>3</sup> In this paper, we examine the important deadlines in the four rules and discuss the implications for the power sectors’ investment decisions in the existing coal-fired power plants. The effect of the rules on a power plant will depend on the pollution control equipment already installed at the plant and the owners and operators’ expectations for use of that equipment and estimate of how long the plant will operate.

## Greenhouse Gas Emission Standards

EPA’s final rule sets new [GHG emissions standards for existing coal and new natural gas plants](#). The agency estimates the rule will reduce 1.38 billion metric tons of carbon dioxide (CO<sub>2</sub>) emissions through 2047 and will also reduce fine particulate matter (PM<sub>2.5</sub>), sulfur dioxide (SO<sub>2</sub>), and nitrogen oxides (NO<sub>x</sub>).<sup>4</sup>

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<sup>1</sup> Seth Feaster, [U.S. on track to close half of coal capacity by 2026](#), *Inst. For Energy Economics and Financial Analysis* (Apr. 3, 2023).

<sup>2</sup> Metin Celebi et al., [A review of Coal-Fired Electricity Generation in the US](#), *Brattle Group* (Apr. 27, 2023).

<sup>3</sup> See *West Virginia et al. v. EPA*, Docket No. 24-1120 (D.C. Cir.)(consolidated with 24-1121, 24-1122, 24-1126, 24-1128, 24-1142, 24-1143, 24-1144, 24-1146, 24-1152, 24-1153, 24-1155); *North Dakota et al. v. EPA*, Docket No. 24-1119 (D.C. Cir.)(consolidated with 24-1179, 24-1154); *Clean Water Action et al. v. Michael Regan, et al.*, Docket No. 24-1167 (D.C. Cir.); *City Utilities of Springfield Missouri v. EPA*, Docket No. 24-1200 (D.C. Cir.).

<sup>4</sup> *New Source Performance Standards for Greenhouse Gas Emissions From New, Modified, and Reconstructed Fossil Fuel-Fired Electric Generating Units; Emission Guidelines for Greenhouse Gas Emissions From Existing*

As [Sara Dewey and Carrie Jenks recently wrote](#), under the Clean Air Act (CAA) section 111, “EPA [must] identify source categories that emit dangerous air pollutants and regulate new and existing sources of those emissions...EPA must determine the ‘best system of emission reduction [BSER] ... adequately demonstrated’ considering cost, ‘non-air quality health and environmental impacts, and energy requirements.’ After EPA determines the BSER for an emissions source, it determines the ‘degree of emission limitation’ achievable by applying that BSER...EPA explains that ‘BSER’s key features include that it must reduce emissions, be based on ‘adequately demonstrated’ technology, and have a reasonable cost of control.’”

EPA sets emission standards for existing coal units based on carbon capture and sequestration. However, EPA provides alternative compliance options for units planning on retiring by certain dates.

- **Existing coal standards for units operating beyond 2039.** For these units, EPA defines BSER as carbon capture and sequestration/storage (CCS) with 90 percent capture of CO<sub>2</sub>,<sup>5</sup> which is equivalent to an 88.4 percent annual reduction in emission rate.<sup>6</sup> Units must comply with this standard by 2032.<sup>7</sup>
- **Existing coal standards for units retiring between 2032 and 2039.** For these units, the final rule bases BSER on co-firing with natural gas, at a level of 40 percent of the unit’s annual heat input, and units must comply by 2030.<sup>8</sup>
- **Existing coal standards for units retiring before 2032.** Coal plants retiring before 2032 are not subject to EPA’s final rule.<sup>9</sup>

## Mercury and Air Toxics Standards (MATS)

Under the Clean Air Act section 112, EPA is required to promulgate standards for HAP emissions from major stationary sources using the maximum achievable control technology (MACT).<sup>10</sup> EPA established the MACT standards for coal- and oil- fired power plants in 2012. The CAA, however, also requires EPA to conduct a “residual risk review” within eight years of promulgating new standards. As part of this review, the agency must assess whether more stringent standards are necessary to mitigate the health risks associated with HAP emissions from regulated sources. EPA must also perform a “technology review” to revise the emission standards at least every 8 years.<sup>11</sup> These reviews are commonly referred to as the “residual risk and technology review” or “RTR.” You can read our analysis of the [RTR proposed rule](#) and our Regulatory Tracker page with [the history of the related rulemakings](#).

EPA’s [final rule updates emission standards and monitoring requirements for mercury emissions and hazardous air pollutants from coal- and oil-fired power plants](#).<sup>12</sup> Based on findings in the RTR, this

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Fossil Fuel-Fired Electric Generating Units; and Repeal of the Affordable Clean Energy Rule, 89 Fed. Reg. 39798 (May 9, 2024)(to be codified at 40 C.F.R. 60), <https://www.federalregister.gov/documents/2024/05/09/2024-09233/new-source-performance-standards-for-greenhouse-gas-emissions-from-new-modified-and-reconstructed>.

<sup>5</sup> 89 Fed. Reg. 39798, 40050.

<sup>6</sup> *Id.* at 39801.

<sup>7</sup> *Id.* at 40056.

<sup>8</sup> *Id.*

<sup>9</sup> *Id.* at 40047.

<sup>10</sup> 89 Fed. Reg. 38513 (May 7, 2024) (to be codified at 40 C.F.R. 63).

<sup>11</sup> *Id.* at 39515.

<sup>12</sup> National Emission Standards for Hazardous Air Pollutants: Coal- and Oil-Fired Electric Utility Steam Generating Units Review of the Residual Risk and Technology Review, 89 Fed. Reg. 38508 (May 7, 2024) (to be codified at 40 C.F.R. 63), <https://www.federalregister.gov/documents/2024/05/07/2024-09148/national-emission-standards-for-hazardous-air-pollutants-coal-and-oil-fired-electric-utility-steam>.

final rule sets new limits for filterable particulate matter (fPM) for all coal-fired power plants,<sup>13</sup> tightens the mercury emission standard for existing lignite coal-fired EGUs, mandates that all coal- and oil-fired sources use PM Continuous Emissions Monitoring Systems (PM CEMS) to demonstrate compliance,<sup>14</sup> and changes the requirements for operators when starting up an EGU, mandating the use of natural gas or certain oils for ignition and control technologies when combustion begins.<sup>15</sup>

Compliance with the new emission limits and the requirement to monitor compliance with PM CEMS is required three years after the effective date of the rule (i.e., compliance deadline of July 8, 2027).<sup>16</sup> The compliance date for the new startup requirements is 180 days after the effective date (i.e., compliance deadline of January 2, 2025).<sup>17</sup>

EPA expects that 194 coal-fired power plants will need to install PM CEMS to comply with the rule and explains that PM CEMS “are the best choice for this rule's compliance monitoring as they provide increased emissions transparency, ability for EGU owner/operators to quickly detect and correct potential control or operational problems, and greater assurance of continuous compliance.”<sup>18</sup> EPA projects that the revised fPM limits are expected to affect 33 coal-fired plants and the mercury standard for lignite-fired power plants is expected to impact 22 EGUs.<sup>19</sup> EPA predicts that by 2028, the rule will result in approximately: a 16.3 percent reduction of mercury, a 1.09 percent reduction in fine particulate matter (PM<sub>2.5</sub>) and a 0.09 percent reduction in ozone-seasons NO<sub>x</sub>.<sup>20</sup>

## Effluent Limitations Guidelines and Standards (ELGs)

In response to EPA's review of the current limits, EPA also finalized revisions to [the technology-based effluent limitation guidelines \(ELGs\) for direct and indirect discharges](#) from steam electric coal-fired power plants. Coal combustion wastewater contains toxins that can become more concentrated as they move up the food chain and can cause health and environmental harms.<sup>21</sup> In a direct discharge,

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<sup>13</sup> *Id.* at 38520.

<sup>14</sup> *Id.* at 38518-20.

<sup>15</sup> *Id.* at 38569, Table 3 *citing* 40 C.F.R. 63.10042.

<sup>16</sup> *Id.* at 38563.

<sup>17</sup> *Id.* at 38568.

<sup>18</sup> *Id.* at 38529. Regulatory Impact Analysis for the Final National Emission Standards for Hazardous Air Pollutants, *supra* note 12, at 3-13 (“To produce an inventory of total units which would require the installation of PM CEMS under the final rule as well as the incremental costs of the requirement, EPA began with an inventory of all existing coal-fired EGUs with capacity great enough to be regulated by MATS. That inventory was then filtered to remove EGUs with planned retirements or coal to gas conversions prior to 2028 from analysis of both the baseline and final rule. Within that remaining inventory of 314 EGUs, we used recent compliance data to determine that 120 units have installed PM CEMS, while 177 units use quarterly testing and do not have existing PM CEMS installations. The remaining 17 units (for which fPM compliance data were not available) are assumed to use quarterly testing and not have existing PM CEMS installations.”)

<sup>19</sup> 89 Fed. Reg. at 38530.

<sup>20</sup> Regulatory Impact Analysis for the Final National Emission Standards for Hazardous Air Pollutants: Coal- and Oil-Fired Electric Utility Steam Generating Units Review of the Residual Risk and Technology Review (Ref. EPA-452/R-24-005) at p. 3-9, <https://www.epa.gov/system/files/documents/2024-04/2024-mats-rtr-final-ria-final.pdf>.

<sup>21</sup> Supplemental Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category, 89 Fed. Reg. 40198 (May 9, 2024)(to be codified at 40 C.F.R. 60), <https://www.federalregister.gov/documents/2024/05/09/2024-09185/supplemental-effluent-limitations-guidelines-and-standards-for-the-steam-electric-power-generating>.

wastewater flows directly into waters of the United States (WOTUS).<sup>22</sup> In an indirect discharge, wastewater flows to a publicly owned treatment plant.<sup>23</sup>

The Clean Water Act (CWA) prohibits point sources, such as power plants, from discharging into WOTUS, unless authorized by a National Pollutant Discharge Elimination System (NPDES) permit.<sup>24</sup> The CWA requires EPA to set technology-based limitations for these discharges, review them annually, and revise them where appropriate.<sup>25</sup> For direct discharges, EGUs must comply with these limitations when they renew their NPDES permits.<sup>26</sup> EGUs must generally renew these permits every five years, so compliance timelines for direct discharges are staggered on a five-year cycle. The CWA also requires EPA to set pretreatment standards for indirect discharges.<sup>27</sup>

The final rule includes three subcategories of effluent limitations based on when units are retiring:

- **Units retiring by 2028** The 94 coal-fired EGUs that have indicated to their intent to retire by December 31, 2028 can continue to meet existing discharge limitations set by the 2015 rule.<sup>28</sup>
- **Units retiring by 2034** EPA creates a new subcategory for EGUs retiring by December 31, 2034 and requires these units to meet wastewater and transport water standards set by the 2020 rule.<sup>29</sup> While EPA had proposed 2032 as the cutoff year for this subcategory, it extended the deadline to 2034 based on the five-year NPDES cycle and the “cluster of retirement occurring from 2030 to 2034.”<sup>30</sup> EPA notes that due to the EGUs’ staggered NPDES permit cycle, some plants have not yet complied with the rule, but most have begun to prepare and all facilities must comply by December 31, 2025.<sup>31</sup> EPA is aware of 59 EGUs with scheduled retirements in this subcategory.<sup>32</sup>
- **Units retiring after 2034.** Units operating beyond 2034 must meet a new standard based on zero-discharge systems.<sup>33</sup> Consistent with prior rules, EGUs will comply based on their NPDES permit cycle, but no later than December 31, 2029 for flue gas desulfurization (FGD)

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<sup>22</sup> Environmental Assessment for Final Supplemental Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category at 19 (Apr. 2024), [https://www.epa.gov/system/files/documents/2024-04/se11722\\_2024\\_steam\\_ea-report\\_508.pdf](https://www.epa.gov/system/files/documents/2024-04/se11722_2024_steam_ea-report_508.pdf).

<sup>23</sup> 89 Fed. Reg. 40201.

<sup>24</sup> *Id.*

<sup>25</sup> *Id.* at 40201. Although in the rule’s preamble, EPA says that it is “authorize[d]” to establish ELGs, CWA Section 304(b) states that EPA “shall” promulgate regulations that “identify control measures and practices available to eliminate the discharge of pollutants from categories and classes of point sources, taking into account the cost of achieving such elimination of the discharge of pollutants” and the “degree of effluent reduction attainable.” See 33 U.S.C. § 1314 (b).

<sup>26</sup> 33 U.S.C. §§ 1314-17.

<sup>27</sup> 33 U.S.C. § 1317.

<sup>28</sup> 89 Fed. Reg. 40294-97. These standards have not changed from the [2020 rule](#) and the [2023 direct final rule](#). However, the final rule modifies the requirements for progress reports that must be filed by these facilities. Additionally, EPA eliminated two subcategories—high-flow facilities and low-utilization electric generating units. EPA notes that it knows of only three facilities that would fit into those subcategories, which are expected to close by 2034. 89 Fed. Reg. 40200. In the 2023 direct final rule, the Biden administration extended the date for coal-fired power plants to submit a notice of planned participation (NOPP), allowing additional facilities to opt into the retiring by 2028 subcategory. However, EPA notes that 94 may not be a final count because EPA did not obtain information for all plants and states and because facilities can transfer between categories.

<sup>29</sup> 89 Fed. Reg. 40238.

<sup>30</sup> *Id.*

<sup>31</sup> *Id.* at 40294-96.

<sup>32</sup> *Id.* at 40240-43.

<sup>33</sup> *Id.* at 40199.

wastewater and bottom ash (BA) transport water.<sup>34</sup> FGD wastewater is produced when scrubbers remove SO<sub>2</sub> from flue gas to stop it from being emitted into the air.<sup>35</sup> BA transport water contains the heaviest particles which “are not entrained in the flue gas and fall to the bottom of the furnace.”<sup>36</sup> For indirect discharges, EGUs must meet the new BA transport limits by May 9, 2027.<sup>37</sup> EPA is aware of 61 EGUs with scheduled retirements after 2034 that would be subject to these new standards.<sup>38</sup>

In addition to these three subcategories, the final rule also establishes limits for legacy wastewater. For surface impoundments commencing closure after July 8, 2024, discharge limits are set based on chemical precipitation.<sup>39</sup> For other impoundments, limitations are set based on the best professional judgment of the permitting authority.<sup>40</sup>

## Disposal of Coal Combustion Residuals (CCR)

EPA also finalized [a rule establishing additional requirements for the disposal of coal ash waste from power plants](#).

The Resource Conservation and Recovery Act (RCRA) requires EPA to regulate the disposal of coal plant CCR (or coal ash) in a way that ensures “no reasonable probability of adverse effects on health or the environment.”<sup>41</sup> EPA finalized its first CCR regulations in 2015 under the Obama administration, and this new rule establishes national minimum criteria for two categories that the 2015 rule did not cover: legacy coal ash impoundments and coal ash management units. In addition, EPA provides an alternative closure option to enable facilities to remove coal ash in two phases: (1) removal and decontamination, followed by (2) groundwater remediation in a post-closure care period.<sup>42</sup>

**Legacy impoundments.** EPA’s 2015 CCR rule exempted legacy coal ash impoundments, which are inactive impoundments at inactive facilities.<sup>43</sup> In *Utility Solid Waste Activities Group, et al. v. EPA*, the DC Circuit vacated and remanded the exemption, finding that “legacy ponds are most likely to be unlined and unmonitored and that such units have been shown to be more likely to leak than units at utilities still in operation.”<sup>44</sup> EPA explains that its requirements for legacy impoundments in this final rule is in response to the DC Circuit’s order and based on the record that shows regulations will result in significant public health and environmental benefits.<sup>45</sup>

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<sup>34</sup> *Id.* at 40298.

<sup>35</sup> *Id.* at 40208.

<sup>36</sup> *Id.*

<sup>37</sup> *Id.* at 40295.

<sup>38</sup> *Id.* at 40240-43.

<sup>39</sup> *Id.* at 40227.

<sup>40</sup> *Id.*

<sup>41</sup> Hazardous and Solid Waste Management System: Disposal of Coal Combustion Residuals From Electric Utilities; Legacy CCR Surface Impoundments, 89 Fed. Reg. 38950, 38952 (May 8, 2024)(to be codified at 40 C.F.R. 9, 40 C.F.R. 257), <https://www.federalregister.gov/documents/2024/05/08/2024-09157/hazardous-and-solid-waste-management-system-disposal-of-coal-combustion-residuals-from-electric>.

<sup>42</sup> *Id.* at 39110.

<sup>43</sup> The final rule defines “Legacy CCR Surface Impoundment” as “a CCR surface impoundment that no longer receives CCR but contained both CCR and liquids on or after October 19, 2015, and that is located at an inactive electric utility or independent power producer.” *Id.* at 39100.

<sup>44</sup> *Id.* at 38954, *citing* Util. Solid Waste Activities Grp. v. Env’t Prot. Agency, 901 F.3d 414, 432 (D.C. Cir. 2018)).

<sup>45</sup> *Id.*

The final rule requires that legacy CCR impoundments comply with most of the existing CCR regulations but with tailored compliance deadlines. This includes inspections, groundwater monitoring and corrective action, closure and post-closure care, and recordkeeping requirements. Unlike the 2015 CCR Rule, where closure must be initiated under three triggering scenarios, owners of legacy impoundments must initiate closure within 42 months of the rule's effective date (i.e., a compliance deadline of May 8, 2028).<sup>46</sup> EPA initially proposed expedited compliance deadlines (12 months after the rule's effective date) but extended the deadlines in the final rule to accommodate a shortage of qualified contractors and laboratory resources, and for other factors.<sup>47</sup>

**CCR management units.** CCR management units include previously unregulated facilities—meaning areas on which CCR was received that are not regulated as a CCR units, including inactive CCR landfills and CCR units that closed prior to the effective date of the 2015 rule.<sup>48</sup> For these units, the final rule requires owners and operators to identify and delineate any areas that contain one ton or more of coal ash. Areas identified as having 1,000 tons or more of coal ash must comply with groundwater monitoring and undertake corrective action where necessary, including closure and post-closure care requirements.<sup>49</sup> For the units required to meet closure requirements, they must initiate closure by May 8, 2029.<sup>50</sup>

## Timing Implications for Coal-Fired Power Plants

Each of the four rules recognizes that owners and operators are planning to retire many of the existing coal-fired power plants. While each rule must be grounded in EPA's statutory authority under the CAA, CWA, or RCRA, EPA has considered the timing of requirements to avoid requiring investments in units that will be shut down soon.

The first decisions about whether to comply or retire come in 2027 and 2028, when operators will need to close any CCR management units and some units will be subject to more stringent MATS and ELG rules. Operators will face additional decision points in 2032 and 2034, when certain operators would have to comply with more stringent ELG and GHG requirements.

Which rule is most impactful will depend on the investments operators have already made and when they plan to retire units. As we show in Figure 1 below, the operator of a coal unit that does not have PM CEMS installed will have to decide whether to invest in the technology by 2027. In other cases, a unit being retired by 2036 may have PM CEMS installed, but it will need to be in compliance with the ELGs rule. In this case, the timing of the ELG rule (which will be staggered based on when the NPDES permit must be renewed for that unit, but no later than 2029) will be the most impactful. For units that been brought into compliance with PM CEMS and ELG requirements, the GHG emissions standards will act as a backstop to make sure the units are retired by 2039 and meet an emissions rate equivalent to 40 percent with co-firing from 2032 to 2039.

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<sup>46</sup> *Id.* at 39032.

<sup>47</sup> *Id.* at 39004.

<sup>48</sup> *Id.* at 39034.

<sup>49</sup> *Id.* at 39035.

<sup>50</sup> *Id.* at 39061.

Figure 1: Decision Matrix Flowchart for Operators Weighing Upcoming Investments under the New Rules

