

May 30, 2024

Recent Developments in the Carbon Capture Sector in the U.S. and Europe

On April 25, 2024, the U.S. Environmental Protection Agency (the “EPA”) released [final regulations](#) aimed at reducing pollution from fossil fuel-fired power plants, which may have important implications for existing and future carbon capture/sequestration and storage (“CCS”) projects in the U.S. The final EPA regulations are similar to the [proposed regulations](#) that were issued in May 2023, except for the finalization of greenhouse gas (“GHG”) emission guidelines related to existing fossil fuel-fired stationary combustion turbines, which has been deferred to a later date.¹ The final EPA regulations become effective on July 8, 2024. In Europe, the European Union (the “EU”) Commission has also recently proposed a number of ambitious policies focused on CCS, which are described below.

A. BRIEF OVERVIEW OF FINAL EPA REGULATIONS

The final EPA regulations aim to address GHG emissions from fossil fuel-fired electric generating units by (i) establishing GHG emission guidelines for existing fossil fuel-fired steam-generating units (including coal-fired and oil- or gas-fired steam-generating units) and (ii) establishing new performance standards for GHG emissions from (a) new and reconstructed fossil fuel-fired stationary combustion turbines and (b) coal-fired steam-generating units that undertake large modifications (defined as modifications that increase hourly emission rates by more than 10%), each of which is described below and could have important implications for CCS projects moving forward.²

Existing coal-fired steam-generating units that will operate on or after January 1, 2039 are required to reduce their annual emission rates (measured in pounds of CO₂ per MWh-gross) by 88.4% (based on the implementation of CCS with 90% capture as the best system of emission reduction (“BSER”)) by January 1, 2032.³ Existing⁴ coal-fired steam-generating units that will operate on or after January 1, 2032, but will cease operations before January 1, 2039, are required to reduce their annual emission rate by 16% (based

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on the implementation of natural gas co-firing as the BSER) by January 1, 2030.⁵ Existing coal-fired steam-generating units that will cease operations before January 1, 2032 are not subject to annual emission rate reductions.⁶ Oil-fired and gas-fired steam-generating units are also subject to varying annual emission rate reduction requirements depending on the unit's annual capacity factor.⁷ Coal-fired steam-generating units that undertake modifications increasing hourly emission rates by more than 10% after May 23, 2023 are subject to performance standards that mirror the emission guidelines applicable to existing coal-fired steam-generating units that will operate on or after January 1, 2039, since, according to the EPA, "it is reasonable to assume that any existing source that invests in a physical change or change in the method of operation that would qualify as a large modification expects to continue to operate past 2039."⁸

Stationary combustion turbines that commence construction or reconstruction after May 23, 2023 are required to comply with performance standards based on the percentage of their potential electric output as net-electric sales on both a 12-operating-month and a three-year rolling average basis (such percentage, the "capacity factor").⁹ Base load combustion turbines (*i.e.*, combustion turbines having a capacity factor greater than 40%) are subject to performance standards (i) on initial startup or effectiveness of the final EPA regulations, whichever occurs later, based on "highly efficient combined cycle generation with the best operating and maintenance practices" as the BSER and (ii) by January 1, 2032, based on the implementation of CCS with 90% capture as the BSER, though the EPA noted that since performance standards are "technologically neutral . . . , affected sources may comply with it by co-firing hydrogen."¹⁰ Intermediate load combustion turbines (*i.e.*, combustion turbines having a capacity factor greater than 20% and less than or equal to 40%) and low load combustion turbines (*i.e.*, combustion turbines having a capacity factor less than or equal to 20%) are also subject to performance standards on initial startup or effectiveness of the final EPA regulations, but are not subject to a second phase of performance standards based on CCS as the BSER.¹¹

B. EUROPEAN DEVELOPMENTS IN CCS

Pursuant to the [EU's target to reduce net emissions by 90% by 2040](#), the EU Commission adopted the [EU Industrial Carbon Management Strategy](#) (the "Strategy") in February 2024. The Strategy brings together different policy strands to create an enabling environment and pathways to develop and scale up such large-scale carbon management projects, aiming to establish a single market for CO₂ in Europe by promoting the development of technologies to capture, store, transport, use and remove CO₂, as well as of a uniform regulatory and investment framework. The Strategy focuses on three main technological pathways: (i) capture of CO₂ for storage; (ii) capture of CO₂ for utilization; and (iii) removal of CO₂ from the atmosphere. The rapid scale-up of such technologies will particularly benefit "hard-to-abate" sectors such as cement and steel, which have traditionally been difficult and expensive to decarbonize, and could have

important implications for the development of operational large-sale industrial carbon management projects in Europe.

The Strategy is intended to complement a number of other EU initiatives. Most notably, the proposed [EU Certification Framework for Carbon Removals Regulation](#) (the “CRCF Regulation”), which is expected to create the first EU-wide voluntary framework for certifying high-quality and permanent carbon removals, carbon farming and carbon storage in products (e.g., bio-based and timber construction materials) based on certain quality criteria. The CRCF Regulation aims to create widely accepted standards for monitoring, reporting and verifying carbon removals in the EU. To facilitate adoption, the CRCF Regulation also addresses costs and greenwashing concerns, through remote sensing and modeling, group auditing and standardized baselines. The CRCF Regulation will likely enter into force by the beginning of 2025. Following its entry into force, the next steps will include implementing the EU Certification Methodologies, third-party verification and setting up an EU-wide registry.

C. IMPLICATIONS FOR CCS PROJECT DEVELOPMENT

The final EPA regulations, combined with recent European developments in the CCS space, are likely to further encourage owners and operators to make decisions related to the future of fossil fuel-fired power plant operations. As is happening already, owners and operators are balancing the economics and costs of shut-downs or reconfiguration with implementing and utilizing CCS technology to continue fossil fuel-based operations. The increase in the number of facilities that can economically meet the new and expanding regulatory requirements with CCS will spur further development and commercialization of CCS projects by increasing demand for carbon capture and sequestration. One recent example is the merger of California Resources Corporation (“CRC”) with Aera Energy, which will allow CRC to expand its carbon management business for future CCS development. S&C acted for CRC in connection with the merger (see [S&C Client Highlight](#) for more details) and in the formation of its [joint venture](#) with Brookfield Renewable to create a carbon management partnership dedicated to CCS. Recent developments in direct air capture technology, which involves the capture (and sequestration/storage) of CO₂ directly from the surrounding air, have also made [headlines](#) and could represent such an opportunity as well.

D. STATE CHALLENGES TO FINAL EPA REGULATIONS COULD MEAN CHANGES MOVING FORWARD

In the [press release](#) accompanying the issuance of the final EPA regulations, the EPA noted that CCS represents “an available and cost-reasonable emission control technology” that has benefited from cost reductions, continued innovation and Inflation Reduction Act tax incentives, including the Section 45Q tax credits (see [S&C Energy Transition Insights memo](#) for more details on recent regulations released regarding the transfer of tax credits), making compliance possible with “negligible impacts on energy prices”

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and allowing companies to “largely offset the cost of CCS.” However, on May 9, 2024, attorneys general from 27 U.S. states, along with other industry trade groups, sued¹² the EPA to block the final EPA regulations, with one attorney general stating that the final EPA regulations are “based on emissions reduction technologies that have not been meaningfully deployed in the real world. . . .”

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ENDNOTES

- ¹ New Source Performance Standards for Greenhouse Gas Emissions, 89 Fed. Reg. 39798, 39798 (May 9, 2024).
- ² The final EPA regulations also repeal the existing Affordable Clean Energy rule emission guidelines. *Id.*
- ³ The emission guidelines are not imposed directly on existing fossil fuel-fired sources. Instead, individual states are required to develop, submit and implement plans that set standards for existing sources based on what is achievable through the application of the BSER. See 40 C.F.R. § 60.5740b(a)(1)(i); 40 C.F.R. § 60.5775b(c)(1); 40 C.F.R. § 60.5780b(a)(1).
Compliance date extensions of up to one year are permitted for owners or operators of generating units due to circumstances beyond the owner’s or operator’s control. Extensions are also available to affected generating units that have committed to permanently cease operations that demonstrate that operation of the affected generating units “is necessary for electric grid reliability.” See 40 C.F.R. §§ 60.5740b(a)(11) and (13).
- ⁴ “Existing” generating units are defined as those that were operating or had begun construction on or before January 8, 2014. 40 C.F.R. § 60.5845b(a)(1); see also 42 U.S.C. § 7411(a)(6).
- ⁵ 40 C.F.R. § 60.5740b(1)(a)(ii); 40 C.F.R. § 60.5775b(c)(2); 40 C.F.R. § 60.5870(a)(2).
- ⁶ 40 C.F.R. § 60.5740b(a)(9)(ii); 40 C.F.R. § 60.5850b(k).
- ⁷ Base load (those with annual capacity factors (which the EPA defines as “the ratio between the actual heat input to an EGU during a calendar year and the potential heat input to the EGU had it been operated for 8,760 hours during a calendar year at the base load rating”) greater than 45%) and intermediate load (those with annual capacity factors greater than 8% and less than or equal to 45%) oil-fired and natural gas-fired steam-generating units are required to keep their annual emission rate at 1,400 and 1,600 lbs of CO₂/MWh-gross, respectively, based on the BSER of “routine methods of operation and maintenance,” by January 1, 2030. Low load (those with annual capacity factors less than 8%) oil-fired and natural gas-fired steam-generating units are required to keep their annual emission rate at 170 and 130 lbs of CO₂/MWh-gross, respectively, based on the BSER of “uniform fuels” (*i.e.*, fuels with a consistent chemical composition) by January 1, 2030. See 40 C.F.R. §§ 60.5740b(a)(1)(iii)-(viii); 40 C.F.R. §§ 60.5775b(c)(3)-(8).
- ⁸ 40 C.F.R. § 60.5509a(b)(7) and Table 2 to Subpart TTTTa of 40 C.F.R. § 60; New Source Performance Standards for Greenhouse Gas Emissions, 89 Fed. Reg. 39798, 39954 (May 9, 2024).
- ⁹ 40 C.F.R. § 60.5580a.
- ¹⁰ New Source Performance Standards for Greenhouse Gas Emissions, 89 Fed. Reg. 39798, 39924 (May 9, 2024). For the performance standards, see 40 C.F.R. § 60.5525(a)(3)(i). The initial standard applicable to turbines with a base load rating of (i) 2,000 MMBtu/h or more is 800 lb of CO₂/MWh-gross and (ii) less than 2,000 MMBtu/h is 800 to 900 lbs of CO₂/MWh-gross. The standard applicable to such turbines on and after January 1, 2032 is 100 lbs of CO₂/MWh-gross.
Compliance date extensions of up to one year are permitted for owners and operators of base load turbines as well. See 40 C.F.R. § 60.5540(c).
- ¹¹ See 40 C.F.R. § 60.5525(a)(3)(ii). Intermediate load turbines are subject to performance standards of 1,170 lbs of CO₂/MWh-gross based on the BSER of “highly efficient simple cycle generation with the best operating and maintenance practices.” Low load turbines are subject to performance standards of 160 lbs CO₂/MMBtu based on the BSER of “use of lower emitting fuels.”
- ¹² For Ohio’s and Kansas’ petition, see Petition for Review, *Ohio v. United States Env’t Prot. Agency and Michael S. Regan*, No. 24-1121 (DC Cir. May 9, 2024); for West Virginia’s (and 24 other states’) petition, see Petition for Review, *West Virginia v. United States Env’t Prot. Agency and Michael S.*

ENDNOTES (CONTINUED)

Regan, No. 24-1120 (DC Cir. May 9, 2024); for North Dakota's (and 22 other states') petition, see Petition for Review, *North Dakota v. United States Env't Prot. Agency*, No. 24-1119 (DC Cir. May 8, 2024).

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