CENTER FOR ENVIRONMENTAL ACCOUNTABILITY

COMMENTS OF THE CENTER FOR ENVIRONMENTAL ACCOUNTABILITY

Comments on
Nonrulemaking Docket: Reducing Greenhouse Gas Emissions from New and Existing Fossil Fuel-Fired Stationary Combustion Turbines

Docket No. EPA-HQ-OAR-2024-0135

SUBMITTED MAY 28, 2024

40328072v.9

May 28, 2024

Administrator Michael S. Regan
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, NW
Washington, DC 20460

Re: Comments of the Center for Environmental Accountability on Nonregulatory Public Docket: Reducing Greenhouse Gas Emissions from Existing Gas Turbines and Power Plants (Docket ID No. EPA–HQ-OAR-2024-0135)

Dear Administrator Regan,

The Center for Environmental Accountability (CEA) submits these comments on the U.S. Environmental Protection Agency's (EPA) Nonregulatory Public Docket: Reducing Greenhouse Gas Emissions from Existing Gas Turbines at Power Plants, Docket No. EPA-HQ-OAR-2024-0135.

CEA is a 501(c)(3) organization devoted to educating the public and government on the importance of transparency and accountability in the areas of environmental and energy policy. CEA's work is driven by its core principles, including a commitment to the rule of law, to a clean environment, and to a healthy human environment founded on a strong economy and vibrant communities animated by people gainfully employed in the all the occupations of human flourishing. CEA understands that adherence to law requires respect for the proper roles of each branch of government and for the respective roles of the federal government and of state governments. CEA recognizes that the public interest requires a balance of environmental stewardship, resource development, and energy access and security, and that environmental remediation functions best when targeted at those communities injured by unlawful pollution.

TABLE OF CONTENTS

I. Introduction.

For the third time in twelve months, EPA signals its intention to crackdown on the backbone of the electric grid with a half-baked, legally dubious plan for generation shifting that amounts to little more than political posturing. The essentially political nature of EPA's actions is confirmed not only by what it says but what it has omitted at every step over the past year: an analysis of the reliability impacts of its proposed restrictions on the carbon workhorses of America's electricity grid. And EPA's new request for public input suggests that, on policy and on the law, it is ignoring all warning signs and hurtling forward on a collision course with failure.

Instead of grappling with whether its contemplated regulatory approach satisfies the "energy requirements" of workaday Americans or newly rapacious data center consumers, EPA has put on a masterclass in avoidance at every stage. First, in the May 2023 proposal, it attempted to pawn off a "resource adequacy" analysis as confirming grid reliability until called out by a career official at another agency during the interagency process. Next, in its November 2023 supplemental solicitation of comment, the Agency cast around for potential "reliability mechanisms" to paper over the holes in grid reliability opened by its insistence on driving towards a fuel mix overly reliant on intermittent resources. And now, we come to the instant notice, posing "Framing Questions for Stakeholder Input" on how EPA should finalize its regulations on existing gas-fired power plants. Here, the Agency engages in the policy planning equivalent of throwing spaghetti at the wall, asking the public to validate one or another technically dubious scheme that EPA hopes will allow it to escape the corner into which it's painted itself and ratepayers of all classes with the 2024 Final Rule.

The dilemma in which the Agency finds itself derives from two inconvenient facts. First, the President has staked his legacy on transforming the nation's energy mix on an arbitrary timetable that bears no relationship to what is feasible (let alone desirable) on the ground and that has not been authorized by Congress. According to reporting, it was the White House that insisted that EPA's 2023 proposal cover existing gas plants. The Agency only relented and left those plants unregulated in the 2024 Final Rule after States, grid reliability and planning organizations, and civil-society entities sounded the alarm that such a course, in addition to being unlawful, would plunge large swaths of the grid into darkness. Second, that Final Rule, which cracked down on existing coal plants and on *new* gas plants, only makes grid reliability all the more dependent on the existing natural gas fleet, as our modeling shows. But rather than acknowledge this reality and staying its regulatory hand, EPA shows the public through its "Framing Questions" that it has learned nothing. Until the courts stop it (again), or until a change in administration, EPA *will not stop* until it has transformed the utility sector and, in the telling words of its Administrator during the 2023 comment period, completed its suite of rulemakings that "help[] us to transition from heavily fossil fuel resources to clean resources."

Faced with this intransigence, commenters have little choice but to do EPA's job for it. Based on assumptions contained in the Regulatory Impact Analysis accompanying the 2024 Final Rule, CEA has modeled grid reliability in two different planning regions out to 2055. The results of this independent analysis are ugly. By 2035, widespread seasonal grid meltdowns are virtually engineered into the system. But the risks begin much sooner, as flagging ability to meet peak demand and non-existent reserve margins in both regions mean their grids are poised on the precipice before the end of this decade. This analysis confirms the imprudence of EPA's regulatory actions to date and the supreme ill-advisedness of EPA moving forward with finalizing any restrictions on existing natural gas plants until, at the least, the grid impacts of its recently finalized regulations play out.

In light of the tone and content of EPA's "Framing Questions," commenters also must remind EPA, as CEA does here, that there are limits on its authority under Clean Air Act Section 111. The Supreme Court in 2022's *West Virginia v. EPA* held that the Clean Power Plan exceeded those limits in its quest to shift the nation's electric fuel mix. Because the 2024 Final Rule only pays lip service to that ruling, while patently still pursuing the same forbidden policy goal under the guise of traditional, source-specific regulation, stay motions are already pending in the D.C. Circuit to block that rule and shield the nation from its consequences. That EPA is now posing "Framing Questions" to prepare for *another* rule designed to shift the fuel mix, and that several of those questions verge on outright defiance of *West Virginia*, confirms that EPA is working towards goals it will not forthrightly acknowledge, operating on a timetable driven by politics rather than right reason and the rule of law. EPA must heed our and others' warnings and abandon this regulatory adventurism, or this rulemaking will join the Clean Power Plan in the graveyard of *ultra vires* power grabs.

II. Summary of Argument: EPA's Key Framing Questions.

Let's start with the bottom line: EPA needs to start over.

The Agency has wandered well outside the boundaries of its statutory (and constitutional) authority. The reliability of the electric grid, and therefore the lives of all Americans who depend on our electric system are at stake.

It is clear, considering not just this instant regulatory action but the totality of EPA's actions over the last several years, that EPA wishes to reshape the electric power grid. EPA envisions a grid dominated by renewable resources, with fossil fuel-powered energy resources used only as a backstop, and no significant reductions in reliability. To be sure, EPA is entitled to its visions but not its own facts—let alone authority beyond what Congress has validly delegated.

CEA provides the following comments in the spirit of contributing to the public's and the government's knowledge about the consequences of EPA's current regulatory tack. And while CEA appreciates the Key Framing Questions as a launching-off point, given the breathtaking scope of the 2024 Final Rule,[1] we note that the Agency fails to ask several key questions it should be considering as it contemplates next steps. Accordingly, CEA is unable to confine the

[1] EPA, NSPS for GHGs from New, Modified, and Reconstructed Fossil Fuel-Fired EGUs and Emission Guidelines for Existing Fossil Fuel-Fired EGUs, 89 Fed. Reg. 39,798 (May 9, 2024) (2024 Final Rule).

organization of its comments strictly to correspond to EPA's framing questions. Instead, beginning with a summary, CEA provides insights on questions in the order they should have been asked, starting with the most fundamental questions first.

A. Framing Question 6: How should EPA consider interactions between the existing source and new source standards for GHGs from combustion turbines?

- EPA must first recognize that versions 2.0 (the 2024 Final Rule) and 3.0 (the not-yet-finalized existing gas-plant regulations) of the Clean Power Plan rulemakings are inextricably linked for the purposes of grid reliability.

- EPA must begin its analysis with the assumptions the Agency made as a part of its resource adequacy assessment in the 2024 Final Rule. As the modeling discussed in this comment demonstrates, the 2024 Final Rule already places the grid in grave jeopardy. As a result, EPA in any further rulemaking for existing plants must take all the more care to ensure that it does not inflict additional negative impacts on grid reliability.

- While CEA does not know the full reasons why EPA did not finalize existing gas-plant regulations in the 2024 Final Rule, we warn EPA against attempting a shell game here. EPA must not avoid taking final action on existing gas plants in that rule to assist its defense that that rule does not impair reliability, only to throttle existing plants and risk the grid in a future rulemaking.

B. Framing Question 3: How could EPA most effectively subcategorize the diverse combustion turbine fleet?

- The first question is not a utilitarian or practical one but rather a question of authority: What authority has Congress granted EPA to subcategorize under the Clean Air Act? As the text of the Act reveals, EPA only has the authority to subcategorize based on the physical characteristics of the sources it seeks to regulate: their "classes, sizes, and types." (CAA § 111(b)(2).) Any other basis for subcategorization—and especially EPA's chosen path of regulation based on market function, which reveals that it still pursues the original Clean Power Plan's forbidden goal of reshaping that market—is outside the bounds of the law.

- We will argue that in the Carbon Rule, EPA has already demonstrated a willingness to exceed its authority in this regard.

- The most effective way for EPA to subcategorize is to consider the classes, sizes, and types of sources. This is, as EPA points out, a difficult task given the incredible diversity of existing sources. However, the only method of subcategorization available to EPA is that which comports to the authority granted EPA by Congress.

C. Framing Question 1: What technologies should the EPA consider as part of the BSER [best system of emission reductions] for existing combustion turbines?

- CEA does not intend to propose specific technologies that EPA should consider as BSER for existing combustion turbines. Rather, we will make the case for two critical *limits* on EPA's statutory authority to regulate in this area when determining BSER for these sources.

- The first limit is statutory authority. EPA's task in setting the initial guideline for BSER (not the final standard set by the states, as discussed below) is to determine the "best system of emissions reduction." This requires the Agency to return to an understanding of "adequately demonstrated" that is consistent with the text, structure, context, and purpose of the CAA.

- The second limit is the impact of EPA's emission guidelines on grid reliability. Because EPA has not itself conducted a grid reliability study, it may not understand the full implications of the blackouts its rulemakings will cause. This kind of analysis simulates supply and demand for electricity each hour of the day, using historical data and weather patterns. As explained below, this is important because relying on annual resource averages may obscure grid reliability issues. Such blackouts during extreme weather events would have tragic consequences. Indeed, these consequences are so significant that where the very reliability of America's electric grid is put into question, that is evidence EPA is addressing major questions of policy, rather than restricting its actions within the bounds of its validly delegated statutory authority.

D. Framing Question 5: What steps can the EPA take in defining BSER or via compliance flexibility mechanisms to allow states to address a wide range of concerns, including reliability of the power system?

- First, EPA must conduct or commission an hour-by-hour grid reliability analysis and transparently share the results of this analysis with the American people. As then-FERC Commissioner Danly pointed out in his August 2023 comments in the Carbon Rule docket, EPA continues to conflate two important types of analysis: resource adequacy and grid reliability.[2] Because EPA to date has, despite occasional misleading statements to the contrary, only analyzed the former (resource adequacy), we are all in the dark, so to speak, on the 2024 Final Rule's impact on grid reliability. EPA must coordinate with FERC to accomplish this work, as FERC is the expert entity tasked by Congress with overseeing such matters.

---

[2] Comment of Commissioner James P. Danly on the EPA's proposed New Source Performance Standards for Greenhouse Gas Emissions (Aug. 8, 2023), *available at* https://ferc.gov/news-events/news/comment-commissioner-james-p-danly-epas-proposed-new-source-performance-standards.

- Second, as the Supreme Court observed,[3] where EPA's regulations throw the reliability of the electric grid into question, the Agency is likely attempting to regulate a major question without congressional authorization.

- EPA must always be mindful of the century-old division of authority in the Federal Power Act, under which FERC is restricted to regulating wholesale and interstate electricity sales and transmission, with resource-mix and plant-siting issues left to the states. The illegal Clean Power Plan would have functioned as an end-run against this careful division; EPA must eschew that forbidden goal in any future rulemaking.

E. Framing Question 4: What other compliance flexibilities should EPA provide for state implementation guidelines?

- It is Congress via the text of CAA § 111(d), not EPA in its regulatory largesse, that has already made the policy choice to provide substantial flexibilities to States when establishing standards of performance for their existing sources in their state plans.

- EPA must first, then, abandon its efforts to constrict the authority of the States as a part of its rules "implementing" § 111(d), the 2024 Final Rule, and any future emission guidelines for existing gas-fired EGUs. (We note that EPA's illegal restriction of state authority is already at issue in pending motions to stay the 2024 Final Rule and another 2024 final action under § 111(d) (the oil and gas methane rule). The fact that major aspects of its policy architecture are already under litigation should caution EPA against continuing any further down this course, pending the outcome of that litigation.)

- EPA must next recognize after establishing emission guidelines, its authority is limited to ensuring state plans are "satisfactory," after the States have established standards of performance for their existing sources, taking into account, as Congress gave them discretion to do, "among other factors, the remaining useful life" of those sources.

III. Legal Foundation: Issues with EPA's Proposed Regulations of Existing Natural Gas EGUs.

A. EPA Must, at Long Last, Recognize that its Authority Is Limited by the Rule of Law.

Section 111(d), as the courts have observed, is a bit of a "gap-filler." It serves to make sure that a small category of pollutants don't fall between the cracks: those for which the Agency has not developed national ambient air quality standards and which are not hazardous air pollutants.[4] Because the number of air pollutants that elude those categories are so few, EPA has rarely invoked its authority under § 111(d); it is a "regulatory backwater."[5]

---

[3] *See West Virginia v. EPA*, 597 U.S. 697, 728-29 (2022).

[4] *Id.* at 710 (quoting *American Lung Ass'n v. EPA* 985 F.3d 914, 932 (D.C. Cir. 2021)).

[5] *Id.* at 730.

But the EPA's current approach seeks to swell this backwater to the dimensions of the mighty Mississippi in springtime. This is an "extravagant" vision indeed, the very kind of claim of authority that the Supreme Court has said would be rightly met with skepticism in the courts.[6]

And yet, here we are again. EPA's vision for a muscular § 111(d) has not faded. In the 2024 Final Rule, as the CEA has already argued, the EPA attempts to achieve the same "extravagant" ends through different means. But we see evidence of the same vision in this docket. In its framing questions, EPA assumes the authority to redefine sources (Framing Question 1), use market mechanisms in actually establishing emission guidelines (Framing Question 2), and subcategorize based on market function (Framing Question 3).

Indeed, for EPA to assert authority to require one type of power plant to become another type altogether (e.g., to force combustion turbines to "integrate with" solar or batteries) is to assume precisely the sort of authority to decide major questions that the Supreme Court incredulously noted that EPA had not even "remotely" attempted in its previous rulemaking.[7]

And yet, here we are again.

EPA's quest to reshape the power sector according to its own vision continues unabated. The Agency's rollout of the 2024 Final Rule was careful in its wording, assuring that its purpose was to provide "regulatory certainty."[8] But the EPA Administrator showed his hand last year, when he said during the comment period on the 2024 Final Rule: "We are working on a proposed power plant standard in the United States that *helps us to transition from heavily fossil fuel resources to clean resources*."[9] This drive to force a shift from one type of generation to another is what the Supreme Court forbade in *West Virginia*, the Administrator's comments confirm that it still animates the 2024 Final Rule, and EPA's instant questions suggest that it continues to guide EPA's regulatory development in this area.

Although EPA's 2024 Final Rule and ongoing litigation briefing pays lip-service to the Supreme Court, it is simply not credible that the Agency has abandoned its goal to force an energy transition. The Clean Power Plan has been replaced with a flurry of new rules—the § 111(d) framework rule, the oil and gas methane rule, and the 2024 Final Rule—that achieve the same ends by different means. Indeed, all of these rules have sparked litigation making precisely this argument. It would, therefore, be spectacularly unwise for the Agency to forge ahead and attempt to "finish the job" with existing gas-fired EGUs before waiting for the judiciary to weigh in.

Given that all EPA's recent regulatory actions—the § 111(d) framework rule, the oil and gas methane rule, and the 2024 Final Rule—have sparked litigation on precisely this question, it

---

[6] *Id.* at 724.

[7] *Id.* at 728 n.3 (reacting to the dissent's suggestion that EPA could order coal plants to convert to gas: "Of course, EPA has never ordered anything remotely like that, and we doubt it could.").

[8] EPA, "Biden-Harris Administration Finalizes Suite of Standards to Reduce Pollution from Fossil Fuel-Fired Power Plants," (Apr. 25, 2024), *available at* https://www.epa.gov/newsreleases/biden-harris-administration-finalizes-suite-standards-reduce-pollution-fossil-fuel.

[9] World Energy, reprinting *The Hindu Businessline*, US working on power plant standards for energy transition: US EPA head (July 29, 2023) (emphases added), *available at* https://www.world-energy.org/article/34841.html.

would be spectacularly unwise for the Agency to forge ahead and "finish the job" with existing gas-fired EGUs before waiting to see whether these gambits will survive judicial review.

But on a more fundamental level, these lawsuits speak to a deeper problem. Each branch of our government is under an independent obligation to uphold the Constitution. After all, each political appointee in the executive branch takes an oath to "uphold the Constitution."[10] At a time when many are losing faith in our form of government, every exertion of power that violates our Constitution comes with a price. The practice of pursuing policy ends that stretch the outer bounds of constitutional law accumulates a debt that will eventually come due.

EPA should step back and start over.

B. The Clean Air Act Envisions "Cooperative Federalism," not Federal Fiat.

The Clean Air Act is "an exercise in cooperative federalism."[11] The respective roles of the EPA and the State vary depending on the CAA program in question, but CAA § 111(d) is special in it authorizes EPA to regulate existing sources rather than new ones. This is not the only section of the CAA where Congress grants such authority to EPA, but as can be readily observed by comparing the text of § 111(b) and § 111(d), Congress's approach is decidedly different when considering existing sources.

In short, EPA provides a guide, but it is the State that actually sets the standard. True, EPA must still ensure the plan is "satisfactory," but this approval process is hemmed in by Congress's unusually stark command that EPA "shall permit" the States to apply emission guidelines within their own unique contexts, taking into account particular existing source's specific characteristics.[12] Although EPA plays dumb, Congress's intent here is patent: the States know their existing plants better, and EPA must respect that.

Congress directs EPA to develop a procedure whereby States submit plans that establish standards of performance for existing sources that fall under CAA § 111(d)'s ambit. EPA plays a role in determining the "standard of performance"—more on that later—but Congress issues a clear command that identifies where the EPA's authority ends and the State's authority begins: The EPA "*shall permit the State*," when tailoring the EPA's standard of performance to the State's existing sources "to take into consideration, among other factors, the remaining useful life of the existing source."[13]

This deference to the State makes sense in this context. It is the State, not the federal EPA cloistered within the Beltway, that has the local knowledge of how a standard might need to be tailored to a specific source. The State may consider a range of factors, but that Congress intended to allow the State to establish a less stringent standard of performance for a particular existing source than EPA's "emission guideline" rule would otherwise indicate is clear by the

---

[10] 5 U.S.C. § 3331.

[11] *Dominion Transmission, Inc. v. Summers*, 723 F.3d 238, 240 (D.C. Cir. 2013).

[12] 42 U.S.C. § 7411(d).

[13] 42 U.S.C. § 7411(d)(1).

very nature of the explanatory factor Congress called out: If the "remaining useful life" of a particular source is short relative to the other sources in the State, it only makes sense that the State would have the authority to loosen the emissions standard for that unit rather than drive it out of business.

The nature of the cooperative federalism framework Congress envisioned under § 111(d) thus emerges. The EPA provides a national guideline, and the State applies both that guideline and its local knowledge of the existing sources within its regulatory ambit.

Contrast this balance of State–federal authority for existing sources in § 111(d) with the direct-federal-regulation authority delegated for new sources in § 111(b). There, it is EPA that sets the new source performance standards (NSPS). States may develop a plan to "implement[] and enforce[e]" those standards, but Congress provides no specific role for the State to tailor or adapt them.[14]

But of course, a State's discretion in establishing emissions standards for a specific source is not limited to remaining useful life: the statute authorizes the State to consider "other factors," and Congress provided no textual limit on what those factors may be. This lack of textual limit, however, has not prevented the EPA from trying to impose one. In the Proposed Rule, EPA explicitly proposed to take one important issue off the table for States to consider: grid reliability.[15]

This statement is breathtaking—and revealing. The EPA's legitimate remit is important but limited: it is a federal agency tasked with regulating air quality through a cooperative federalism framework. The States, however, are responsible for most of the issues of daily life. This includes, of course, whether the lights will turn on at the flip of a switch. The EPA has no statutory authority to transmit its own limitations to the State. Indeed, such an assertion of authority not only exceeds the Agency's authority under the Clean Air Act, nor even the federal government's authority under the Federal Power Act: EPA is proposing to violate the Constitutional structure itself.

It's not just the 2024 Final Rule. In its rules implementing the state plan submission and approval process, EPA attempts to enforce a cramped vision for the role of the States, notwithstanding the text of § 111(d) itself.[16] In the CAA § 111(d) Implementation Rules, the EPA acknowledges that the statute "contemplates circumstances in which states would be permitted to deviate from the

---

[14] *Id.* § 7410(b).

[15] EPA, Proposed NSPS and Emission Guidelines for GHGs from Fossil-Fuel EGUs, 88 Fed. Reg. 33,240, 33,382 n.628 ("The EPA also considered impacts on the energy sector as part of its BSER determinations. However, because this consideration does not apply at the level of a particular affected EGU, *it would not be appropriate basis for invoking RULOF*." (emphasis added)). Note that while the EPA was less provocative in the preamble for the 2024 Final Rule, EPA has not moved off its position, arguing that the States' authority to tailor is limited to "the specific conditions of particular sources." 2024 Final Rule, 89 Fed. Reg. at 39,843 n.272 ("As the EPA's implementing regulations specify, the provision for states' consideration of RULOF is intended address the specific conditions of particular sources, whereas the EPA is responsible for determining generally how to regulate a source category under an emission guideline.").

[16] EPA, Implementing Regulations Under CAA § 111(d), 88 Fed. Reg. 80,480, 80,508-10 (Nov. 17, 2023) (CAA § 111(d) Implementation Rules).

degree of emission limitation in the applicable [emission guidelines] based on consideration of RULOF for particular sources."[17]

However, the EPA then launches into a series of arguments rooted in legislative history—rather than text of the statute—to suggest that the State's statutory authority to consider RULOF is constrained to plant age, location, or basic process design.[18] EPA then drives the point home by asserting that it has broad authority invalidate state plans and insert its own will, should it decide that a state plan is inadequate.[19]

In its press release for the 2024 Final Rule, the EPA quite carefully emphasized that one of its purposes was to provide "regulatory certainty" for operators seeking to make long-term investment decisions.[20] But stepping back and considering all the rulemakings that EPA has issued, it is difficult to take this seriously. What EPA has done in fact is to set numerous roadblocks to investment in new facilities, to create regulatory overhang for existing facilities, and to assure the States that if they would like to exercise authority granted to them by Congress, the Agency is not going down without a fight. Litigation will be the only way for States to actually obtain the authority granted to them by the plain text of the statute. And indeed, litigation is already joined, and stay motions have been filed raising this as a primary grounds for eventual likelihood of success on the merits.

Is this really any way to run a country? Or, more to the point, is this really any way to run an *electricity grid*, which provides the vital energy resources that are needed not only for basic needs but are also correlated with essentially everything that is good in life?[21]

Perhaps the Agency believes that the American people won't notice. A new regulation for all EGUs over here. Pulling some EGUs out of the rule over there. Hemming in the ability of States to exercise their statutory authority around the bend, out of sight. And now, standing on the shoulders of a Rule that assumes their availability, seeking to regulate existing gas-fired EGUs. If it was only state sovereignty at stake, it would be bad enough. But as recent years have unfortunately taught us, lives are at stake when the power doesn't come on.[22] Hiding behind a dozen regulatory pinpricks, EPA must believe it can disavow responsibility. But the big picture is plain: EPA has a vision for how electricity should be supplied in the United States. All impediments to that vision must be removed.

This all implicates Framing Question 4: "What other compliance flexibilities should EPA provide for state implementation guidelines?" The answer is: EPA should abandon its illegal

[17] *Id.* at 80,509.

[18] *Id.* at 80,510.

[19] *Id.*

[20] EPA, "Biden-Harris Administration Finalizes Suite of Standards to Reduce Pollution from Fossil Fuel-Fired Power Plants."

[21] Robert Bryce, "Powering the Unplugged: Overcoming the Barriers to Electrification in the Developing World," *ARC Research*, Oct. 2023, https://www.arc-research.org/research-papers/powering-the-unplugged.

[22] *E.g.*, "Texas puts final estimate of winter storm death toll at 246," *Texas Tribune*, Jan. 2, 2022, *available at* https://www.texastribune.org/2022/01/02/texas-winter-storm-final-death-toll-246/.

attempt to constrict state discretion. Congress already provided the needed flexibility in the text of § 111(d): the States may consider the remaining useful life and other factors for every covered source. The EPA should not and cannot suffocate the State's role, as the Agency has done in the 2024 Final Rule, and then provide uncertain "flexibility" at a sort of atonement. In other words, EPA should *not* try to find "flexibilities" in trading-and-averaging credit schemes, which *West Virginia* already held were beyond the Agency's authority. It should stick to the ample flexibility Congress provided in the text of the statute itself.

Unfortunately, the EPA has already demonstrated a propensity to flip the balance of cooperative federalism within the context of § 111(d) on its head. CEA expects the judiciary to yet again rein things in. But as EPA looks ahead to the regulation of existing gas sources, CEA encourages EPA to consider how much authority it has already been granted by Congress; EPA need not grasp for power that isn't there.

C. The EPA Must Abide by *West Virginia v. EPA*.

As alluded to above, this particular rulemaking saga has been unfolding for nearly 10 years. But a little less than two years ago, the Supreme Court weighed in on the merits, and the Court had quite a bit to say. Based on EPA's actions since then, it does not seem that EPA has gotten the message. A review of the key holdings in *West Virginia v. EPA* appears to be in order.

First, the Supreme Court held that major questions of policy are reserved to Congress to make, not administrative agencies. This doctrine stands for the proposition that an agency must point to "clear congressional authorization" when regulating on a highly consequential matter.[23] Or to put it another way: "Extraordinary grants of regulatory authority are rarely accomplished through modest words, vague terms, or subtle devices."[24]

When taking up the task of regulating existing natural gas-fired EGUs, the Agency certainly takes up a highly consequential matter. This is true not just because of the role that gas-fired EGUs play in our electric grid, but because it is crucial to consider the big picture of what the EPA is considering here. EPA seeks input in what it frames as a mundane, run-of-the-mill matter: regulating emissions from a category of stationary sources. But considering what EPA has already done, in this nonregulatory docket, the Agency is seeking input on an extraordinary question.

The actions the EPA has already taken must be considered as a part of the Framing Questions the EPA has posed here:

- EPA has already issued unachievable new source performance standards that will all but prohibit the construction of new baseload gas-fired EGUs. That these are unachievable is well beyond the scope of this comment letter, but we would simply observe the utter dearth of evidence in the record of utility-scale CCS implemented at even a single natural gas combined cycle EGU.

[23] *West Virginia*, 597 U.S. at 721.

[24] *Id.* at 723.

- EPA has created, through market function-based applicability provisions of the 2024 Final Rule, powerful incentives for only small, gas-fired peaking units to be constructed.[25] In EPA's vision, these units would operate for less than 1% of the time, ramping up only to bail out renewable resources when they fail to deliver.[26]

- EPA has created a perverse incentive for coal-fired EGUs to convert to highly inefficient gas-fired steam-generating units. In the 2024 Final Rule, EPA has indicated that if a coal-fired EGU converts to a gas steam-generating unit prior to 2030, it will be treated as an existing source and not be subject to the much more stringent requirements associated with new gas-fired EGUs.[27] This exposes EPA's true rationale—to force fuel switching—rather than achieving maximum efficiency in the gas fleet.

These regulations pursue an illegitimate goal: to reshape how the electric grid works and what kind of energy is produced in the United States.

If EPA is inclined to prove that it is focused on air quality rather than energy policy, it must pursue a conventional course that falls within the mainstream of its historical regulatory approach. This is not a time for the EPA to get fancy with redefining the concept of "source" or with leveraging subcategorization to incentivize retirement of disfavored EGUs. If the Congress wished the EPA to do so, it would have said so directly.

Second, and relatedly, the Court observed that it is unlikely that Congress delegated "to any administrative agency" the responsibility of "balancing the many vital considerations of national policy implicated in deciding how Americans will get their energy."[28] Perhaps attempting to avoid this pitfall is why EPA seems to have provided so little of substance to support its conclusory reassurance in the 2024 Final Rule that that rule will not impact Americans' access to reliable electricity every hour of the day. Make no mistake: The 2024 Final Rule comes with massive consequences for grid reliability. But as modeling conducted for this nonregulatory docket demonstrates, even very small retirements of the existing gas-fired fleet will cause the grid reliability problem to spiral further out of control.[29] As bad as the 2024 Final Rule is, regulation of existing gas plants along the lines of the 2023 Proposal as informed by the instant questions will make the situation much worse.

The Biden Administrative set the table for the current problem right at the beginning of its administration, when it issued its Executive Order on Tackling the Climate Crisis at Home and Abroad.[30] In it, President Biden announced a new policy:

---

[25] For a fuller discussion of the problems with EPA's market-based subcategorization, see *infra* subpart III(D).

[26] EPA, Analysis of the Final Greenhouse Gas Standards and Guidelines: Power Sector Modeling, https://www.epa.gov/power-sector-modeling/analysis-final-greenhouse-gas-standards-and-guidelines.

[27] 40 C.F.R. § 60.5880b.

[28] *West Virginia*, 597 U.S. at 729.

[29] *See infra* Part V.

[30] Exec. Order No. 14008, 86 Fed. Reg. 7,619 (Feb. 1, 2021).

> It is the policy of my Administration to organize and deploy the full capacity of its agencies to combat the climate crisis to implement a Government-wide approach that reduces climate pollution in every sector of the economy; increases resilience to the impacts of climate change; protects public health; conserves our lands, waters, and biodiversity; delivers environmental justice; and spurs well-paying union jobs and economic growth, especially through innovation, commercialization, and deployment of clean energy technologies and infrastructure. Successfully meeting these challenges will require the Federal Government to pursue such a coordinated approach from planning to implementation, coupled with substantive engagement by stakeholders, including State, local, and Tribal governments.[31]

It is certainly President Biden's prerogative to announce such a policy. Elections have consequences, after all. However, the Executive Branch may only exercise the authority granted to it by the Congress and the Constitution. And more to the point, each individual agency within the Executive Branch is constrained by its own statutory authority and the Constitution. The Supreme Court counseled in *West Virginia* that no single agency, but especially not the EPA, has been tasked with "balancing the many vital considerations" at stake here.

And so, the cumulative impact of EPA's air-regulatory agenda is so vast and sweeping that it raises the specter of blackouts in times of emergency. This confirms that EPA continues to address major questions of policy, despite the Court's clear command not to do so without clear congressional authorization.

Third, the Court focused its discussion of Section 111 around the observation that, prior to the illegal Clean Power Plan, EPA's rules under this authority always shared the goal of "causing the regulated source to operate more cleanly."[32] And the Court held specifically that whether the EPA can create a cap-and-trade regime across all fossil fuel-fired EGUs is a major question reserved for Congress to answer.[33] While the Court did not need to address the question whether valid "systems of emission reduction" can *only* be those applicable to and at the level of an individual facility,[34] it again noted EPA's consistent practice of observing that limit prior to the Clean Power Plan. This, coupled with the direct holding that cap-and-trade schemes are *extra vires* under Section 111, should cause EPA to steer well clear of the rocks on which the Clean Power Plan foundered.

But the "market mechanisms" EPA seems to be considering here in Framing Question 2 are cruising very close to these rocky shoals. Indeed, this Agency in 2019 disavowed that the Clean

---

[31] *Id.* § 201.

[32] *West Virginia*, 597 U.S. at 725.

[33] *Id.*

[34] *Id.* at 734 ("We have no occasion to decide whether the statutory phrase 'system of emission reduction' refers exclusively to measures that improve the pollution performance of individual sources, such that all other actions are ineligible to qualify as the BSER. To be sure, it is pertinent to our analysis that EPA has acted consistent with such a limitation for the first four decades of the statute's existence.").

Air Mercury Rule provided authority for the EPA to regulate in this fashion.[35] Predicting the legal jeopardy the Agency was in for exceeding its statutory authority in the Clean Power Plan, the EPA corrected course. There, the EPA concluded that "the statute does not, in fact, delegate discretion to the Administrator to 'establish . . . for an entire category of existing sources' standards that can only be accomplished by 'a fundamental redesign' of that category, of the generation mix, and of the division of jurisdiction over electricity generation within the federal government and between the federal government and the states."[36]

There are two reasons for this conclusion. First, it is the states that actually set the emissions standards for units within their borders through their state plans.[37] These state plans must actually address a source's emissions performance—averaging and trading don't. But second, the statute limits EPA's consideration of what is the best system of emission reduction to those systems that reduce emissions at a source, rather than an entire sector. This is the first step down the path that the Supreme Court forbade in *West Virginia*.[38] EPA should heed the unmistakable tenor of the Court's views in *West Virginia*, or its rulemakings will continue to meet the same fate as the Clean Power Plan met in that case.

Fourth and finally, the Court cast significant doubt on the idea that EPA could redefine a source, that is, require a coal plant to become a gas plant.[39] Indeed, the Court cast doubt on the question of whether EPA would attempt such a thing. It appears the Court should have had more imagination, because in the 2024 Final Rule, the Agency has done just that, in requiring coal-fired EGUs that wish to operate in the 2030s, but that acquiesce to EPA's demand to not trespass upon the 2040s, to co-fire 40% natural gas.[40] This is a matter rightly in litigation today.

But EPA's Framing Question 1 suggests the Agency is contemplating going even further, requiring combustion turbines to "integrate with" battery storage, solar, and utility-scale fuel cells. In its August 2023 comments in the rulemaking docket for the 2024 Final Rule, CEA provided a way of thinking about EPA's authority here:

> The children's story of the Three Little Pigs is instructive. One pig builds a house from bricks, the other from twigs, and the third from straw. Is EPA's job to figure out how brick houses can most cleanly be built? Or is it to say "we don't like bricks, bricks are unacceptably harmful, so why don't you start using straw instead?" The former is the traditional, "build a better mousetrap" approach that is

---

[35] EPA, Proposed Emission Guidelines for GHGs from Existing EGUs, 83 Fed. Reg. 44,746, 44,753 (Aug. 31, 2018).

[36] *Id.* at 44,753.

[37] *See supra* subpart III(B).

[38] *West Virginia*, 597 U.S. at 725-26.

[39] *Id.* at 728 n.3.

[40] *See* 89 Fed. Reg. at 39,801/3; *id.* at 40,054/2 (setting forth new 40 CFR § 60.5775b(c)(1)(i) ("(2) Medium-term coal-fired steam generating units (i) BSER is natural gas co-firing at 40 percent of the heat input to the unit.").

> the clearly authorized heartland of Section 111. The latter is the road to legal ruin.[41]

What EPA seems to have in mind here goes beyond even this scenario. Existing gas-fired EGUs would need to enter Frankenstein's laboratory and emerge a new creature, a kind of "source" never before conceived by operators, at least not in the manner in which EPA seems intent on regulating.

Has Congress granted the EPA the authority to proceed in this matter? The Supreme Court had "doubt[s]." CEA does as well. We urge the Agency to change course.

D. The EPA Must Abandon Its Efforts to Subcategorize Based on Market Function.

Congress gave EPA the authority in its § 111 rulemaking to "distinguish among classes, types, and sizes within categories of new sources for the purpose of establishing such standards."[42]

EPA has historically exercised this authority to create subcategories based on physical characteristics. This makes sense, because it is those physical characteristics that have a direct bearing on emissions.

In the 2024 Final Rule, however, as in the Clean Power Plan, EPA instead purports to subcategorize power plants based not on their physical characteristics but their *market function*: how often the EGU operates, and how long it wishes to remain operational.[43] Not only was the authority to subcategorize in this manner not granted by Congress, EPA's assertion of authority demonstrates the Agency's true goal: to restructure the utility markets.

Considering the combination of criteria EPA uses to subcategorize, EPA's goal in the 2024 Final Rule is clear. EPA wishes to: (1) force all existing coal-fired EGUs into premature retirement; (2) deter the construction of new natural gas-fired EGUs; and (3) ensure that dispatchable energy resources are essentially subservient to the renewable energy fleet.

The problem with all of this, of course, is that this is a vision for *energy policy*, not an examination of the best available emissions reduction technology that can be applied to new and existing sources of air pollutants. EPA's approach in subcategorization gives away the game. EPA lacks statutory authority to proceed in this manner because Congress has not granted EPA the authority to dictate how the electricity markets should function. EPA's lack of authority is confirmed by reference to the Federal Power Act,[44] whose careful division of authority between the federal and state governments even when expressly delegating regulatory authority over utilities to a federal agency makes all the more obvious that the federal *environmental* agency lacks the grid-shaping powers it seeks to wield.

---

[41] CEA, Comment Letter on Proposed Rule for NSPS and Emissions Guidelines for GHGs from Fossil Fuel-Fired EGUs, 53-54, *docketed as* EPA-HQ-OAR-2023-0072-0703.

[42] 41 U.S.C. § 7411(b)(2).

[43] Final Rule, 89 Fed. Reg. at 39,842.

[44] 16 U.S.C. ch. 12.

E. The EPA Is Charged with Determining the "Best System of Emissions Reduction," Not Wishcasting.

We incorporate here by reference our comments on the 2023 proposal.[45] All our observations on the statute and caselaw remain in force. Although we incorporate that discussion here in full, it can be summarize simply: an "adequately demonstrated" "system of emission reduction" is one that has a proven track record and will soon be widely available. Although the validity of the early D.C. Circuit caselaw is questionable (and may well be swept away by pending litigation), even under that caselaw EPA's authority to design standards premised on the application of measures that are not yet widely available is limited to *new* sources (for that is all that the caselaw addresses, and in fact some of the caselaw explicitly says that the newness of the sources is what permits such "nudging") and extends no more than a few years. Any "best system of emission reduction" EPA identifies in a future rulemaking regulating existing gas plants must observe these limits on the Agency's authority.

IV. EPA's 2024 Final Rule Has Set the Table for a Grid Meltdown.

Throughout the rulemaking process EPA has repeatedly demonstrated it does not have the expertise necessary to implement regulations while keeping the power system reliable. This is evidenced in the Agency's Regulatory Impact Analysis for the Final Rules and in the modeled MISO and SPP grids in the agency's Integrated Planning Model Output files.[46]

The Agency's use of unrealistic assumptions about available electric generation capacity in its resource adequacy analysis and its failure to conduct a grid reliability analysis of the 2024 Final Rule result in dangerous and irresponsible grid conditions in the modeled MISO and SPP grid. As shown below, EPA overestimates the energy resources that will be on the grid in the future, fails to account for seasonal differences in the availability of intermittent resources, and makes several assumptions that defy a commonsense explanation. Taken together, these errors undermine the validity of EPA's resource adequacy analysis. Coupled with its failure to study reliability impacts, this leaves an important tradeoff inherent in regulating GHG emissions from thermal power plants insufficiently considered and renders additional restrictions unthinkable for the foreseeable future.

A. Electricity Demand Growth Is on the Rise, Yet EPA Mystifyingly Assumes Demand Will Fall.

Underpinning many of the core assumptions of the future of energy in America has been the idea that demand for electricity will fall. This has been driven by historic improvements in energy efficiency, which have broadly outpaced population growth.

---

[45] CEA, Comment Letter on Proposed Rule for NSPS and Emissions Guidelines for GHGs from Fossil Fuel-Fired EGUs, *docketed as* EPA-HQ-OAR-2023-0072-0703, incorporated by reference here both in its entirety and specifically pages 8-32.

[46] EPA, Analysis of the Final Greenhouse Gas Standards and Guidelines: Power Sector Modeling, https://www.epa.gov/power-sector-modeling/analysis-final-greenhouse-gas-standards-and-guidelines.

The problem is, as was explained to the Agency during both the initial and supplemental comment periods, this era of declining energy demand is now over. During the 2023 FERC Reliability Technical Conference, several of the nation's grid operators sounded the alarm about the reliability of the electric grid due to increasing demand and the changing resource mix.[47] For instance, a representative of PJM Interconnection indicated he was "concerned about reliability into the future," given that "[t]he rate of electricity demand is increasing in PJM.[48] Representatives from MISO shared concerns about grid reliability, especially in the face of increasing retirements at a House Energy & Commerce subcommittee hearing.[49]

These concerns about resources adequacy and rising demand came months before a wave of new reporting about the escalating power demands resulting from industrial load growth and the proliferation of data centers and computing centers for artificial intelligence. As Karen Onaran, President and CEO of the Electricity Consumers Resource Council noted in a recent Senate hearing:

> Manufacturers, on average, use one third of the nation's energy. After decades of declining domestic manufacturing, the industry is seeing a resurgence due to the onshoring of previously outsourced industrial operations as well as expanding domestic exploration of new technologies and supply chain opportunities. According to an April 2024 article from the Deloitte Research Center for Energy & Industrials, the number of manufacturing facilities in the United States grew by more than 11% between the first quarter of 2019 and the second quarter of 2023. Construction spending in manufacturing has nearly tripled since June 2020 and was up 37% year over year in January 2024 when it reached a record high of $225 billion.[50]

But it is not just manufacturing. While the U.S. has seen a surge in demand from conventional data centers, data processing centers associated with AI could lead to a four-fold increase in demand for electricity.[51] Consider this testimony from Mark Mills before the Senate Energy and Commerce Committee:

> [I]n monetary terms, every $1 billion spent on datacenters leads to over $600 million in electricity purchases over an operating decade. Last year, capital spending on datacenters was running at about $100 billion a year in the U.S. Now, the addition of AI-enabled hardware is accelerating both the buildout of

---

[47] FERC, 2023 FERC Reliability Technical Conference (Nov. 9, 2023), *docketed as* AD23-9-000.

[48] *Id.* at 190.

[49] House Energy, Climate, and Grid Security Subcommittee Hearing: "Powering America's Economy, Security, and Our Way of Life: Examining the State of Grid Reliability" (Sept. 28, 2023) (Testimony of Todd Ramey, MISO Senior Vice President Markets and Digital Strategy).

[50] Senate Committee on Energy and Natural Resources Hearing: "Opportunities, Risks, and Challenges Associated with Growth in Demand for Electric Power in the United States" (May 21, 2024) (Testimony of Karen Onaran, President and CEO, ELCON).

[51] *Id.* (Testimony of Mark P. Mills, Executive Director, National Center for Energy Analytics, Distinguished Senior Fellow, Texas Public Policy Foundation).

> datacenters and the energy use per datacenter with at least a doubling in both factors which means, combined, there's a potential four-fold jump in energy use per new dollar of capital deployed in digital domains. That would translate into well over $2 billion in energy purchases over a decade for every $1 billion spent on new AI-infused datacenters.
>
> The AI revolution is on track to add more net new energy demand annually than will manufacturing, or the auto industry, and far more than EVs. And this says nothing about the spillover effect, the point of using AI in the first place, which is to accelerate economic growth and competitiveness. The arrival of a new way to boost the economy illustrates the long-standing correlation, a veritable iron-law, that links economic growth and rising energy use, especially now electricity.[52]

The body of evidence of this new trend continues to grow, but it is not as though EPA was not warned during the comment period for the Proposed Rule.[53] And yet, inexplicably, EPA revised demand projections in MISO, SERC, and SPP significant downward from the Proposed Rule to the 2024 Final Rule.[54]

EPA must not make this mistake again. In any future rulemaking related to the power sector, EPA must use realistic assumptions on demand growth as a part of resource adequacy and grid reliability studies.

B. EPA's Modeled MISO Grid Fundamentally Lacks Resource Adequacy.

Always On Energy Research (AOER) modeled the impact of the 2024 Final Rule on the reliability of the electric grid in the subregions consisting of the Midcontinent Independent System Operator (MISO) and Southwest Power Pool (SPP) using the EPA's Integrated Planning Model, which is found within several .zip files as a part of EPA's Power Sector Modeling Analysis for the 2024 Final Rule.[55]

As explained in the Regulatory Impact Analysis, EPA uses a modeling tool called the Integrated Planning Model (IPM).[56] This model generates a range of outputs based on the modeled assumptions that constitute each discrete grid scenario. These outputs include both new capacity construction and existing capacity retirements expected by the model, again based on the assumptions provided to IPM. We will refer to these outputs as EPA's "modeled grids," because they are the energy resources that EPA predicts will be available to the grid over time.

---

[52] *Id.*

[53] *See, e.g.*, Cato Institute, Comment Letter on Proposed Rule for NSPS and Emissions Guidelines for GHGs from Fossil Fuel-Fired EGUs Supplemental Comment Period, *docketed as* EPA-HQ-OAR-2023-0072-8213.

[54] EPA, Analysis of the Final Greenhouse Gas Standards and Guidelines: Power Sector Modeling, https://www.epa.gov/power-sector-modeling/analysis-final-greenhouse-gas-standards-and-guidelines.

[55] *Id.*

[56] EPA, Regulatory Impact Assessment, 2024 Final Rule, ES-3 (Apr. 2024), Doc. ID EPA-HQ-OAR-2023-0072-8913.

Any modeling exercise requires a base case. For the RIA released as a part of the 2024 Final Rule, EPA chose a "Post-Inflation Reduction Act" base case, which assumes significant changes to the electric grid from its current composition due to the source-specific subsidies in the Inflation Reduction Act. This creates a false baseline, conveniently attributing to the IRA what are properly understood as generation-shifting impacts of the 2024 Final Rule. By engaging in a shell-game that disclaims a large portion of the consequences of the 2024 Final Rule, EPA not-so-artfully underestimates the rule's impact.

Importantly, ***EPA does not conduct a grid reliability analysis*** of these modeled future grids. Instead, it performs only a resource adequacy analysis. The difference between these kinds of analysis is significant. EPA's resource adequacy analysis is annualized and analyzes whether total power supply is sufficient to meet total power demand for the entire year.[57] To be sure, this type of analysis is important and helpful, but it is not sufficient to understand whether grid reliability can be maintained. That requires a grid reliability analysis, that analyzes power supply and demand a much more granular level: every hour of the year. This is important because a weather event may reduce the capacity of intermittent renewable energy resources for a number of days. This anomaly would be hidden in an annual average, but the consequences—blackouts during extreme weather events—come with a severe human toll.

For its resource adequacy analysis, EPA assumes the projected peak demand for each region and then assigns a reserve margin based on estimates provided by the North American Electric Reliability Corporation (NERC). The target reserve margins for SPP and MISO are 16 percent and 17 percent, respectively, and are based on the summer season because peak demand typically occurs in the summer months.[58] Under the parameters EPA set for its own modeling exercise, it must ensure that there are sufficient energy resources to meet both projected load and the reserve margin.

EPA continues that its resource adequacy analysis is

> meant to serve as a resource adequacy assessment of the impacts of the [2024 Final Rule] and how projected outcomes under the [2024 Final Rule] compare with projected baseline outcomes in the presence of the Inflation Reduction Act (IRA). . . . The focus of the analysis is on comparing the illustrative final rules scenario from the RIA to a base case (absent the rule requirements) that is projected to be adequate and reliable.[59]

The result of this analysis is what we will refer to as EPA's "modeled grid." The output of EPA's analysis is an electricity generating fleet for a given model year. Thus, each model year will have its own modeled mix of generating capacity among coal, gas, wind, solar, and other resources. This mix changes over time in response to EPA's model's assumptions and calculations of a

---

[57] EPA, Resource Adequacy Analysis Technical Support Document, NSPS for GHGs from New, Modified, and Reconstructed Fossil Fuel-Fired EGUs; Emissions Guidelines for GHG Emissions from Existing Fossil Fuel-Fired EGUs; and Repeal of the Affordable Clean Energy Rule, Final Rule, 2 (Apr. 2024), Doc. ID EPA-HQ-OAR-2023-0072-8916.

[58] *Id.*

[59] *Id.* 2, 5.

range of economic factors. To determine whether there are adequate resources, EPA compares the annual total electricity generation to a modeled estimate of demand for that year.

AOER's analysis, on the other hand, conducted a reliability assessment of EPA's "modeled grids" to determine whether there is adequate generating capacity to maintain grid reliability at all hours of the day.[60] Because grid reliability is managed at the regional, rather than national level, we narrowed our analysis to two regions: MISO and SPP. AOER's reliability assessment tests EPA's modeled MISO and SPP grids by applying historically observed hourly electricity demand and historically observed capacity factors for intermittent resources to determine whether there is sufficient power supply to prevent blackouts.[61]

AOER's modeling shows severe capacity shortfalls in the form of rolling blackouts, in both MISO and SPP. These severe blackouts are not captured by EPA's resource adequacy analysis because the Agency is using indefensibly unrealistic estimations of a power plant's reliability (i.e., its capacity value) for the thermal fleet, wind, and solar resources. In short, EPA has greatly overestimated the reliability of its modeled grids for both MISO and SPP well into the future, effectively obscuring the predictable consequences of its crackdown on the workhorses of the thermal fleet.

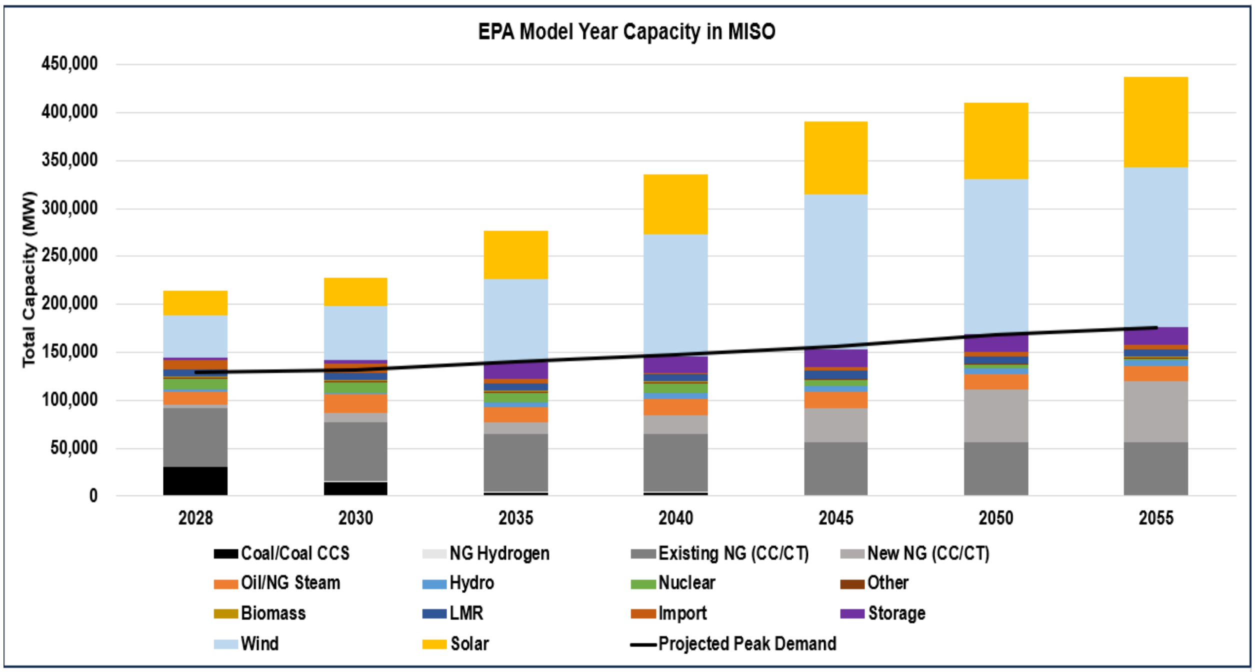
Figure 4.1 shows what the EPA predicts the MISO grid will look like based on installed capacity by resource type in light of the 2024 Final Rule—that is the mix of energy resources that will exist based on the incentives and disincentives created by the 2024 Final Rule—and compares installed capacity to protected peak demand based on historically observed hourly electric demand in each region. Installed capacity is essentially the maximum capacity—sometimes called the nameplate capacity—of an energy resource installed on the grid.

Of note, EPA predicts that existing coal will be virtually entirely retired by 2035. Wind, solar, new natural gas (including natural gas with hydrogen), and battery storage will take its place.

In Figure 4.1 (and in all similar figures throughout this comment letter), energy resources are sorted by dispatchability, with more dispatchable resources at the bottom of the stack. Non dispatchable resources (wind and solar) are placed at the top of the stack to visually demonstrate a scenario where these resources underperform EPA's assumptions for their expected capacity.

[60] Total installed capacity for EPA's modeled MISO and SPP grids is calculated using Final Rule Zip File, RPT, Supply Resource Utilization, CapacityTypeDetails, Totaled the capacity in Dispatch Capacity MW for each resource type by model year.

[61] Hourly wind and solar generation are obtained from U.S. Energy Information Administration data and are specific to the MISO region. These hourly data are then divided by the total installed wind and solar capacity to determine the hourly capacity factor.



Total Installed Capacity: is calculated using Final Rule Zip File, RPT, Supply Resource Utilization, CapacityTypeDetails, Totaled the capacity in Dispatch Capacity MW for each resource type by model year.

Figure 4.1. The installed capacity of EPA's modeled MISO grid grows by nearly a factor of two. Most of the new capacity is solar, wind, new natural gas and battery storage throughout the model run.

For each energy resource, EPA assumes an "accredited capacity value," which can be thought of as an estimate of the average actual capacity for that energy resource, taking into consideration a variety of factors such as weather, seasonality, operations and maintenance, and so on.

EPA then applies this accreditation to each energy resource featured in Figure 4.1 to determine whether there will be adequate generating capacity over the timeframe EPA is modeling.

Table 4.2 compares the accredited capacity values EPA gives to each resource in the Proposed Rule and 2024 Final Rule in the MISO region.[62] While some of EPA's assumptions for accredited capacity value become more realistic in the 2024 Final Rule (i.e., EPA's accreditation for existing solar capacity moves from 55% to 19-24%), other accreditations remain mystifyingly unreasonable. For instance, thermal sources will never operate at 100% capacity.

[62] EPA Capacity Accreditation was calculated using the data in the Final rule zip file, RPT, SupplyResourceUtilization spreadheet. Calculated by dividing the R.M Capacity MW by the Dispatch Capacity MW for each resource by model year.

EPA Accreditation: Proposed vs. Final		
Resource	**Proposed Rule**	**Final Rule**
Existing Wind	19%	14%-20%
Existing Solar	55%	19%-24%
New Wind	9%-25%	8%-23%
New Solar	32%-52%	30%-52%
New and Existing Thermal	100%	100%
Existing Hydro	56%	54%
New Hydro	65%	65%
Existing Energy Storage	48%	94%
Pumped Storage	95%	95%
New Battery Storage	100%	100%

Table 4.2. These figures are for MISO. EPA gives each resource a capacity value (accreditation) to perform its resource adequacy anaylsis. These figures were derived by dividing the Reserve Margin Capacity megawatts (MW) in the IPM output files by the Dispatch Capacity (MW).

EPA also assumes that the capacity value for each of these resources will change over time. To be blunt, EPA's assumptions defy a commonsense explanation. EPA expects the capacity of existing wind generation to increase over time, while EPA assumes new wind resources will do the opposite. EPA assumes new solar will steadily increase in efficiency and electricity generated through 2035, and then efficiency will drop off, ending 2055 with lower accredited capacity values than where new solar started in 2028. The fact that EPA's model produces such strange results raises significant concerns about the use of the model in the first place.

Further, as discussed later, while EPA assumes that actual capacity will change from year-to-year, the Agency assumes that actual capacity will remain consistent throughout each season of the year. This is inconsistent with how regional energy authorities model electricity demand taking into account seasonal weather patterns. Solar energy is stronger in the summer than in the winter, and wind patterns similarly fluctuate throughout the year. Failing to account for this fact renders EPA's resources adequacy assessment incomprehensible even to a layman. AOER's reliability analysis affirmatively demonstrates that these flawed assumptions, among many others, irresponsibly increase the risk of unanticipated capacity shortfalls in the MISO region.

Table 4.3 shows the accreditation for new and existing wind and solar resources for each of EPA's model years.

EPA Final Rule Model Year Accreditation for Existing and New Wind and Solar Resources							
Resource	**2028**	**2030**	**2035**	**2040**	**2045**	**2050**	**2055**
Existing Wind	14%	14%	14%	20%	20%	20%	20%
New Wind	16%	23%	15%	10%	9%	9%	8%
Existing Solar	24%	24%	24%	19%	19%	19%	19%
New Solar	39%	50%	52%	40%	34%	33%	30%

Table 4.3. New and existing wind and solar resources are given different capacity values, which is not consistent with MISO's accreditation process.

Using these capacity accreditation percentages, AOER conducted a resource adequacy analysis using EPA's modeled assumptions for the MISO region, including these capacity accreditation percentages, which were then applied to the resource portfolio in Figure 4.1. The resulting analysis is shown in Figure 4.2 below.

As Figure 4.2 shows, EPA's modeled MISO grid relies on wind, solar, and battery storage capacity in every model year after 2030 to meet projected peak demand. If these non dispatchable resources underperform EPA's capacity accreditation (due to unusual weather events or seasonal variability), blackouts will occur.

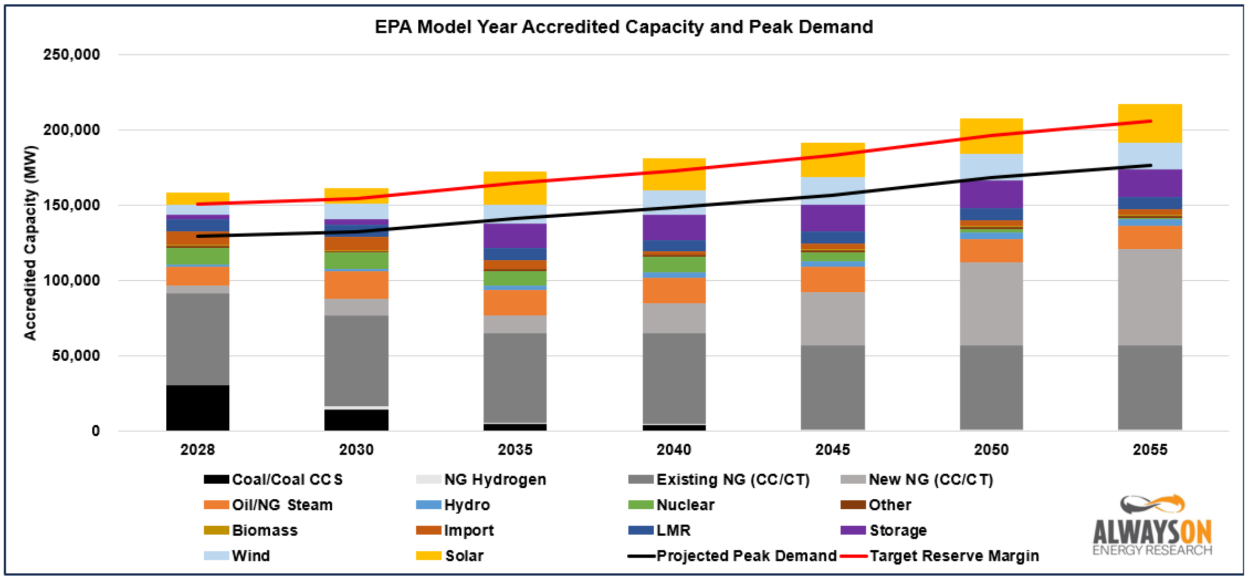


Figure 4.4. MISO is able to meet its peak demand, but not its target reserve margin, under EPA's modeled grid using dispatchable resources in 2028 and 2030. However, after 2030, the grid is reliant upon the performance of wind, solar, and storage to meet even peak demand.

Using EPA's accreditation of each resource type, Figure 4.2 shows there is not enough dispatchable capacity to meet the projected peak demand starting in model year 2035, meaning the region will suffer rolling blackouts if non dispatchable resources on the system are performing at significantly below the capacity values assumed by EPA.

But there is another problem. EPA's capacity accreditations of non dispatchable energy resources far exceed MISO's assumptions for the near term under its proposed Direct Loss of

Load (DLOL) accreditation framework.[63] This new framework is an effort by MISO to more accurately predict the availability of energy resources moving forward.

MISO has produced two estimates of future resource accreditation based on the DLOL approach, one for 2027 and the other for 2032.

Table 4.5 annualizes MISO's accredited capacity values for the MISO Planning Year 2024-25 and the DLOL values for 2027 and 2032 and compares them to the capacity accreditation metrics used by EPA in its model.[64] MISO's DLOL values for 2027 are used for the model years 2028 and 2030, and the 2032 DLOL values are held constant for EPA model years 2035 to 2055for illustrative purposes because MISO has not published capacity accreditation estimates beyond 2032.

As this figure shows, MISO (a regional energy authority with actual responsibility for ensuring that the lights stay on) and EPA have wildly different assumptions about the availability of wind and solar energy resources in the MISO region moving forward.[65]

MISO vs EPA Capacity Accreditation for Wind Resources								
Resource	Planning Year 2024-25	2028	2030	2035	2040	2045	2050	2055
MISO Average Solar	38.75%	7.5%	7.5%	4.5%	4.5%	4.5%	4.5%	4.5%
EPA Existing Solar	N/A	24%	24%	24%	19%	19%	19%	19%
EPA New Solar	N/A	39%	50%	52%	40%	34%	33%	30%
% Difference: MISO vs EPA Existing	N/A	220%	220%	433%	322%	322%	322%	322%
% Difference: MISO vs EPA New	N/A	420%	567%	1056%	789%	656%	633%	567%
MISO vs EPA Capacity Accreditation for Wind Resources								
MISO Average Wind	26.2%	12%	12%	11%	11%	11%	11%	11%
EPA Existing Wind	N/A	14%	14%	14%	20%	20%	20%	20%
EPA New Wind	N/A	16%	23%	15%	10%	9%	9%	9%
% Difference: MISO vs EPA Existing	N/A	17%	17%	27%	82%	82%	82%	82%
% Difference: MISO vs EPA New	N/A	33%	92%	36%	-9%	-18%	-18%	-18%

Table 4.5. EPA's capacity accreditations are significantly more optimistic than MISO's proposed DLOL values for solar throughout the model run. EPA's accreditations for wind are more aligned with MISO's DLOL estimates but still overestimate the capacity values in 2030 and 2035.

As demonstrated above, EPA and MISO have different assumptions about the expected capacity value of non dispatchable energy resources.

---

[63] Midcontinent Independent System Operator, "Market Redefinition: Accreditation Reform," RASC, January 17, 2024, https://cdn.misoenergy.org/20240117%20RASC%20Item%2007a%20Accreditation%20Presentation%20(RASC-2020-4%20and%202019-2631379.pdf.

[64] Midcontinent Independent System Operator, "Planning Resource Auction Results for Planning Year 2024-25," April 25, 2024, https://cdn.misoenergy.org/2024%20PRA%20Results%20Posting%2020240425632665.pdf.

[65] With one caveat that doesn't exactly cut in EPA's favor when looking at the big picture. MISO assumes that all wind resources have the same capacity factor, while EPA makes different assumptions for new and existing wind. This would make sense if EPA assumed that new wind resources were more efficient and therefore produced more electricity. However, EPA mystifyingly assumes the opposite, raising fundamental questions about EPA's methodology, expertise in energy modeling, and therefore its assurances that everything will be fine.

What if MISO is right? Figure 4.6 has the answer, and it's not good.

Figure 4.6 below shows accredited capacity using EPA's modeled MISO grid but applying MISO's assumptions about real-world performance of these resources.[66]

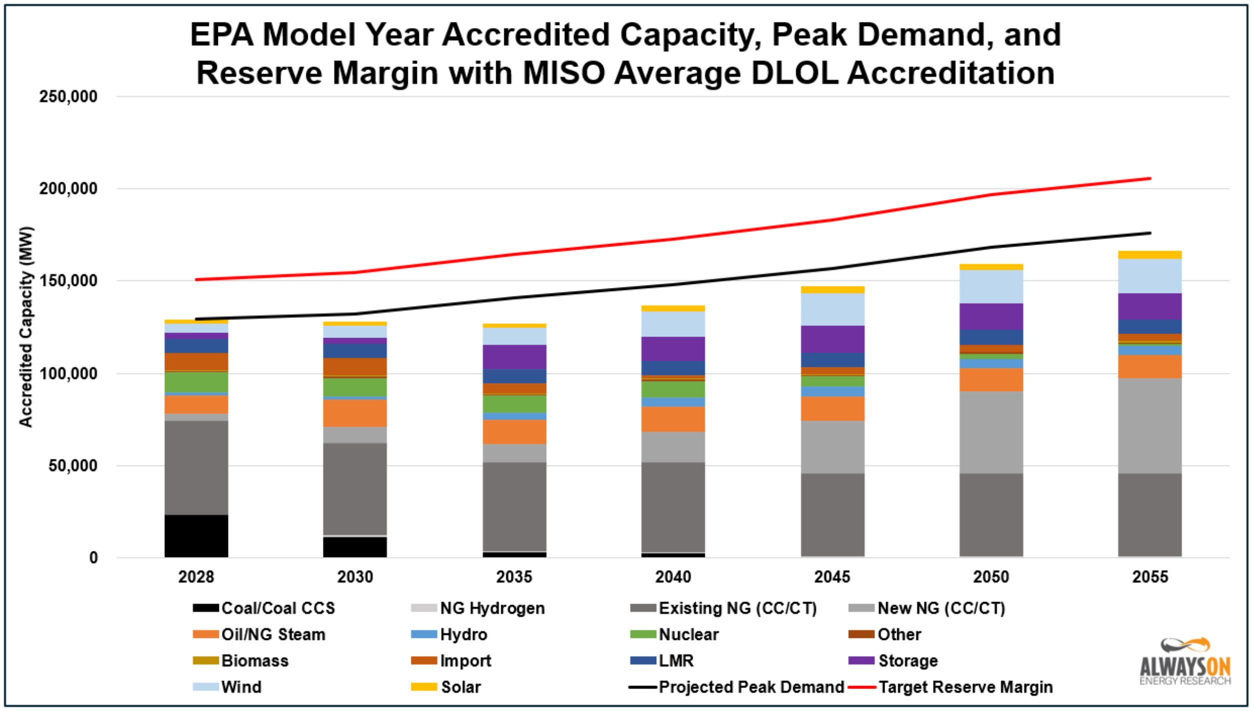


Figure 4.6. Based on MISO's estimated future capacity values, EPA's modeled MISO grid will not be able to meet peak demand after 2028, and in no year does it mean the EPA's target reserve margins established in its modeling.

As Figure 4.6 demonstrates, if MISO's future capacity accreditations are correct, the energy future EPA promises is a disastrous one. MISO would be unable to meet projected peak demand after 2028 or meet EPA's own target reserve margin in any model year.

C. EPA's Modeled MISO Grid Is Unreliable and Will Lead to Significant Blackouts.

We now turn to hourly grid reliability modeling. To determine if the resources on EPA's modeled MISO grid could maintain reliability for every hour of the year, AOER analyzed EPA's modeled generation portfolio relative to the historical hourly electricity demand and hourly capacity factors for wind and solar for each year from 2019 to 2023. This means that rather than using *assumptions* about the world might look like, AOER modeled using historical data about what the world *has actually looked like* in recent years. The purpose of this exercise is to assess

[66] MISO's DLOL values for 2027 and 2032 have been applied to EPA's model years 2028 and 2035. MISO's DLOL values for 2032 are held constant throughout the rest of the EPA model years. MISO also downwardly revised the capacity accreditation for thermal energy resources (e.g., coal, natural gas, fuel oil, and biomass). These changes are reflected in Figure 4.6, though they were not shown in Table 4.5.

whether the energy resources EPA assumes will be installed into the future would be able to provide reliable electricity for all hours in each Historic Comparison Year (HCY).[67]

For this modeling exercise, AOER uses several assumptions that are generous to EPA. First, hourly demand and wind and solar capacity factors were adjusted upward to meet EPA's peak load, annual generation, and capacity factor assumptions (rather than MISO's capacity factors applied in Table 4.5).

Second, dispatchable thermal generation resources were allowed to run at 100% availability when MISO has historically accredited them at 90 percent. This means these generators are expected and allowed to be available at 100 percent capacity whenever they are needed, an unrealistic assumption because EGUs need down time for routine maintenance or encounter problems that require them to shut down. As a result, AOER's assumptions are generous to EPA because they increase the output of wind, solar and thermal generators to reach levels that are not observed in MISO.

The analysis also replicated the "reliability mechanisms" EPA created in the 2024 Final Rule by allowing GHG-emitting resources to run without mitigating emissions to help meet demand during capacity shortfalls. Our model also allows GHG-emitting resources to exceed emission limits to charge the batteries on the system to reduce the severity of shortfalls when they occur.[68] AOER also used generous assumptions for Load Modifying Resources (LMRs). LMRs are tools used by regional power authorities to reduce demand during peak hours, such as limiting supply to certain sources. EPA does not account for LMRs in its own modeling, but we included LMRs because they are important tools used by regional power authorities in the real world.

Figure 4.7 illustrates that the MISO region would experience three capacity shortfall events in July of 2035 using the 2020 HCY.

[67] These hourly capacity factors were calculated using U.S. Energy Information Administration hourly electricity generation data by source. This data is specific to MISO. We divided these generation values by the installed capacity of the wind and solar resources in the MISO system for each Historical Comparison Year. These hourly capacity factors were then applied to the installed wind and solar capacity in the EPA's modeled MISO grid.

[68] 2024 Final Rule, 89 Fed. Reg. at 39,805.

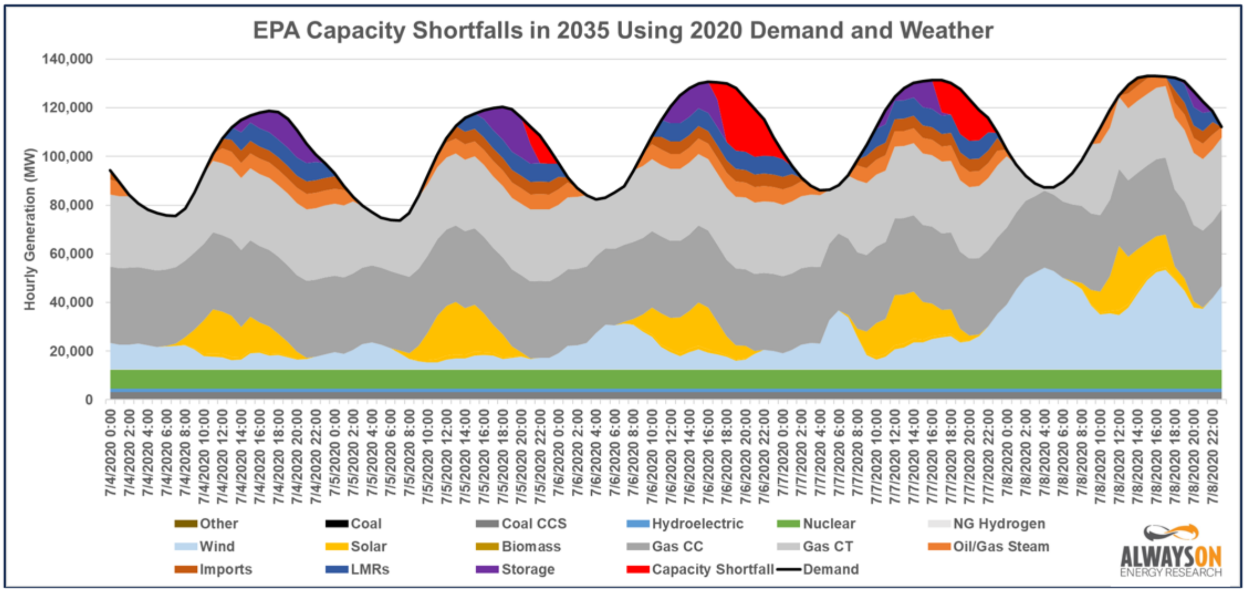


Figure 4.7. EPA's modeled MISO grid would experience three blackout events in July of 2035 using the 2020 HCY.

Two of the shortfalls in Figure 4.7 are massive—the maximum shortfall totaling 25,900 MW—which accounts for 19 percent of MISO's Planning Reserve Margin Requirement in the 2024-2025 planning year. This is nearly the equivalent of all of MISO Zones 1 and 5 losing power, which can be seen in Figure 4.8. These zones include all of North Dakota, virtually all of Minnesota, large portions of Wisconsin and Missouri, and significant portions of Montana, South Dakota, and Illinois.

Summer 2024 PRA Results by Zone

	Z1	Z2	Z3	Z4	Z5	Z6	Z7	Z8	Z9	Z10	ERZ	System
PRMR	18,697	13,396	10,787	9,403	8,297	18,565	21,565	8,431	21,888	5,038	N/A	136,067

MISO Resource Adequacy Zones

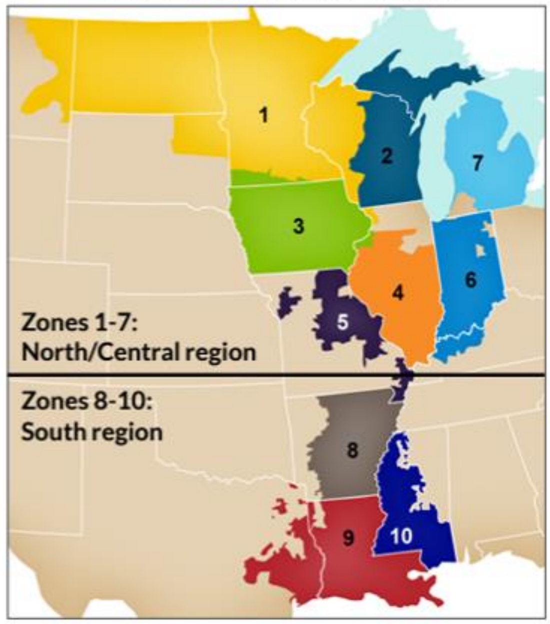


Figure 4.8. Each zone in the table above the map shows the Planning Reserve Margin Requirement for each MISO zone in the Planning Year 2024-25. The blackouts observed in Figure 4.7 are large enough to nearly blackout all of Zones 1 and 5 at the same time.

The blackouts observed in our modeling occur because there is not enough thermal capacity to make up for the shortfalls in wind generation compared to EPA's unrealistic capacity accreditations for this resource. Figure 4.9 shows the hourly capacity factor of wind during the three capacity shortfall events and the extent of the capacity shortfalls (in MW) shown in Figure 4.7. During the height of the blackouts, wind was operating at a 4.1 percent capacity factor, which is substantially below EPA's accreditations for new and existing wind of 15 and 14 percent, respectively. Again, the modeled capacity for wind is derived from EIA historical data specific to the MISO region, as explained above.

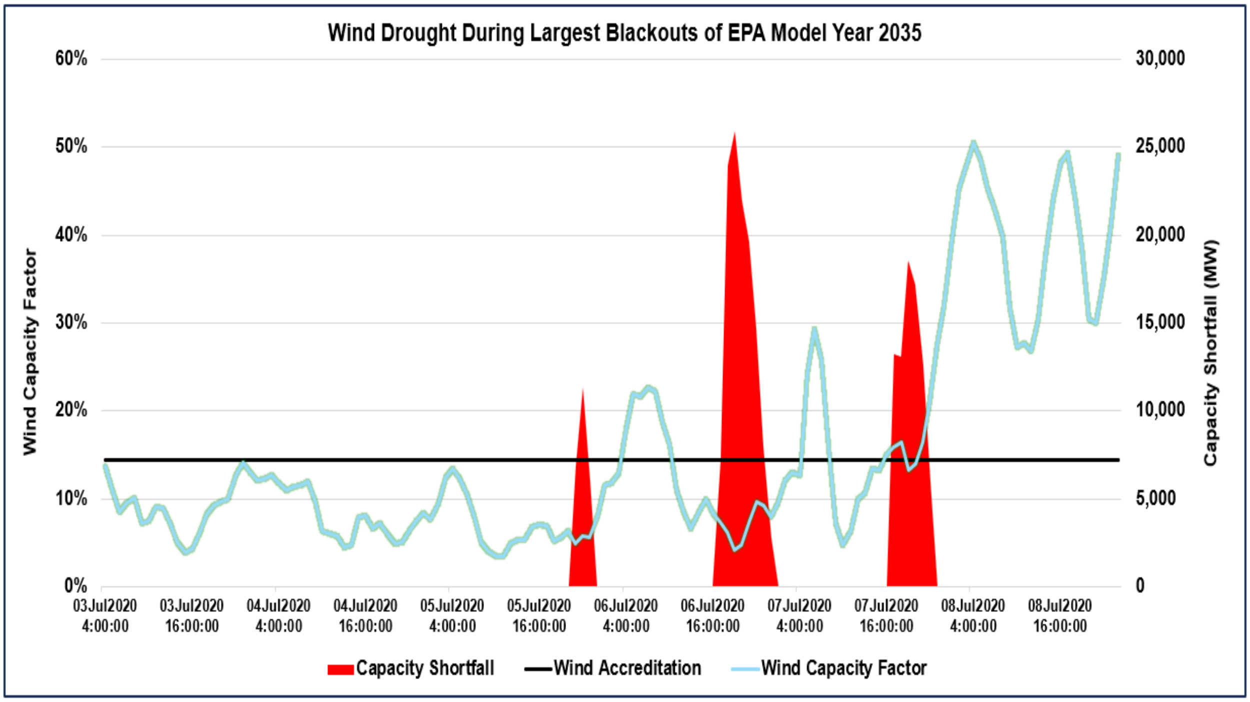


Figure 4.9. EPA's capacity values for wind prove too generous in our modeling scenario, as the underperformance of the wind fleet contributes to a massive 25,900 MW capacity shortfall. The thermal fleet capacity modeled by EPA under its 2024 Final Rule cannot make up the difference, even operating at an assumed 100 percent capacity.

Table 4.10 shows the total number of shortfalls in MWh for each of EPA's seven model years, applying historical capacity factors for each of the five HCYs and allowing thermal units to run as much as possible to meet demand. No capacity shortfalls occur in 2028 because EPA's modeled MISO grid leaves sufficient dispatchable capacity online to meet peak demand in that year. However, capacity shortfalls begin to occur in 2030, and these blackout events reach their peak in the 2035 and 2040 model years.

Total Shortfalls (MWh)							
Historical Comparison Year	EPA Modeled Years						
	2028	2030	2035	2040	2045	2050	2055
2019	0	0	109,888	52,065	39,463	10,660	4,701
2020	0	3,017	229,235	86,640	48,393	9,081	934
2021	0	56	129,724	0	0	0	0
2022	0	0	0	0	0	0	0
2023	0	5,880	132,189	21,615	4,917	0	0

Table 4.10. In only one of the HCYs (2022) are there no blackouts, meaning 80 percent of the HCYs studied produced at least some blackouts based on the installed capacity on EPAs grid.

In summary, the reductions in thermal fleet capacity from the early retirement of existing coal and natural gas EGUs due to the 2024 Final Rule leads to entirely foreseeable reliability issues in MISO. Since EPA's faulty resource adequacy analysis in MISO papers over these problems, it is incumbent on EPA to acknowledge these issues before imposing any further regulations aimed at (or, as EPA disingenuously claims, merely predicted to result in, whether this is the actual policy goal or not) generation shifting or adding costs to existing thermal fleet units. As this stands, the Agency's high accreditation of thermal and intermittent resources already leaves the MISO system dangerously exposed to capacity shortfall events when these resources are not living up to EPA's unrealistic expectations. EPA must revisit these faulty assumptions as a first step to considering any new requirements on existing natural gas EGUs under § 111(d).

D. EPA's Modeled SPP Grid Is, Somehow, Even More Lacking in Resource Adequacy and Grid Reliability.

EPA's resource adequacy analysis in MISO was slapdash, but an examination of the Agency's analysis in SPP is truly alarming.

Figure 4.11 shows the installed capacity of EPA's modeled SPP grid by resource type and the projected peak demand through 2055.[69] Existing coal plants are virtually phased out by 2035 and the majority of replacement capacity is new wind and solar.

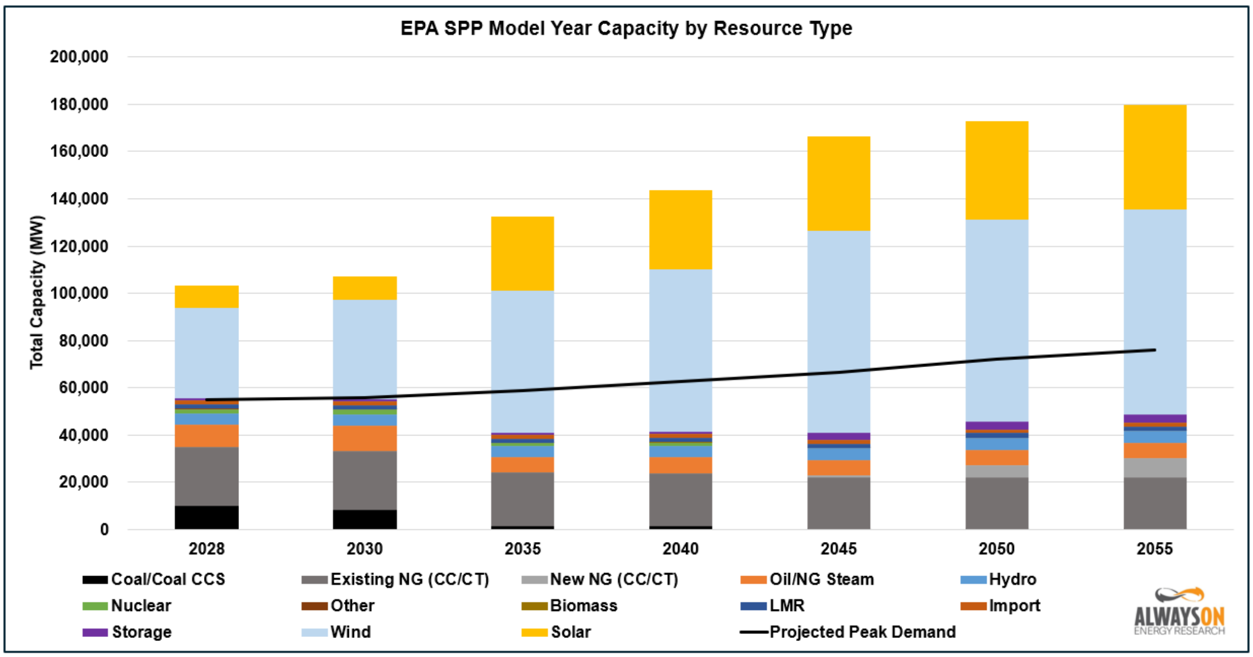


Figure 4.11. The vast majority of new capacity added in EPA's model run is new solar and wind. EPA adds a small amount of battery storage and new gas capacity in 2050 and 2055.

Table 4.12 shows the EPA's expected capacity values for each resource in the SPP region under the 2024 Final Rule.

A few things stick out, but none more than EPA's staggering and indefensible capacity accreditations for solar resources: 82 percent for existing solar and a range of 83 to 100 percent

---

[69] These figures are based on the EPA's IPM final rule output files. Total Installed Capacity is calculated using Final Rule Zip File, RPT, Supply Resource Utilization, CapacityTypeDetails, Totaled the capacity in Dispatch Capacity MW for each resource type by model year.

for new solar. These assumed capacity values for existing and new solar are 3.4 to 4.3 times higher and 1.6 and 3.2 times higher, respectively, than EPA's own assumptions within MISO. These assumed values are 18 times higher than MISO's updated assumptions after 2035 for existing solar and up to 22.5 times higher for new solar resources (see Table 4.4). This 82 percent capacity factor is also inconsistent with EPA's accreditations for solar resources in the California region, which range from 0 percent to 14.8 percent.

In addition to implausibly high solar accreditation, the thermal plants on the SPP system continue to receive 100 percent capacity accreditations, which overstates their availability to the grid.

These assumptions are patently unreasonable on their face, condemning EPA's entire modeling exercise. This means that severe grid reliability issues are far more likely to occur than EPA represents to the American public.

Final SPP EPA Accreditation	
Resource	**Final Rule**
Existing Wind	10%
Existing Solar	82%
New Wind	14%-52%
New Solar	83%-100%
New and Existing Thermal	100%
Existing Hydro	76%
New Hydro	65%
Existing Energy Storage	100%
Pumped Storage	95%
New Battery Storage	100%

Table 4.12. EPA's capacity accreditations for new and existing solar are implausibly high.

Table 4.13 shows the annual accreditation values that EPA assigns to new and existing wind and solar resources over time. Inexplicably, EPA assumes new wind generation's capacity will increase by 3.7-fold from 2028 to 2030 before falling back to 21% in 2035. EPA holds its unrealistically high solar accreditations steady for existing solar, and only slightly reduces the capacity value of new solar throughout its model run.

SPP EPA Final Rule Model Year Accreditation for Existing and New Wind and Solar Resources							
Resource	**2028**	**2030**	**2035**	**2040**	**2045**	**2050**	**2055**
Existing Wind	10%	10%	10%	10%	10%	10%	10%
New Wind	14%	52%	21%	26%	18%	18%	19%
Existing Solar	82%	82%	82%	82%	82%	82%	82%
New Solar	100%	100%	84%	84%	83%	83%	83%

Table 4.13. EPA's capacity values for solar remain high throughout the model run. Existing wind receives a realistic accreditation, but new wind receives a higher accreditation.

AOER then conducted a resource adequacy analysis using EPA's assumed capacity values, shown in Figure 4.14. As with the MISO analysis above, energy resources are sorted according to dispatchability, with more dispatchable resources at the bottom of the stack. Non dispatchable resources (wind and solar) are placed at the top of the stack to visually demonstrate a scenario where these resources underperform EPA's assumptions for their expected capacity.

EPA's modeled SPP grid is not able to meet its projected peak demand with dispatchable resources in any year after 2028, and by 2035 the EPA's modeled SPP grid is heavily reliant upon wind and solar generation to meet peak demand.

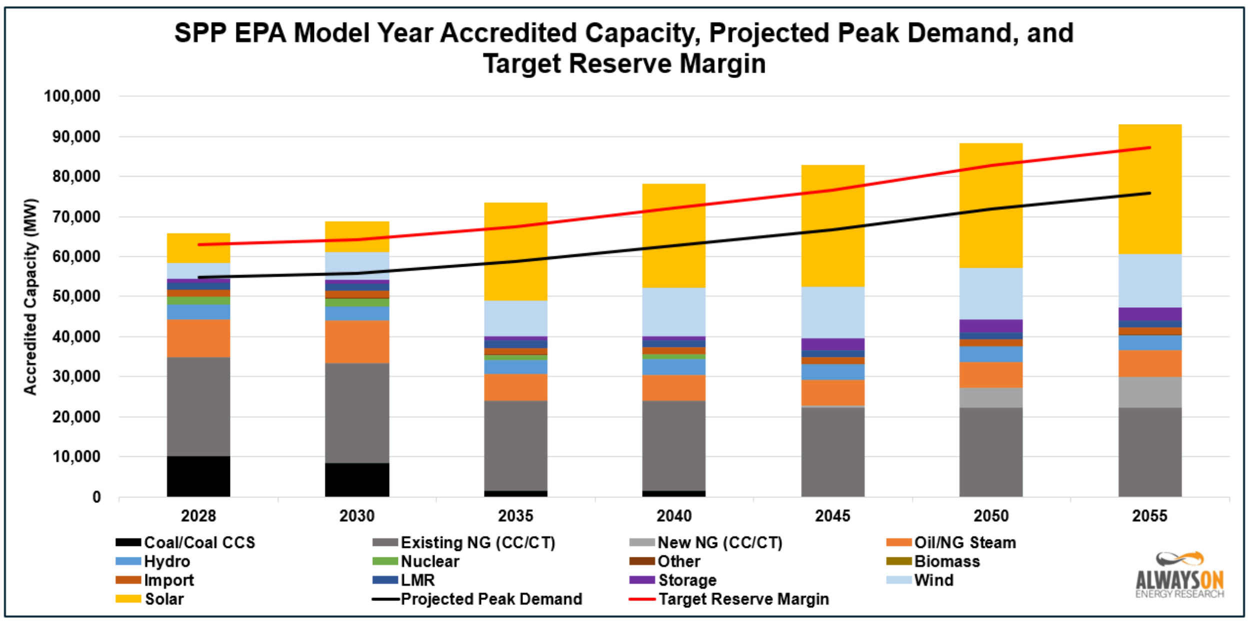


Figure 4.14. By 2035, SPP is heavily reliant upon wind and solar performing in line with EPA's implausible capacity accreditations to meet peak demand.

EPA's capacity accreditations far exceed the assumptions that SPP uses under its proposed Effective Load Carrying Capability (ELCC) accreditation framework.[70] There are two issues to call out here. First, SPP decreases the capacity accreditation of wind and solar resources as they

[70] Southwest Power Pool, "Submission of Tariff Revisions to Implement Effective Load Carrying Capability Methodology and Performance Based Accreditation," Docket No. ER24-____-00.

constitute a greater percentage of peak load.[71] And rightly so—this is to ensure that the grid is not overly reliant on intermittent resources. Second, SPP uses seasonal accreditations, whereas EPA assumes the same capacity factor year-round.

For example, Figure 4.15 shows SPP's winter capacity accreditation for wind falls from just above 25 percent when wind constitutes less than 30 percent of the peak load to 16 percent when wind accounts for more than 40,000 MW, which exceeds the winter peak load on the system. Similarly, the summer wind capacity falls from the mid-twenties when wind resources constitute less than 30 percent of peak load to 16 percent when there are 40,000 MW of installed capacity on the SPP system.

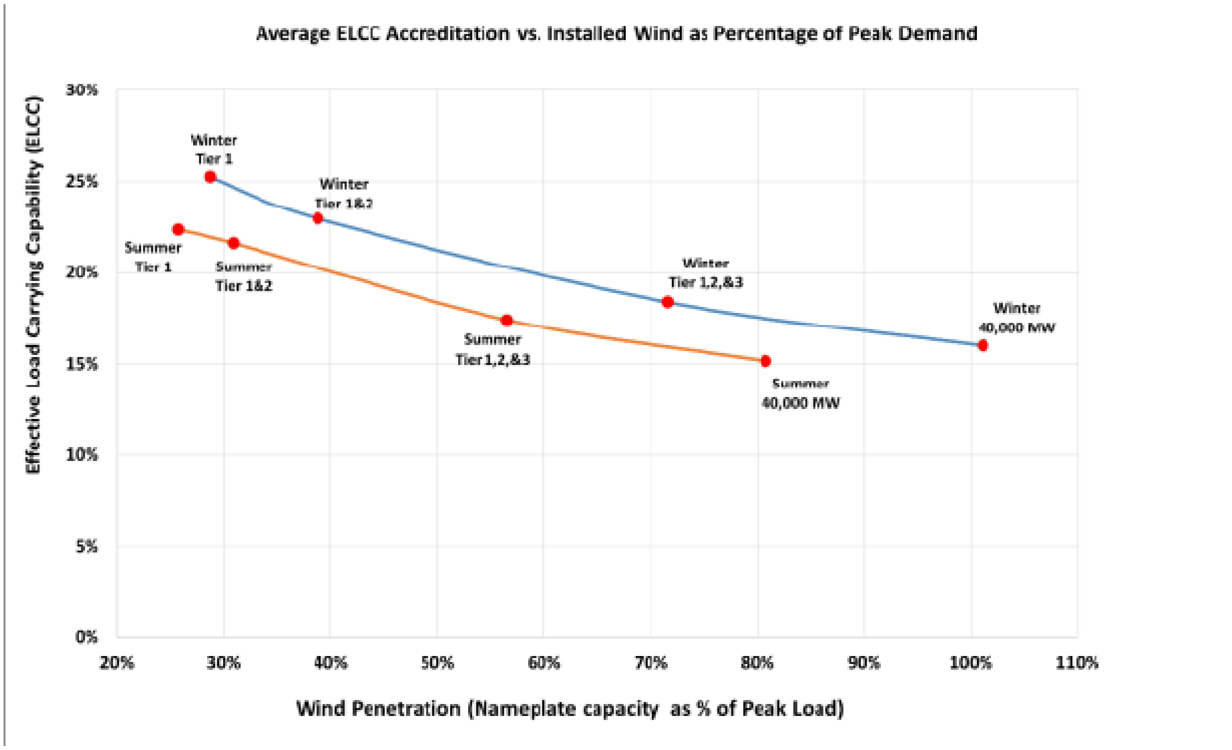


Figure 4.15. The ELCC of wind falls over time as more wind is incorporated on the SPP system. This is at odds with EPA's accreditation for new wind, which begins at 14 percent in 2028 and jumps up to 52 percent in 2030.

Similarly, SPP projects that the summer ELCC of solar falls from 72 percent when there is only 1,000 MW of capacity installed to 40 percent at 20,000 MW because solar accreditation is discounted as more of it is added to the grid. The winter ELCC for solar falls from 19 percent at 1,000 MW of installed capacity to just 6 percent at 20,000 MW (See Figure 4.16).

[71] Southwest Power Pool, "Submission of Tariff Revisions to Implement Effective Load Carrying Capability Methodology and Performance Based Accreditation," Docket No. ER24-____-00.

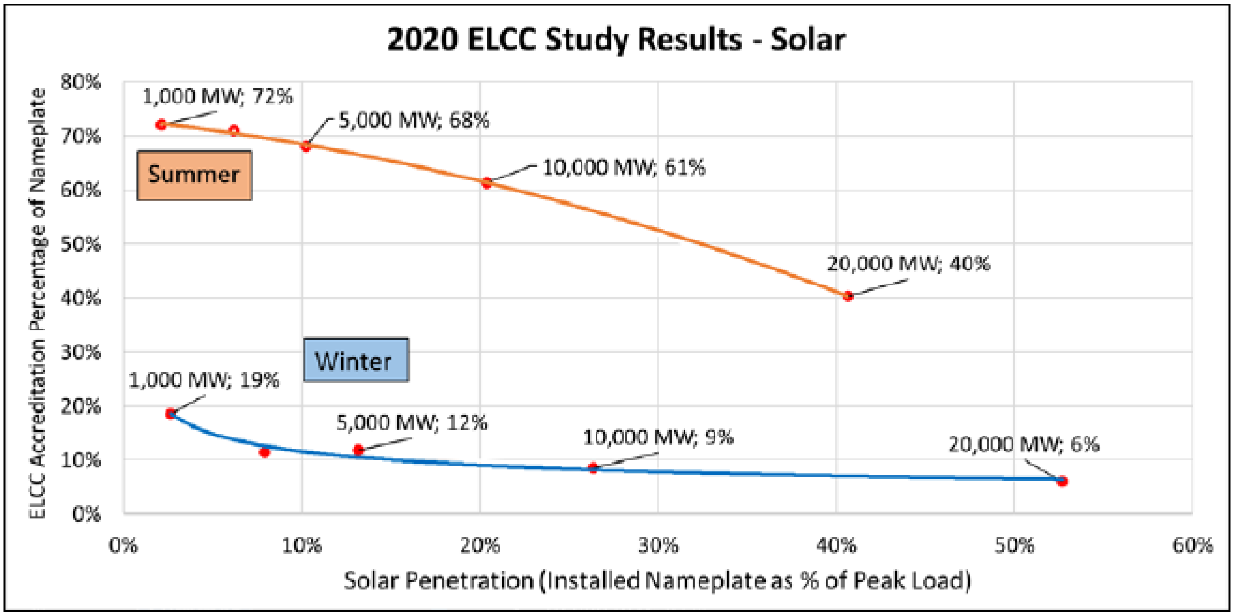


Figure 4.16. The graph above shows capacity value for solar in the summer and winter. Note that SPP only gives solar a 6 percent capacity value in the winter months.

In short, there is wide disagreement over the capacity value of solar among the EPA's modeling and SPP, especially in winter. But even in summer, as solar energy resources continue to come online, SPP assumes for grid reliability purposes these resources will provide half as much electricity as EPA assumes.

Again, what if SPP is right? SPP is, after all, the authority charged with ensuring grid reliability within its region.

Figure 4.17 tells the story, applying SPP's assumptions for capacity values for wind and solar to the EPA modeled SPP grid for the winter season. What we see is that EPA's modeled SPP grid is nowhere near meeting its projected peak demand or target reserve margins when realistic capacity values for solar are used.

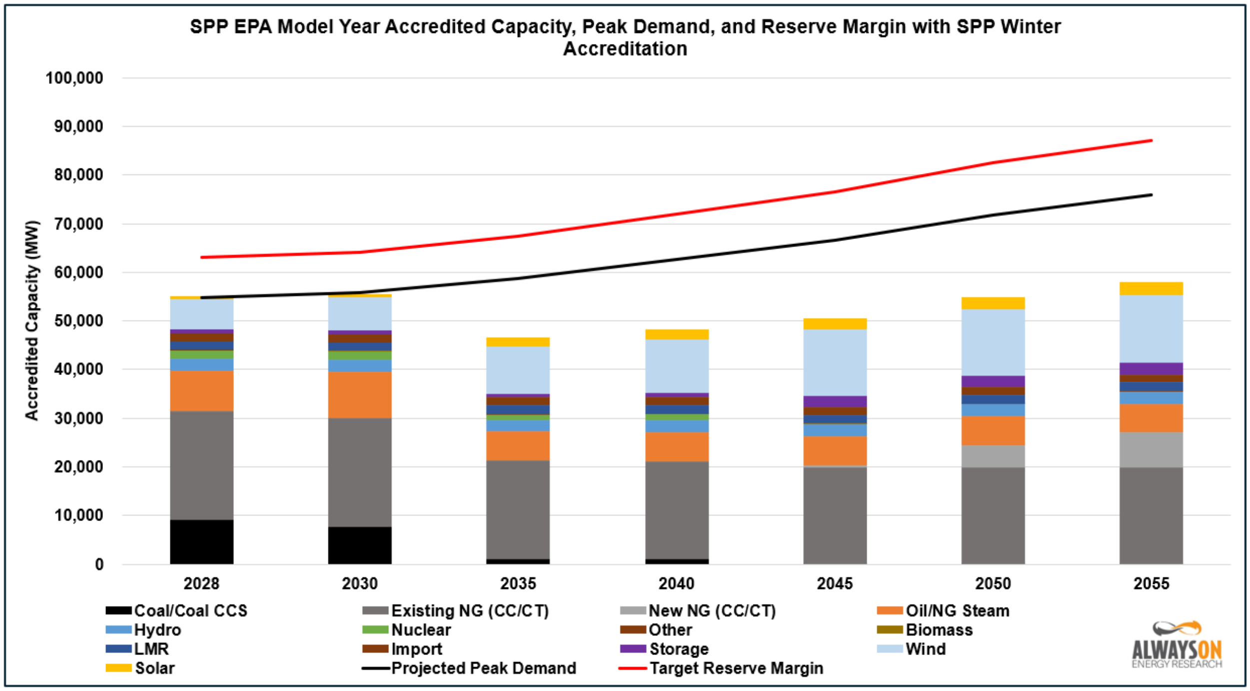


Figure 4.17. EPA's modeled SPP grid is dangerously short of meeting its projected peak demand and target reserve margin when responsible capacity values for solar are used.

E. EPA's Modeled SPP Grid Is Unreliable, and Significant Blackouts Are Likely.

Unsurprisingly, then, EPA's modeled SPP grid results in massive rolling blackouts when applying the hourly grid reliability modeling described above in section IV(D). Figure 4.18 shows the EPA's modeled SPP grid would be subject to 13 separate capacity shortfall events in the span of 13 days in 2040 using the 2021 HCY.

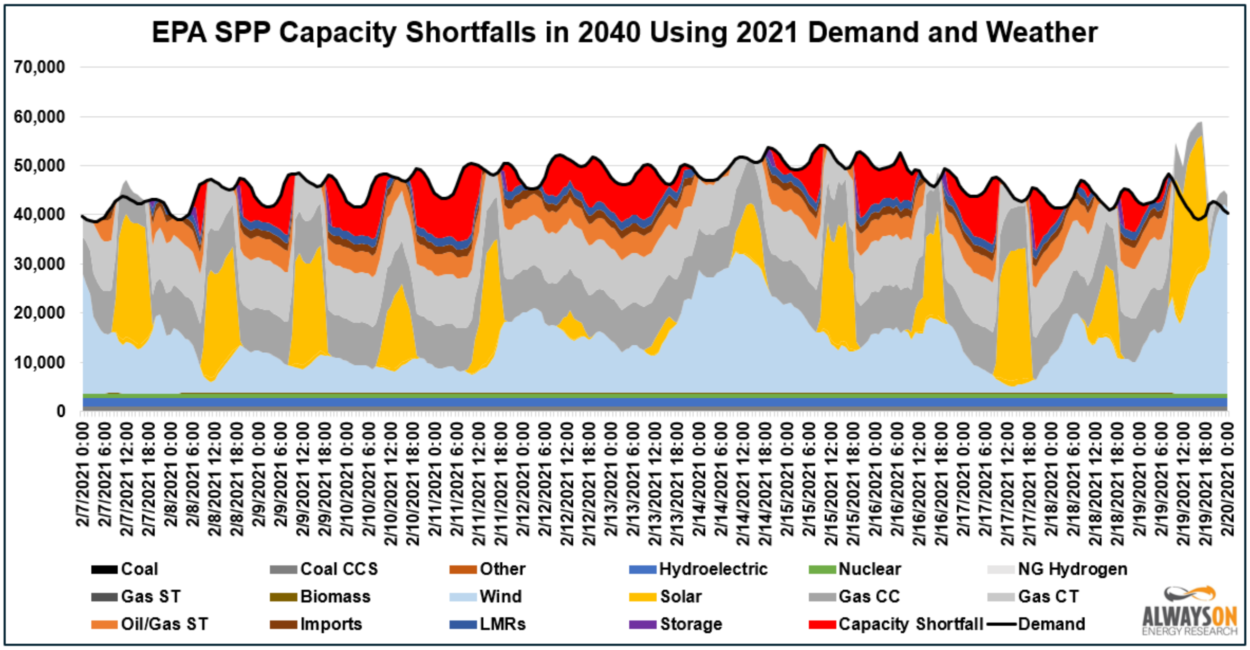


Figure 4.18. EPA's modeled SPP grid would result in 13 blackouts in 13 days in 2040 when tested against 2021 hourly electricity demand and wind and solar capacity factors.

The winter blackouts occur because there are insufficient dispatchable energy resources to meet demand. EPA's flawed resource adequacy analysis obscures this reality, but as can be seen here, the blackouts are especially severe at night, when the sun is not shining. And because dispatchable thermal resources have been retired and new dispatchable resources are not constructed, SPP lacks the energy resources to keep the lights—and with potentially deadly consequences, the heat—on for nearly two weeks.

To demonstrate the problem that overreliance on solar energy creates, Figure 4.19 maps capacity shortfalls against solar electricity generation. When solar resources fail to live up to EPA's 82% capacity factor for solar, SPP experiences massive blackouts.

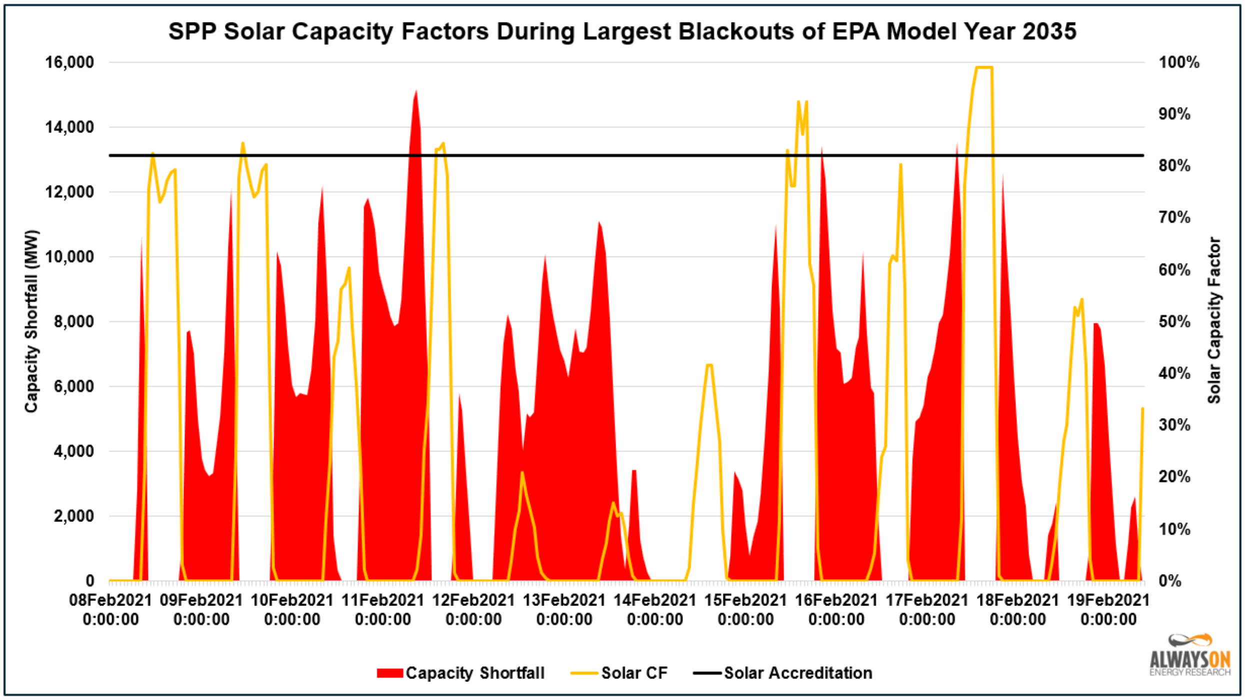


Figure 4.19. Massive blackouts occur because EPA's modeled SPP grid is dangerously reliant upon solar generation, which does not work at night.

The worst blackout is a nearly 15,168 MW capacity shortfall that would occur in February 2040 using the 2021 HCY. This shortfall would account for 27.7 percent of the SPP-wide forecast peak demand for 2024, meaning that 5.2 million of the 19 million people who live in the region would be without power in the middle of winter. It could be Winter Storm Uri all over again.

In total, EPA's modeled SPP grid would experience 8.3 million megawatt hours (MWh) of capacity shortfalls when examining the outages in the seven EPA model years for the 2021 HCY (See Table 4.20). These capacity shortfalls would cause $83 billion in damages in the seven years analyzed using the Value of Lost Load, which can be thought of as the Social Cost of Blackouts.[72]

Total Shortfalls (MWh)								
	2028	2030	2035	2040	2045	2050	2055	Total
2019	2,336	11,481	157,389	327,854	332,649	275,613	271,183	1,378,505
2020	0	0	122,456	232,589	243,625	190,871	189,259	978,800
2021	1,466	12,052	958,204	1,527,581	2,007,625	1,895,291	1,896,587	8,298,806
2022	604	27,668	467,164	843,236	914,724	880,436	903,176	4,037,008
2023	77,714	149,382	428,164	751,748	666,098	660,846	704,685	3,438,637

Table 4.20. EPA's modeled SPP grid would experience millions of MWhs of capacity shortfalls in four of the five HCY model runs based on historical hourly wind and solar capacity factors in SPP. In the 2021 HCY,

[72] MISO is currently seeking to update its VOLL estimates to $10,000 per MWh of unserved load.

F. EPA Must Go Back to the Drawing Board.

EPA's resource adequacy analysis for the 2024 Final Rule is its way of reassuring the American public that despite the forcing the mass retirement of dispatchable thermal energy resources, all will be well. In fact, all will not be well, and the Agency must reverse course and go back to the drawing board.

EPA's own modeling is fundamentally flawed and must be abandoned. First, EPA's modeling with rife with unsupportable—and dangerous—assumptions about the expected capacity of intermittent resources like wind and solar. EPA assumes that these resources will generate far more electricity than they likely will, which the Agency uses to argue that its program of shutting down thermal generation will have no real-world consequences.

Second, EPA fails to account for the fact that intermittent energy sources are not available at the same rate all year long. But instead of using seasonal capacity factors—as regional power authorities do—EPA insists on using an overly optimist annual average to assure Americans that there will be enough energy when they need it. Indeed, these problems with EPA's modeling are so severe, none of EPA's assurances about resource adequacy can be trusted.

But lastly, EPA is in no position to provide assurances about grid reliability in the first place, since the Agency has not conducted the kind of hour-by-hour analysis needed to ensure that electricity supplies will meet demand in a range of circumstances.

EPA has sought comment through Framing Question 6 on the relationship between this nonregulatory docket and the 2024 Final Rule. The answer, of course, is that they are inextricably linked. EPA must reverse course on both efforts.

Bloodless exercises in technical modeling aside, this is about ensuring that Americans have heating in the dead of winter nights and cooling in the heat of the summer. This is a matter with life-and-death consequences.

V. The Existing Gas Fleet Is Essential for Maintaining Grid Reliability.

A. EPA Dramatically Underestimates the Need for Existing Gas To Maintain Grid Reliability.

Finally, we turn to the role of the natural gas fleet in maintaining grid reliability. EPA's failure to conduct a grid reliability analysis leads EPA to vastly underestimate the need for gas plants to operate in its 2024 Final Rule modeling.

According to its modeling, the Agency believes that the existing natural gas fleet, both combustion turbines (CT) and combined cycle (CC), will operate at much lower capacity factors than would be necessary to provide sufficient energy to the grid when wind and solar generation lag due to seasonal and other all-too-predictable factors.

Table 5.1 illustrates the yawning discrepancies between EPA's capacity factor assumptions for new and existing CC and CT plants in MISO and the observed capacity factors for these resources in the 2019 HCY (Historic Comparison Year, see section IV(C) for AOER's reliability modeling.

Capacity Factors for New and Existing Gas in MISO: EPA Assumptions vs. Actual Dispatch								
Model	**Resource**	**2028**	**2030**	**2035**	**2040**	**2045**	**2050**	**2055**
EPA	*Existing CC*	62%	67%	53%	24%	14%	27%	28%
	New CC	87%	87%	67%	50%	40%	47%	45%
	Existing CT	3%	2%	2%	1%	1%	1%	1%
	New CT	13%	10%	4%	0%	0%	1%	1%
Actual (2019 HCY)	*Existing CC*	73%	75%	67%	55%	53%	57%	57%
	New CC	73%	75%	67%	55%	53%	57%	57%
	Existing CT	19%	29%	33%	22%	21%	21%	21%
	New CT	19%	29%	33%	22%	21%	21%	21%

Table 5.1. EPA vastly underestimates the necessary run times for the natural gas fleet because it does not conduct a reliability analysis.

However, AOER's hourly grid reliability modeling shows that new and existing gas-fired EGUs will be needed much more frequently than EPA assumes. As explained *supra* section IV(C), AOER's model allows all thermal EGUs to exceed GHG emission limits in order to provide reliability to the grid and to meet demand for electricity.

For example, in Model Year 2028, EPA assumes existing CT plants will operate at only a 3 percent capacity factor. But in reality, these plants would need to run at 19 percent in order to mitigate the worst impacts of capacity shortfalls, a six-fold underestimate of the utilization of the existing CT fleet.

In Model Year 2035, EPA assumes new and existing CT plants would operate at four percent and two percent, respectively. AOER's modeling shows these plants would actually need to dispatch 33 percent of the time to prevent shortfalls using the hourly analysis for the 2019 HCY.

EPA also makes unwarranted assumptions about the operation of existing CC gas units relative to new CC plants. For example, EPA's modeling suggests that new natural gas CC plants would operate more frequently than the existing fleet in every model year, even though the new plants larger than 300 MW operating more than 40 percent of the time will be required to install carbon capture and sequestration technology, whereas, under the 2024 Final Rule, existing plants aren't regulated at all and therefore would be expected to operate at least as much as new plants.

The unworkable nature of EPA's unrealistically low capacity factor assumptions for the new and existing CC and CT EGUs becomes obvious when AOER's hourly grid reliability model is run to reflect the capacity factor assumptions made by EPA. In this analysis, new and existing CC and CT EGUs are limited to EPA's capacity factors. Figure 5.2 shows that the MISO grid would experience 2,159,828 MWhs of additional capacity shortfalls in 2035 using 2019 HCY—increasing the maximum shortfall event to 33,640 MW—if the gas fleet operates at EPA's projected capacity factors.

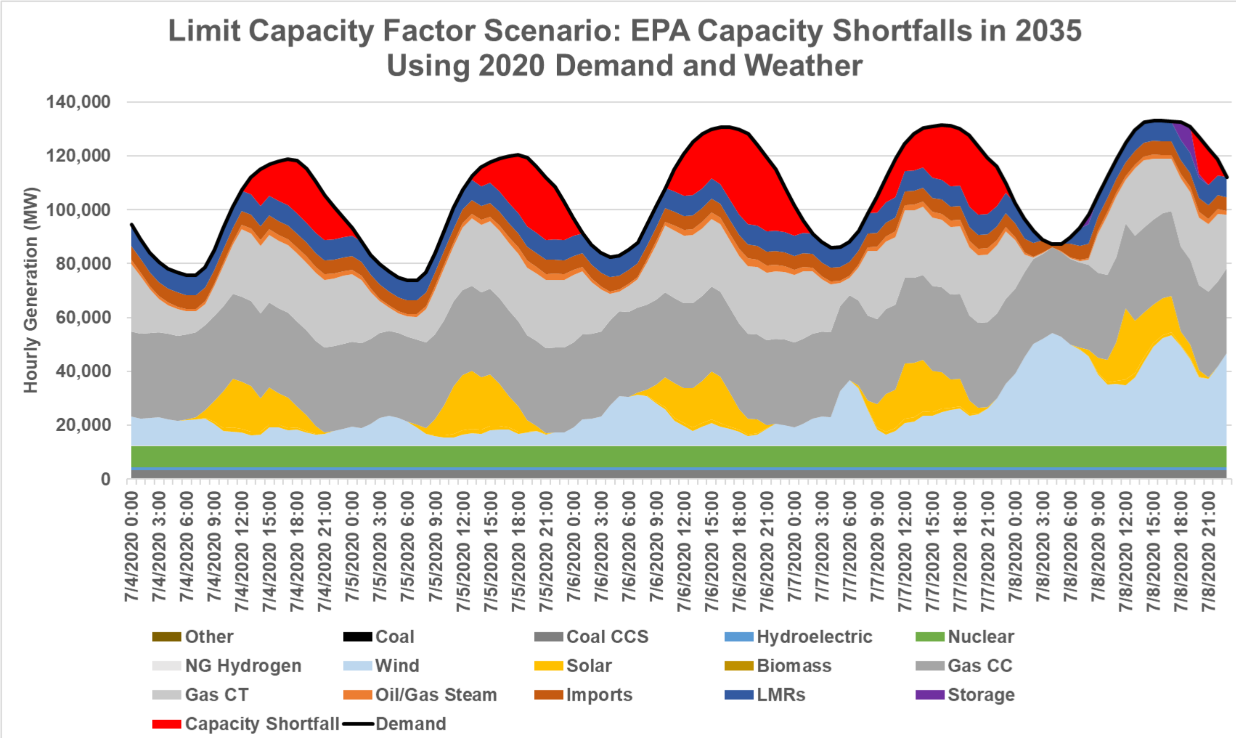


Figure 5.2.

The tables below show the impact of holding capacity factors to EPA's projections for each of EPA's Model Years.

Limit Capacity Factor Scenario Increase in Total Shortfalls (MWh)								
Year	**2028**	**2030**	**2035**	**2040**	**2045**	**2050**	**2055**	**Total**
2019	61,026	1,073,067	2,764,909	709,640	778,741	585,387	472,238	6,445,008
2020	105,440	916,345	2,159,828	796,499	1,025,089	647,606	562,387	6,213,196
2021	130,099	1,114,758	2,540,293	460,482	454,113	188,791	142,736	5,031,272
2022	0	213,376	536,848	65,964	84,111	36,105	33,571	969,974
2023	219,782	1,105,498	1,884,947	428,248	465,433	313,419	224,564	4,641,891

Table 5.3.

Limit Capacity Factor Scenario Increase Maximum Shortfall (MW)							
Year	**2028**	**2030**	**2035**	**2040**	**2045**	**2050**	**2055**
2019	9,364	19,541	8,564	11,411	14,412	27,105	28,760
2020	11,167	18,986	7,740	9,262	14,521	23,287	29,833
2021	11,896	21,250	16,366	28,685	25,456	22,463	22,682
2022	0	15,749	24,152	19,771	21,449	15,742	15,345
2023	15,413	18,278	10,126	18,704	26,548	29,415	30,129

Table 5.4.

Limit Capacity Factor Scenario Increase in Total Hours of Shortfalls								
Year	**2028**	**2030**	**2035**	**2040**	**2045**	**2050**	**2055**	**Total**
2019	24	202	321	83	84	66	47	827
2020	22	128	214	86	104	66	56	676
2021	39	195	317	68	58	27	17	721
2022	0	53	75	10	10	3	3	154
2023	57	177	205	50	49	35	23	596

Table 5.5.

Limit Capacity Factor Scenario Increase Longest Duration of Shortfall							
Year	**2028**	**2030**	**2035**	**2040**	**2045**	**2050**	**2055**
2019	5	12	10	7	6	7	6
2020	7	10	7	7	14	10	12
2021	5	12	39	12	12	6	5
2022	0	10	9	5	5	3	3
2023	9	11	12	6	8	7	6

Table 5.6.

Limit Capacity Factor Scenario Increase in Value of Lost Load								
Year	**2028**	**2030**	**2035**	**2040**	**2045**	**2050**	**2055**	**Total**
2019	$610,256,477	$10,730,669,165	$27,649,094,199	$7,096,396,557	$7,787,410,037	$5,853,872,691	$4,722,384,586	$64,450,083,711
2020	$1,054,404,817	$9,163,452,645	$21,598,284,073	$7,964,989,016	$10,250,886,623	$6,476,064,841	$5,623,873,428	$62,131,955,443
2021	$1,300,994,653	$11,147,576,594	$25,402,929,045	$4,604,822,860	$4,541,125,471	$1,887,905,753	$1,427,362,634	$50,312,717,010
2022	$0	$2,133,759,483	$5,368,481,735	$659,635,300	$841,108,904	$361,045,656	$335,710,246	$9,699,741,324
2023	$2,197,815,766	$11,054,984,174	$18,849,468,986	$4,282,482,711	$4,654,327,841	$3,134,188,850	$2,245,644,659	$46,418,912,987

Table 5.7.

These tables demonstrate the tremendous benefits a dispatchable thermal fleet provides and the role the gas fleet plays in maintaining reliability when intermittent resources perform at less than their expected capacity. As Table 5.5 illustrates, the gas fleet will be required to exceed EPA's unreasonably low gas utilization assumptions for hundreds of hours per year—over a full month of the year for HCY 2019. Since running the fleet longer means more emissions, the inescapable conclusion is that the GHG limitations modeled by EPA in the RIA are incompatible with grid stability in MISO.

EPA anticipates a future where gas-fired EGUs are rarely used and are subservient to the renewable fleet. But at EPA's May 17, 2024 public forum, several commenters remarked that an applicability threshold of 40% capacity would be too high, and most of the existing gas fleet would evade regulation. Figure 5.1 demonstrates that this is pure fantasy: the existing gas fleet is likely to be needed to maintain reliability twice as much as EPA predicts.

Gas-fired EGUs play a crucial role in maintaining grid reliability; EPA should not imperil this important energy resource with future regulation. To do so before observing the 2024 Final Rule's impacts to reliability over a longitudinal period would be breathtakingly reckless.

B. The Existing Natural Gas Fleet Is the Backbone of Grid Reliability Within MISO.

MISO is the largest Regional Transmission Organization (RTO) by size, reaching across 15 states and one Canadian Province (See Map 1)[73] and is the custodian of the electrical grid for over 42 million people. MISO's responsibility is to ensure available and reliable electricity for the people, homes, and businesses in its service territory. Natural gas power plants form the backbone of the MISO system. They are the largest source of generation capacity, comprising 43 percent of MISO's market in 2022.[74] More importantly, natural gas turbines used in peaking plants can help MISO balance its grid by meeting the daily increase in power demand at sunset. But looming rules from the EPA threaten to hamstring MISO's ability to respond to rapid increases in power demand.

Figure 5.8: MISO Natural Gas Power Plants

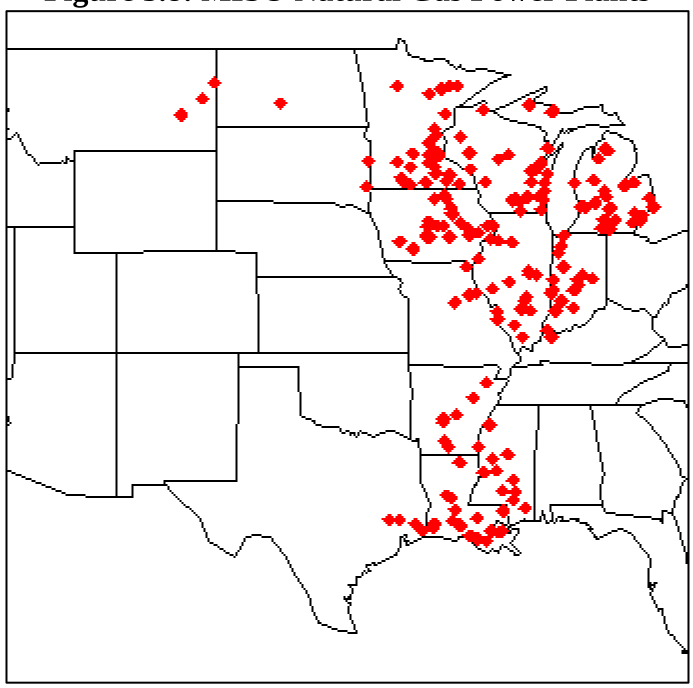


Figure 5.8. The location of natural gas plants within the MISO footprint.[75]

As of March 2024, there are 677 utility-owned natural gas-fired electricity generating units (EGUs) operating in the MISO's regional service area (Table 5.9). Combined, these EGUs have 63,414.4 MW of electricity generating capacity available to MISO's market (Table 5.10). Combined-cycle gas turbines (Combined Cycle) and simple-gas turbines –referred to as either gas turbines (GT) or combustion turbines (CT)—generators are the majority of MISO's natural

---

[73] MISO, MISO Transmission Expansion Plan 2022 Report, 5 (May 15, 2023), *available at* https://cdn.misoenergy.org/MTEP22%20Report627345.pdf.

[74] *Id.* at 4.

[75] Energy Information Administration, "EIA: 860M: Monthly Update to Annual Electric Generator Report" (Mar. 2022), *available at* https://www.eia.gov/electricity/data/eia860m/.

gas-fired generation. Combined-cycle and gas turbines account for 42 and 35 percent of total capacity, respectively (Figure 5.11).

Table 5.9: MISO Natural Gas Plant Fleet Characteristics

Plant Type	Number of Plants	Percent of Generation Fleet
Combustion Turbine (CT)	287	42%
Internal Combustion Engine (IC)	172	25%
Combined Cycle (CC/CS/CA)	160	24%
Steam Turbine (ST)	58	9%
Totals	677	100%

Table 5.9. This table shows the breakdown of natural gas plants on the MISO system by number of plants.[76]

Table 5.10: MISO Natural Gas Plant Capacities in Megawatts (MW)

Plant Type	Nameplate	Winter	Summer
Steam Turbine	13,285.9	11,678.2	11,534.8
Combined Cycle	26,578.6	24,346.7	23,778.3
Combustion Turbine	22,362.6	21,782.6	18,606
Internal Combustion Engine	1,187.3	1,166.4	1,164
Totals	63,414.4	58,973.9	55,083.1

Table 5.10. This table shows the nameplate, winter rated, and summer rated capacity for each type of gas generator in MISO.[77]

---

[76] *Id.*

[77] *Id.*

Figure 5.11: Percent of Nameplate Generation Capacity

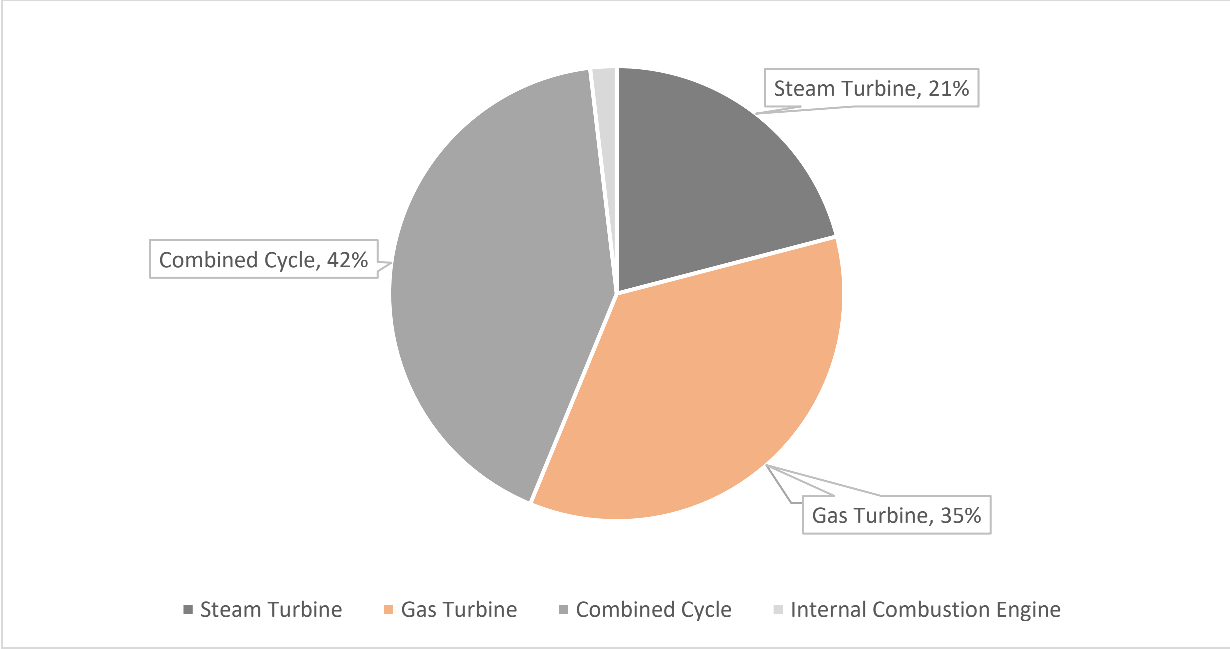


Figure 5.11. There are more CT gas plants on the MISO grid, but because these plants are generally smaller facilities, they constitute less of the total installed capacity on the system. Combined cycle plants represent 42 percent of all gas capacity on the system.[78]

Figure 5.12 and Figure 5.13 distribute combined-cycle and gas turbine power plants by their nameplate capacity. Nameplate capacity is the theoretical maximum amount of electricity that the unit can generate. Combined-cycle natural gas plants tend to have larger nameplate capacities than gas turbine power plants. The average nameplate capacity for a combined-cycle natural gas power plant serving MISO market is 882 MW (Table 5.16). Combined-cycle generators also have the lowest heat rate of any natural gas generator (Table 5.14), which means that combined-cycle generators are the most efficient generator for converting natural gas into electricity. Combined-cycle's low heat rate and large size make them best suited for baseload power generation.[79]

MISO's gas turbine power plants have on average half the nameplate capacity of combined-cycle power plants (Table 5.16). Gas turbines also have the lowest efficiency among natural gas fired power plants (Table 5.14). While combined-cycle power plants offer larger capacity and superior efficiency, gas turbines smaller capacities and size make gas turbines better suited for meeting peak demand. Utilities can use smaller gas turbines as a reliable and cost-effective means of meeting daily peaks in power demand.[80] Gas turbines tend to have lower efficiency, as they are

---

[78] *Id.*

[79] Energy Information Administration, "Use of natural gas-fired generation differs in the United States by technology and region, U.S. Energy Information Administration" (Feb. 22, 2024), *available at* https://www.eia.gov/todayinenergy/detail.php?id=61444.

[80] Jeffrey Winters, "Energy Blog: Gas Power Plants are Efficiency Giants," *The American Society of Mechanical Engineers* (Nov. 29, 2023), *available at* https://www.asme.org/topics-resources/content/blog-gas-power-plants-are-efficiency-giants.

only operated for a few hours per day and do not justify the investments needed for higher efficiency and lower heat rate.[81]

Figure 5.12: MISO Gas Turbine Fleet by Nameplate Capacity

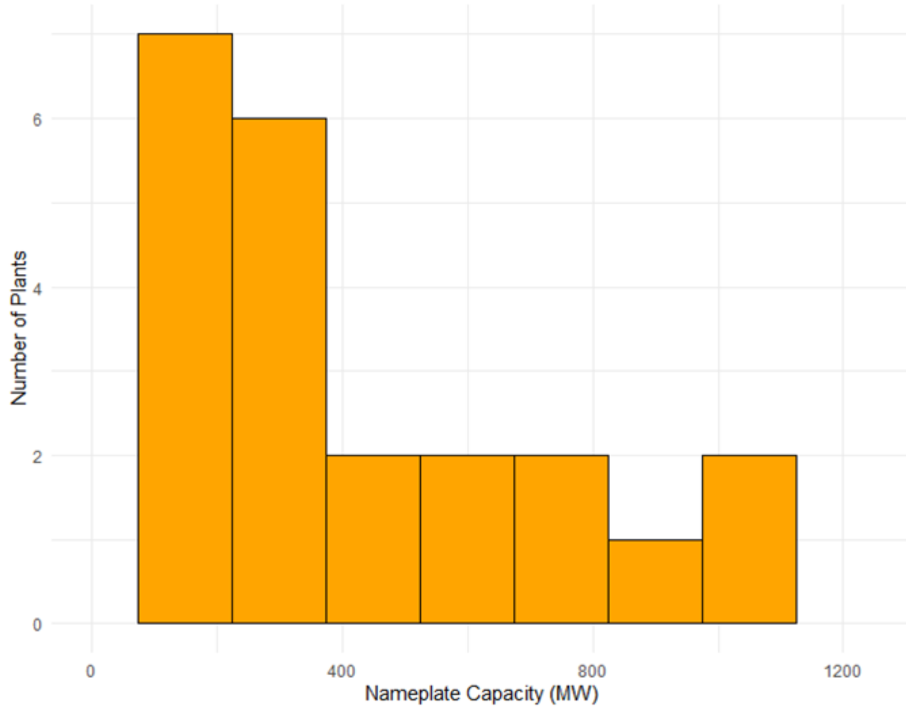


Figure 5.12. The size distribution of the gas turbine fleet skews toward smaller plants.[82]

[81] Robert Rapier, "The load following power plant: the new peaker," *GE Vernova* (2017), *available at* https://www.gevernova.com/gas-power/resources/articles/2017/load-following-power-plant.

[82] Energy Information Administration, "EIA: 860M: Monthly Update to Annual Electric Generator Report" (Mar. 2022).

Figure 5.13: MISO Combined-Cycle Fleet

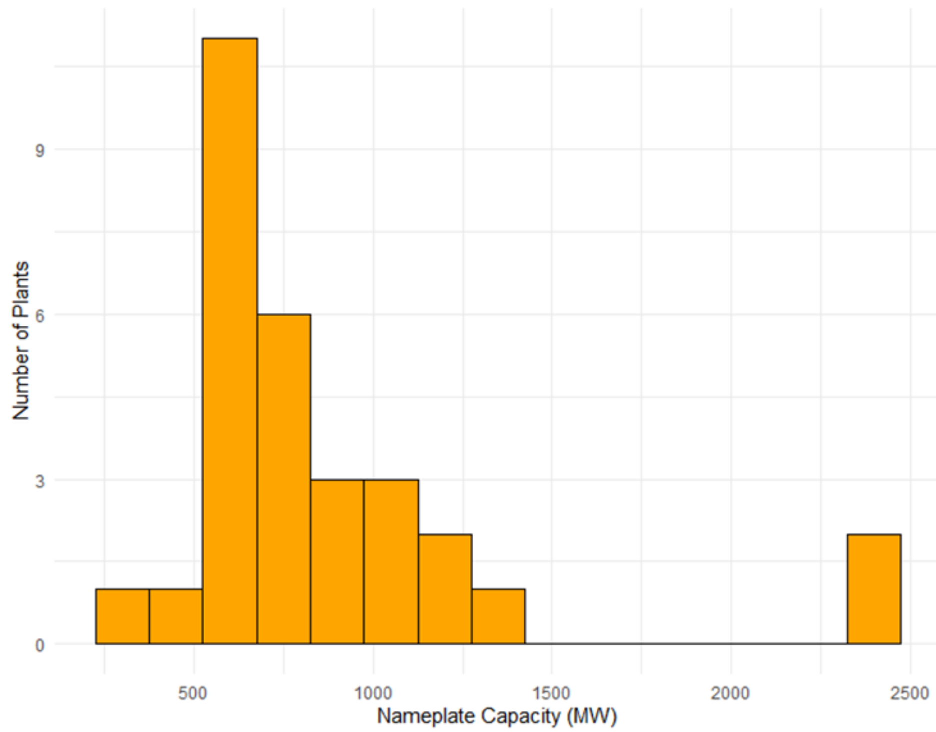


Figure 5.13. Combined Cycle plants are larger than gas turbine plants, with the most above 500 MW.

Table 5.14: Natural Gas-Fired EGU Heat Rates

Plant Type	British thermal units per Kilowatt-hour
Combined Cycle	7,596
Internal Combustion	8,894
Steam Generator	10,295
Gas Turbine	11,030

Table 5.14 shows heat rates for each gas generator technology.[83]

Maintaining a mix of baseload combined-cycle and peaking gas turbine power plants on MISO's market is paramount for ensuring electricity service is not interrupted. As part of their operation, baseload and peaking natural gas plants operate at different times of day and for different lengths of time.

Capacity factor is used to measure how much electric power an EGU actually produced over a period of time compared to its nameplate capacity. Equation 5.15 shows the basic formula for capacity factor.

Equation 5.15: Capacity Factor

[83] EIA, "Form EIA-860: Annual Electric Generator Report," tbl. 8.2, *available at* https://www.eia.gov/electricity/annual/html/epa_08_02.html.

$$Capacity\ Factor = \frac{Total\ Megawatthours\ Generated}{Nameplate\ Capacity \cdot Time}$$

Equation 5.15. Calculating capacity factor.[84]

Using annual generation data from EIA Form 923, generator nameplate capacity data from EIA Form 860, and assuming the plants are capable of operating continuously for a year (8760 hours), AOER calculated the capacity factors for 54 natural gas power plants in the MISO region (Table 5.16).

Table 5.16: MISO Natural Gas Plant Characteristics

Plant Type	Number of Plants	Average Nameplate Capacity	Average Capacity Factor
Combined Cycle	30	882.21	35.12%
Gas Turbine	23	408.42	6.80%
Internal Combustion	1	18.6	11.98%

Table 5.16. This table shows the average plant size and capacity factor for combined cycle, gas turbine, and internal combustion plants in MISO.[85]

Figure 5.17 groups these 54 plants by their capacity factor plotted against their generation capacity. The capacity factor represents the actual amount of power made available to the grid. *Table 5.18* shows total nameplate capacity available in each capacity factor tranche. 10,013MW of nameplate capacity in the 30 – 40% implies that 10,013MW of capacity is only operating 30 – 40% of the time.

[84] Wind Energy and Power Calculations, Dutton Institute, PennState College of Earth and Mineral Sciences, *available at* https://www.e-education.psu.edu/emsc297/node/649.

[85] The data presented in Table 5.14 was obtained by combining generator specific data in EIA Form 860M (Dec. 2023), with plant level data from EIA Form EIA-923. Capacity factor estimates may differ from EIA's state-level estimated capacity factors presented in EIA Table F38 due to MISO's partial presence in several states, datasets used, and the selection of nameplate capacity versus summer or winter capacity.

Figure 5.17: MISO Natural Gas Generation Grouped by Capacity Factor

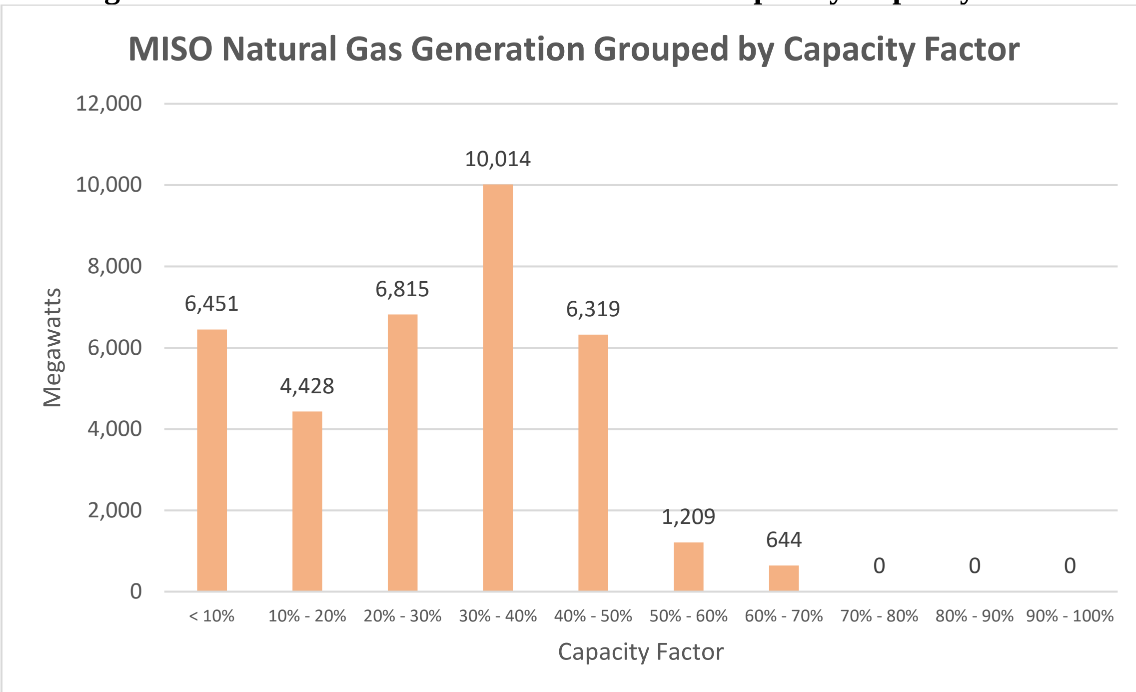


Figure 5.17. This distribution graph shows the number of MW of capacity operating at particular capacity factor thresholds.[86]

Table 5.18: MISO Market Natural Gas Generation Capacity Factor

Capacity Factor	Nameplate Capacity (MW)
< 10%	6,450.5
10% - 20%	4,427.5
20% - 30%	6,815
30% - 40%	10,013.7
40% - 50%	6,319.1
50% - 60%	1,208.8
60% - 70%	644
70% - 80%	0
80% - 90%	0
90% - 100%	0
Total	35,878.6

Table 5.18. This table shows the distribution of gas capacity factors and how much of the MISO gas capacity operates at these thresholds.[87]

The different roles gas turbine and combined cycle power plants play on MISO's grid becomes apparent when the data from Table 5 is broken down by plant type. Like in *Figure 5.17*, *Figure 5.19* groups MISO market's available gas turbine peaking capacity by their capacity factors. In addition to showing nameplate capacity, *Table 5.20'*s percentage column shows gas turbines

[86] EIA, Form 860M (Dec. 2023); EIA, Form EIA-923.

[87] *Id.*

share of generation capacity from *Table 5.18*. Gas turbines low-capacity factors reflect their short bursts of operation during peak hours. The average capacity factor of the observed gas turbines was just 6.8%. Despite this short operational period, gas turbines represent 26 percent of available capacity on MISO's grid.

Figure 5.19: MISO Gas Turbine Generation Capacity Grouped by Capacity Factor

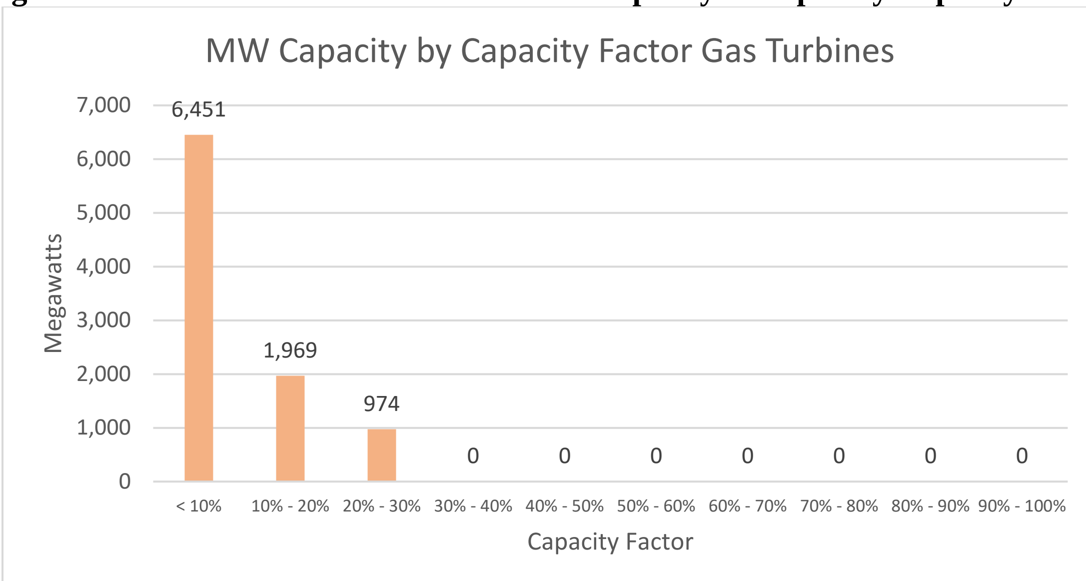


Figure 5.19. The vast majority of the natural gas fleet operates below a 10 percent capacity factor, and no gas turbines in the footprint operated above a 30 percent capacity factor in 2023.[88]

Table 5.20: Gas Turbine Capacity Factors

Gas Turbines	Nameplate Capacity MW	Percent of Total
< 10%	6,450.5	69%
10% - 20%	1,969.2	21%
20% - 30%	974	10%
30% - 40%	0	0%
40% - 50%	0	0%
50% - 60%	0	0%
60% - 70%	0	0%
70% - 80%	0	0%

Table 5.20. 69 percent of the gas turbine fleet operated below a 10 percent capacity factor.[89]

By comparison, combined-cycle natural gas plants operate much longer. The average capacity factor of the Combined Cycle plants observed was 35%. Figure 5.21 groups plants nameplate capacity by their capacity factors. Table 5.22 compares Combined-cycle power plants nameplate

[88] *Id.* with AOER calculations.

[89] *Id.* with AOER calculations.

capacity to the tracked plants. Combined-cycle power plants accounted for 74 percent of generation capacity in the observed power plants.

Figure 5.21: MISO Combined-cycle Power Plants Grouped by Capacity Factor[90]

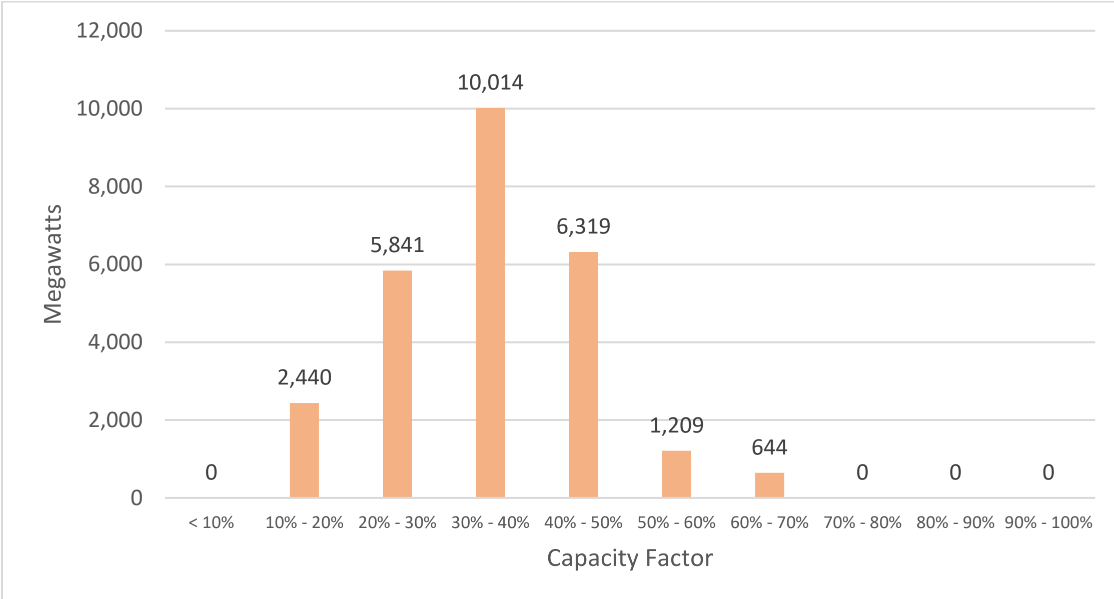


Table 5.22: Combined-Cycle Nameplate Capacity Grouped by Capacity Factor[91]

Combined Cycle	Nameplate Capacity (MW)	Percent of Total
< 10%	0	0%
10% - 20%	2,439.7	9%
20% - 30%	5,841	22%
30% - 40%	10,013.7	38%
40% - 50%	6,319.1	24%
50% - 60%	1,208.8	5%
60% - 70%	644	2%
70% - 80%	0	0%
80% - 90%	0	0%
90% - 100%	0	0%
Total	26,466.3	

[90] *Id.* with AOER calculations.

[91] *Id.* with AOER calculations.

C. Future Regulation of Gas-Fired EGUs Could Force Retirements of Needed Dispatchable Resources.

EPA requests comment on seven potential technologies for BSER for existing gas-fired EGUs. As previously argued by CEA elsewhere, CCS and hydrogen co-firing are not BSER for any source, as the technologies are not remotely adequately demonstrated.[92] And combustion turbines "integrated with" battery storage, solar, or fuel cells would be tantamount to impermissibly redefining the source category, as argued *supra* subpart III(C).

This means EPA leaves us with two plausible possibilities for BSER to consider: improving the efficiency of simple cycle turbines by upgrading to combined cycle plants and improving the efficiency of existing turbines, with retrofit options for both simple and combined cycle turbines.

Both of these options for BSER would create their own technical challenges. But instead of commenting on the application of the statutory definition of BSER to these technologies, we focus on the impact on grid reliability of setting a technology standard that forces retirement of gas-fired EGUs. As is shown *infra* in subpart V(D), even minor retirements of gas-fired EGUs (e.g., five percent) would have a significant, nonlinear impact on grid reliability.

As discussed above, the gas-fired fleet is quite diverse, with a range of units serving different functions within the grid. It would be spectacularly unwise to either apply a one-size-fits-all BSER standard or meddle further with the electricity grid through market-function subcategorization. More to the point, EPA must tread lightly, given the pickle it has put itself in with the grid impacts from the 2024 Final Rule. As a result, EPA should not impose an unrealistic, expensive BSER that would force retirements of this critically important fleet.

Why might a gas-fired unit retire? There are several potential causes:

- Gas-fired peaking units are risky investments, and their economics depend on a range of factors, including weather patterns, the location of the unit with respect to transmission congestion, and the cost of fuel. It is for this reason that in deregulated markets, peaking units are often in and out of bankruptcy or frequently trade hands between investors. Because the investment in the units is recovered over a relatively small number of operating hours, forcing significant new investments in the form of either efficiency upgrades or installation of heat recovery units may simply incentivize investors to walk away from these investments. Peaking units play a crucial role in maintaining grid reliability, as has been shown above and will be further demonstrated in subpart V(D).

- Many gas-fired units with lower annual capacity factors are located in and near metro areas. This may be an accident of history as suburban development has grown up around them, or it may be strategic to ensure that the units can supply electricity when transmission lines are congested. Either way, many of these units are unable to expand their physical footprint to allow for the installation of a heat recovery unit or additional pollution control equipment that may be required as a part of a major modification. EPA

[92] CEA, Comment Letter on Proposed Rule for NSPS and Emissions Guidelines for GHGs from Fossil Fuel-Fired EGUs, *see esp.* 8-32.

must recognize the important role these units play for the reliability of the grid in setting emission guidelines.

- Requiring installation of heat recovery units fundamentally change the economics of low-capacity-factor gas turbines. This is because it takes several hours of operation for the heat recovery unit to become operations and start generating electricity. In cases where these units do not operate for more than a few hours a day, operators would be required to recover the significant investment of the heat recovery unit by selling the same amount of electricity it always has. Faced with such a decision, some operators may choose to simply retire the unit and replace that capacity with highly subsidized wind and solar resources.

The significant diversity of types of gas-fired units exists for a reason. These different sizes, configuration, and operating hours of these units emerged organically over time to serve market needs. As a result, if EPA departs from its core responsibility of regulating air emissions and ventures into energy policy, significant consequences for grid reliability may follow. We turn to these next.

D. Hourly Modeling Demonstrates Even Small Retirements of Gas-Fired EGUs Would be Have Significant Impacts on Grid Reliability in MISO.

As discussed above, EPA's modeled MISO grid leaves the region dangerously dependent upon wind and solar generation and battery storage to maintain reliability. Imposing additional regulations on GHG emissions from existing natural gas plants makes this situation more perilous by inducing the premature retirement of some of this existing natural gas capacity.

To demonstrate how even small changes to the amount of existing natural gas capacity on EPA's modeled MISO system will impact electric reliability, AOER performed three sensitivity analyses: one in which 5 percent (1,478 MW) of the existing CT gas plants online in 2022 are retired in 2035; one in which 10 percent (2,956 MW) of these plants are closed; and one where 15 percent (4,434 MW) of these facilities are closed.

These retiring existing natural gas assets were replaced with a combination of wind, solar, and battery storage to constitute a 1:1 replacement of the accredited capacity on the MISO system based on EPA's capacity accreditation metrics discussed in previous sections. This methodology resulted in the addition of 2.95 MW of wind, 1.35 MW solar, and 0.34 MW of battery storage for every MW of existing natural gas CT capacity retired on the MISO system (See Figure 5.23).

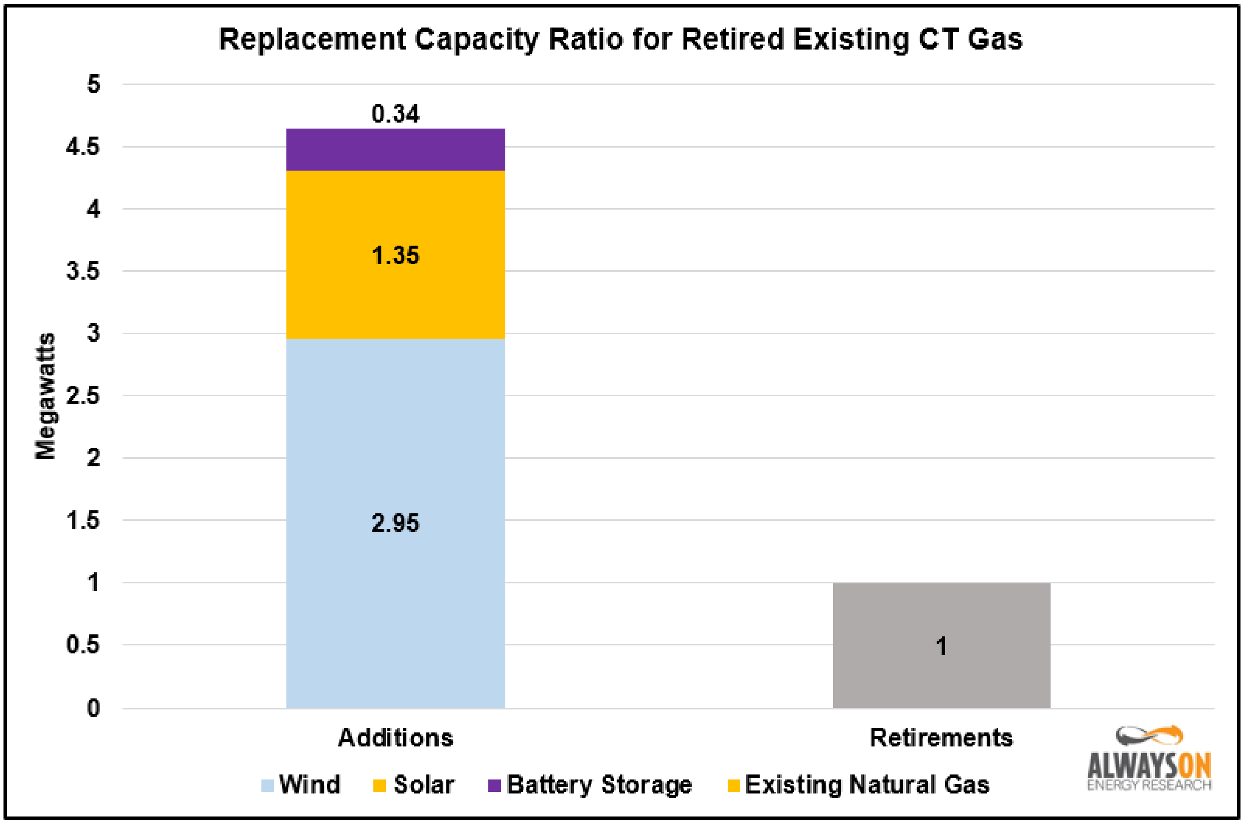


Figure 5.23. 4.65 MW of wind, solar, and battery storage are added to the MISO system for every MW of existing CT natural gas retired.

AOER then conducted an hourly reliability analysis of EPA's modeled MISO grid using the methodology described in part IV to determine the incremental impact of these closures on reliability. AOER's modeling observed that even these small changes to the amount of the existing natural gas plant capacity on the MISO system can lead to a large increase in the number of unserved MWh of electricity.

In short, retiring just five percent of the existing natural gas CT fleet results in negative reliability impacts, and these impacts are amplified further in the 10 percent and 15 percent closure scenarios.

Here, we highlight the worst case scenario, which would occur in EPA model year 2035 using the 2020 HCT. Full tables of the reliability impact for each HCY can be found in Appendix 1: Sensitivity Analysis Full Results.

Model year 2035 sees a substantial increase in capacity shortfalls relative to the base case described above where no existing gas is removed from the system. These sensitivity scenarios also see larger VOLL losses, and larger maximum shortfall events.

Table 5.24 shows the number of MWhs of unserved load in the base case and each of the three sensitivity scenarios for model year 2035 using the 2020 HCY. Retiring 5 percent of the existing CT natural gas fleet yields a 14 percent increase in unserved MWhs in this year, retiring 10 percent of the fleet yields a 35 percent increase in unserved load, and retiring 15 percent of the existing CT fleet yields a 52 percent increase in blackouts, a nonlinear progression of reliability issues.

MWhs of Unserved Load EPA Model Year 2035 with 2020 HCY		
Scenario	MWhs Unserved	% Difference from Base Case
Base Case	229,235	0%
5% CT Retirement	261,897	14%
10% CT Retirement	309,378	35%
15% CT Retirement	347,513	52%

Table 5.24.

Table 5.24 shows the increase in capacity shortfalls for each scenario relative to the base case. This is expressed in terms of the number of unserved MWh of load in each scenario. What we see is that the shortfalls accelerate as more dispatchable resources are removed from the grid. This is the case even though the retired natural assets have been replaced at a ratio of 4.65:1 of installed capacity of wind, solar, and battery storage.

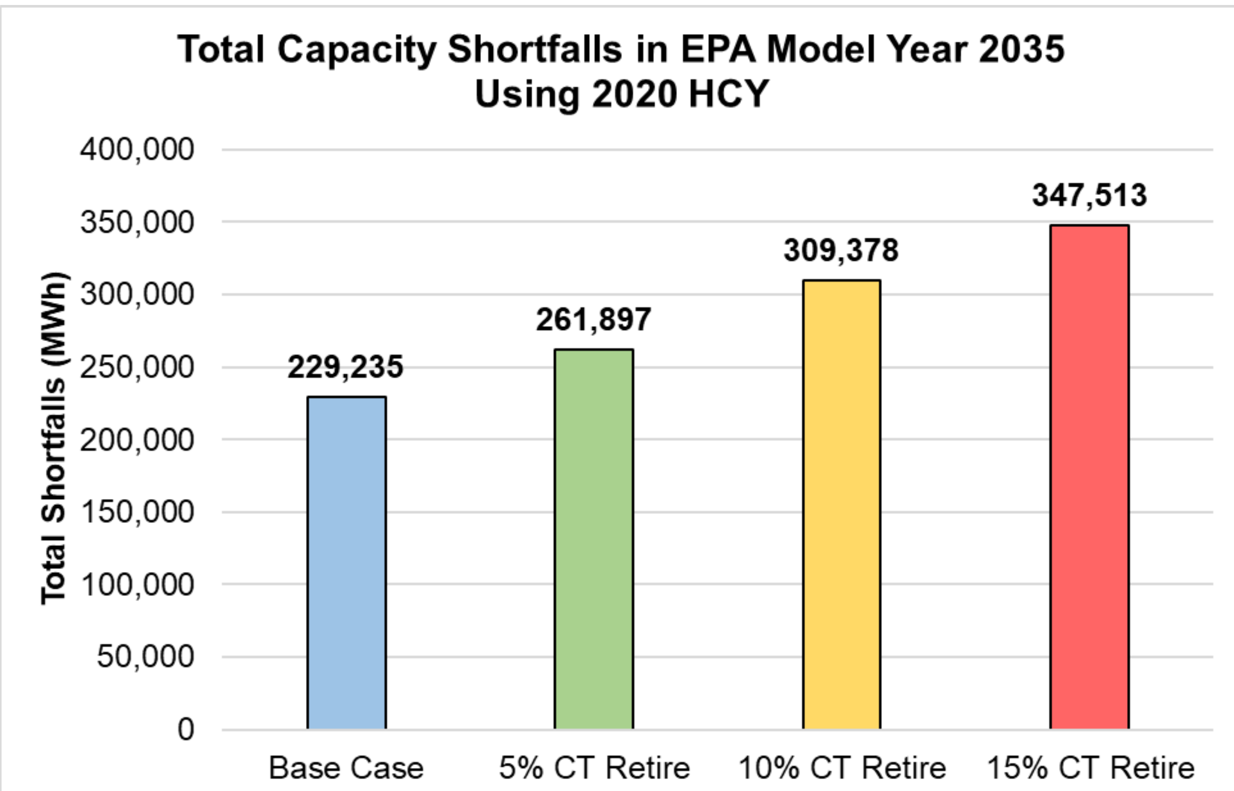


Figure 5.24. A 15 percent reduction in the amount of existing CT gas capacity on the MISO system yields a 52 percent increase in unserved MWh of load based on EPA model year 2035 and the 2020 HCY.

The rising number of MWhs unserved in each sensitivity has a significant increase in the Social Cost of Blackouts, as calculated using the VOLL metrics described in part IV. Based on this methodology, the cost of blackouts would rise from $2.3 billion in the base case to $2.5 billion in the five percent scenario, $3.1 billion in the 10 percent scenario, and $3.5 billion in the 15 percent scenario (See Figure 5.25).

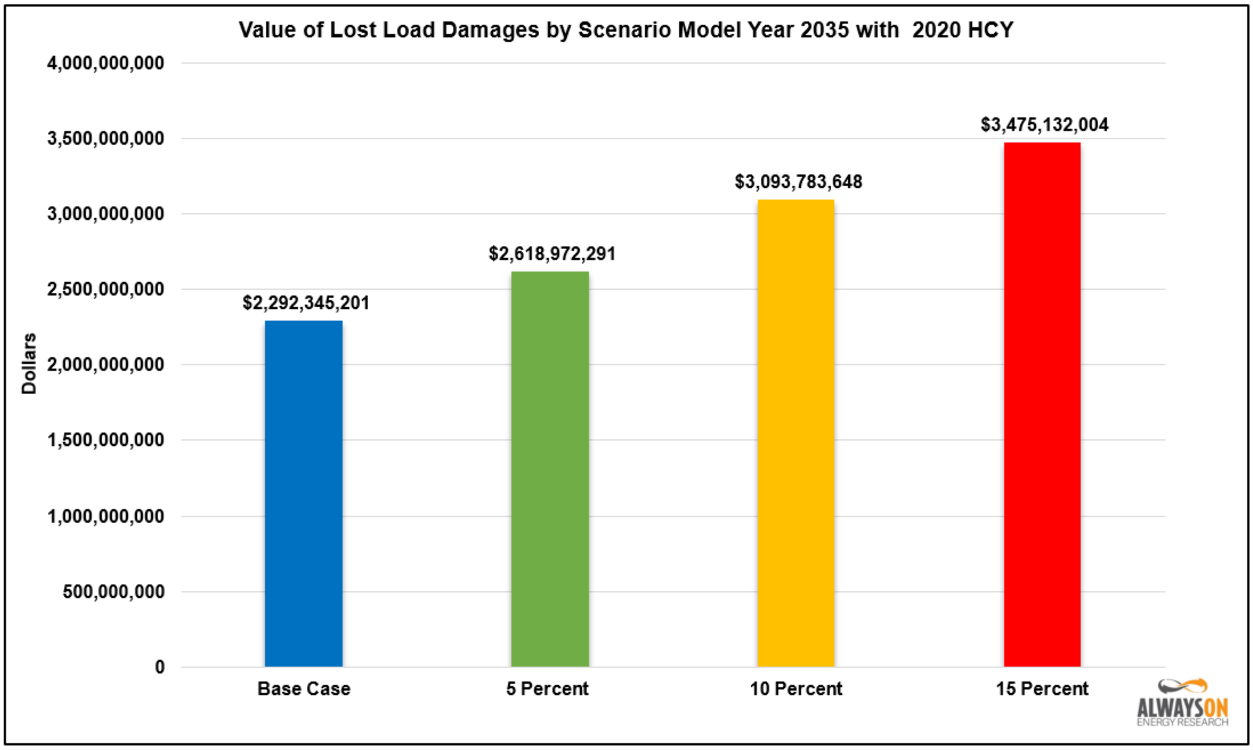


Figure 5.25. The Social Cost of Blackouts rises as more dispatchable capacity is removed from EPA's modeled MISO system.

The retirement of existing CT gas plants would also increase the severity of capacity shortfalls on the system. Figure 5.26 shows the incremental increase in blackouts for the largest shortfall in Figure 4.9 caused by the closures in each sensitivity analysis.

In total, these closures increase the extent of capacity shortfalls by 782 MW, 1,566 MW, 1,622 MW in the 5 percent, 10 percent, and 15 percent retirement scenarios, respectively.

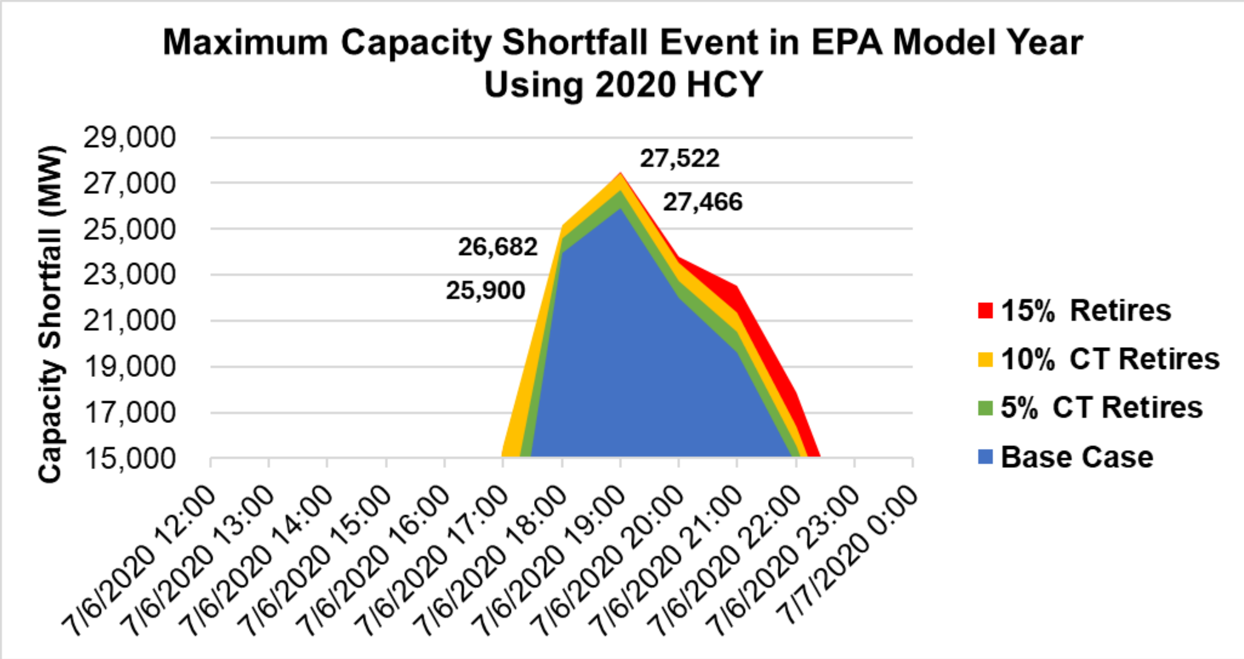


Figure 5.26. Shows the increase in blackouts due to the closure of existing CT gas plants in each of the three sensitivity analyses and compares it to the base case.

There will be real, significant consequences from the emission guidelines contemplated in EPA's current non-regulatory docket. These new restrictions would necessarily drive some part of the existing gas-fired fleet into retirement. Given the consequences for reliability demonstrated by CEA's analysis, the agency must abandon its self-defeating ambition to shift the grid away from its current fuel-mix and instead recognize that the objects of its regulatory ire are in fact indispensable to ensuring that lighting, heating, and cooling are available to residential, commercial, and industrial users at the flick of a switch 365 days a year.

Should it choose to stay the course, EPA must revamp its breezy approach to the question of grid reliability. EPA may have used its models for decades, but the agency's regulatory ambition has long since outpaced its technical expertise. This is hardly surprising as it simply reflects the deeper flaw in EPA's approach to the power sector. In short, the agency finds itself operating beyond its performance envelope precisely because it has ventured far outside its congressionally prescribed role.

As CEA's technical analysis makes clear, this is not an academic concern. Further regulation of existing gas-fired EGUs would carry tremendous real-world costs. Our electric grid is already approaching the brink under EPA's 2024 Final Rule. America's families and its economy cannot afford the dire consequences wrought by retirement of even a small fraction of the existing gas-fired fleet.

VI. Conclusion.

EPA must start over. The agency should withdraw the 2024 Final Rule and proceed no further here.

Sincerely,

/s/
Marc Marie
President
Center for Environmental Accountability
marc@environmentalaccountability.org

Appendix 1: Sensitivity Analysis Full Results

1. Existing CT Gas Retirement Sensitivity Analysis: 5 Percent Scenario

Total Shortfalls (MWh)

Base Case Total Shortfalls (MWh)							
	2028	2030	2035	2040	2045	2050	2055
2019	0	0	109,888	52,065	39,463	10,660	4,701
2020	0	3,017	229,235	86,640	48,393	9,081	934
2021	0	56	129,724	0	0	0	0
2022	0	0	0	0	0	0	0
2023	0	5,880	132,189	21,615	4,917	0	0

5 Percent Closure Total Shortfalls (MWh)								
	2028	2030	2035	2040	2045	2050	2055	Total
2019	0	0	114,007	55,971	43,369	13,655	7,696	234,697
2020	0	3,017	261,897	109,293	75,373	12,178	3,502	465,260
2021	0	56	155,155	0	0	0	0	155,211
2022	0	0	0	0	0	0	0	0
2023	0	5,880	139,179	27,441	7,178	0	0	179,678

5 Percent Scenario Percent Increase in Total Shortfalls (MWh)								
	2028	2030	2035	2040	2045	2050	2055	Total
2019	0	0	4%	8%	10%	28%	64%	8%
2020	0	0	14%	26%	56%	34%	275%	23%
2021	0	0	20%	0	0	0	0	20%
2022	0	0	0	0	0	0	0	0%
2023	0	0	5%	27%	46%	0	0	9%

Value of Lost Load

Base Case Value of Lost Load								
Year	2028	2030	2035	2040	2045	2050	2055	Total
2019	$0	$0	$1,098,884,128	$520,647,875	$394,628,665	$106,598,673	$47,011,180	$2,167,770,521
2020	$0	$30,169,037	$2,292,345,201	$866,401,675	$483,925,493	$90,814,986	$9,343,828	$3,773,000,219
2021	$0	$555,775	$1,297,237,560	$0	$0	$0	$0	$1,297,793,334
2022	$0	$0	$0	$0	$0	$0	$0	$0
2023	$0	$58,796,196	$1,321,887,240	$216,154,963	$49,167,850	$0	$0	$1,646,006,249

5 Percent Closure Value of Lost Load								
Year	2028	2030	2035	2040	2045	2050	2055	Total
2019	$0	$0	$1,140,067,767	$559,710,003	$433,690,793	$136,545,998	$76,958,505	$2,346,973,067
2020	$0	$30,169,037	$2,618,972,291	$1,092,933,244	$753,725,492	$121,784,861	$35,019,383	$4,652,604,309
2021	$0	$555,775	$1,551,550,489	$0	$0	$0	$0	$1,552,106,264
2022	$0	$0	$0	$0	$0	$0	$0	$0
2023	$0	$58,796,196	$1,391,793,987	$274,407,880	$71,780,808	$0	$0	$1,796,778,870

5 Percent Closure Scenario Percentage Change in Value of Lost Load								
Year	2028	2030	2035	2040	2045	2050	2055	Total
2019	0%	0%	4%	8%	10%	28%	64%	8%
2020	0%	0%	14%	26%	56%	34%	275%	23%
2021	0%	0%	20%	0%	0%	0%	0%	20%
2022	0%	0%	0%	0%	0%	0%	0%	0%
2023	0%	0%	5%	27%	46%	0%	0%	9%

Maximum Shortfall Severity

Base Case Maximum Shortfall (MW)							
Year	2028	2030	2035	2040	2045	2050	2055
2019	0	0	24,858	19,751	20,495	5,576	4,522
2020	0	2,351	25,900	21,051	18,835	7,995	934
2021	0	56	16,474	0	0	0	0
2022	0	0	0	0	0	0	0
2023	0	5,880	24,441	10,108	4,917	0	0

5 Percent Closure Maximum Shortfall (MW)							
Year	2028	2030	2035	2040	2045	2050	2055
2019	0	0	25,885	20,778	21,522	7,599	5,493
2020	0	2,351	26,682	21,818	19,701	8,837	3,171
2021	0	56	17,465	0	0	0	0
2022	0	0	0	0	0	0	0
2023	0	5,880	25,258	11,230	5,974	0	0

5 Percent Closure Scenario Percent Increase in Maximum Shortfall Severity							
Year	2028	2030	2035	2040	2045	2050	2055
2019	0	0	4%	5%	5%	36%	21%
2020	0	0	3%	4%	5%	11%	239%
2021	0	0	6%	0	0	0	0
2022	0	0	0	0	0	0	0
2023	0	0	3%	11%	21%	0	0

2. Existing CT Gas Retirement Sensitivity Analysis: 10 Percent Scenario

Total Shortfalls

Base Case Total Shortfalls (MWh)							
	2028	2030	2035	2040	2045	2050	2055
2019	0	0	109,888	52,065	39,463	10,660	4,701
2020	0	3,017	229,235	86,640	48,393	9,081	934
2021	0	56	129,724	0	0	0	0
2022	0	0	0	0	0	0	0
2023	0	5,880	132,189	21,615	4,917	0	0

10 Percent Closure Total Shortfalls (MWh)								
Year	2028	2030	2035	2040	2045	2050	2055	Total
2019	0	0	121,401	59,888	47,286	16,658	10,700	255,933
2020	0	3,017	309,378	139,060	103,850	15,285	6,609	577,200
2021	0	56	178,220	0	0	0	0	178,276
2022	0	0	0	0	0	0	0	0
2023	0	5,880	146,168	33,401	12,148	0	0	197,596

10 Percent Closure Scenario Percentage Increase in Total Shortfalls (MWh)							
Year	2028	2030	2035	2040	2045	2050	2055
2019	0%	0%	10%	14%	18%	44%	78%
2020	0%	0%	31%	48%	74%	51%	162%
2021	0%	0%	31%	0%	0%	0%	0%
2022	0%	0%	0%	0%	0%	0%	0%
2023	0%	0%	10%	43%	101%	0%	0%

Value of Lost Load

Base Case Value of Lost Load								
Year	2028	2030	2035	2040	2045	2050	2055	Total
2019	$0	$0	$1,098,884,128	$520,647,875	$394,628,665	$106,598,673	$47,011,180	$2,167,770,521
2020	$0	$30,169,037	$2,292,345,201	$866,401,675	$483,925,493	$90,814,986	$9,343,828	$3,773,000,219
2021	$0	$555,775	$1,297,237,560	$0	$0	$0	$0	$1,297,793,334
2022	$0	$0	$0	$0	$0	$0	$0	$0
2023	$0	$58,796,196	$1,321,887,240	$216,154,963	$49,167,850	$0	$0	$1,646,006,249

10 Percent Closure Scenario Value of Lost Load								
Year	2028	2030	2035	2040	2045	2050	2055	Total
2019	$0	$0	$1,214,010,486	$598,879,915	$472,860,704	$166,583,027	$106,995,534	$2,559,329,667
2020	$0	$30,169,037	$3,093,783,648	$1,390,604,821	$1,038,503,857	$152,854,292	$66,088,814	$5,772,004,469
2021	$0	$555,775	$1,782,201,910	$0	$0	$0	$0	$1,782,757,685
2022	$0	$0	$0	$0	$0	$0	$0	$0
2023	$0	$58,796,196	$1,461,684,880	$334,005,097	$121,477,757	$0	$0	$1,975,963,930

10 Percent Closure Scenario Percentage Increase in Value of Lost Load							
Year	2028	2030	2035	2040	2045	2050	2055
2019	0%	0%	10%	14%	18%	44%	78%
2020	0%	0%	31%	48%	74%	51%	162%
2021	0%	0%	31%	0%	0%	0%	0%
2022	0%	0%	0%	0%	0%	0%	0%
2023	0%	0%	10%	43%	101%	0%	0%

Maximum Shortfalls

Base Case Maximum Shortfall (MW)							
Year	2028	2030	2035	2040	2045	2050	2055
2019	0	0	24,858	19,751	20,495	5,576	4,522
2020	0	2,351	25,900	21,051	18,835	7,995	934
2021	0	56	16,474	0	0	0	0
2022	0	0	0	0	0	0	0
2023	0	5,880	24,441	10,108	4,917	0	0

10 Percent Closure Scenario Maximum Shortfall (MW)							
Year	2028	2030	2035	2040	2045	2050	2055
2019	0	0	26,913	21,807	22,550	9,630	6,466
2020	0	2,351	27,466	22,586	20,568	9,679	5,416
2021	0	56	18,457	0	0	0	0
2022	0	0	0	0	0	0	0
2023	0	5,880	26,075	12,361	6,879	0	0

10 Percent Closure Scenario Percentage Increase in Maximum Shortfall (MW)							
Year	**2028**	**2030**	**2035**	**2040**	**2045**	**2050**	**2055**
2019	0%	0%	8%	10%	10%	53%	35%
2020	0%	0%	6%	7%	9%	19%	141%
2021	0%	0%	11%	0%	0%	0%	0%
2022	0%	0%	0%	0%	0%	0%	0%
2023	0%	0%	6%	20%	33%	0%	0%

3. Existing CT Gas Retirement Sensitivity Analysis: 15 Percent Scenario

Total Shortfalls

Base Case Total Shortfalls (MWh)							
	2028	**2030**	**2035**	**2040**	**2045**	**2050**	**2055**
2019	0	0	109,888	52,065	39,463	10,660	4,701
2020	0	3,017	229,235	86,640	48,393	9,081	934
2021	0	56	129,724	0	0	0	0
2022	0	0	0	0	0	0	0
2023	0	5,880	132,189	21,615	4,917	0	0

15 Percent Closure Scenario Total Shortfalls (MWh)								
Year	**2028**	**2030**	**2035**	**2040**	**2045**	**2050**	**2055**	**Total**
2019	0	0	98,185	59,122	48,360	17,559	11,601	234,826
2020	0	3,017	347,513	151,032	119,199	15,576	6,900	643,236
2021	0	56	188,575	0	0	0	0	188,630
2022	0	0	0	0	0	0	0	0
2023	0	5,880	114,845	37,782	20,061	0	0	178,568

15 Percent Closure Scenario Percentage Increase in Total Shortfalls (MWh)							
	2028	**2030**	**2035**	**2040**	**2045**	**2050**	**2055**
2019	0%	0%	-10%	13%	21%	51%	90%
2020	0%	0%	45%	59%	94%	53%	170%
2021	0%	0%	38%	0%	0%	0%	0%
2022	0%	0%	0%	0%	0%	0%	0%
2023	0%	0%	-12%	59%	211%	0%	0%

Value of Lost Load

Base Case Value of Lost Load								
Year	2028	2030	2035	2040	2045	2050	2055	Total
2019	$0	$0	$1,098,884,128	$520,647,875	$394,628,665	$106,598,673	$47,011,180	$2,167,770,521
2020	$0	$30,169,037	$2,292,345,201	$866,401,675	$483,925,493	$90,814,986	$9,343,828	$3,773,000,219
2021	$0	$555,775	$1,297,237,560	$0	$0	$0	$0	$1,297,793,334
2022	$0	$0	$0	$0	$0	$0	$0	$0
2023	$0	$58,796,196	$1,321,887,240	$216,154,963	$49,167,850	$0	$0	$1,646,006,249

15 Percent Closure Scenario Value of Lost Load								
Year	2028	2030	2035	2040	2045	2050	2055	Total
2019	$0	$0	$981,847,562	$591,218,614	$483,596,212	$175,594,604	$116,007,111	$2,348,264,102
2020	$0	$30,169,037	$3,475,132,004	$1,510,319,921	$1,191,985,915	$155,760,590	$68,995,112	$6,432,362,579
2021	$0	$555,775	$1,885,748,499	$0	$0	$0	$0	$1,886,304,273
2022	$0	$0	$0	$0	$0	$0	$0	$0
2023	$0	$58,796,196	$1,148,452,603	$377,816,046	$200,613,247	$0	$0	$1,785,678,091

15 Percent Closure Scenario Percentage Increase in Value of Lost Load							
Year	2028	2030	2035	2040	2045	2050	2055
2019	0%	0%	-10%	13%	21%	51%	90%
2020	0%	0%	45%	59%	94%	53%	170%
2021	0%	0%	38%	0%	0%	0%	0%
2022	0%	0%	0%	0%	0%	0%	0%
2023	0%	0%	-12%	59%	211%	0%	0%

Maximum Shortfall

Base Case Maximum Shortfall (MW)							
Year	2028	2030	2035	2040	2045	2050	2055
2019	0	0	24,858	19,751	20,495	5,576	4,522
2020	0	2,351	25,900	21,051	18,835	7,995	934
2021	0	56	16,474	0	0	0	0
2022	0	0	0	0	0	0	0
2023	0	5,880	24,441	10,108	4,917	0	0

15 Percent Closure Scenario Maximum Shortfall (MW)							
Year	**2028**	**2030**	**2035**	**2040**	**2045**	**2050**	**2055**
2019	0	0	28,255	23,178	23,921	9,126	7,872
2020	0	2,351	27,522	21,984	21,721	11,166	4,231
2021	0	56	19,701	0	0	0	0
2022	0	0	0	0	0	0	0
2023	0	5,880	16,667	13,536	8,323	0	0

15 Percent Closure Scenario Percentage Increase in Maximum Shortfall (MW)							
Year	**2028**	**2030**	**2035**	**2040**	**2045**	**2050**	**2055**
2019	0%	0%	13%	16%	16%	47%	61%
2020	0%	0%	6%	4%	15%	36%	104%
2021	0%	0%	18%	0%	0%	0%	0%
2022	0%	0%	0%	0%	0%	0%	0%
2023	0%	0%	-31%	31%	57%	0%	0%

Appendix 2: Model Assumptions

Electricity consumption assumptions
Annual electricity consumption in each model year is increased in accordance with EPA's assumptions in the IPM in each of the MISO subregions.

Peak demand and reserve margin assumptions
The modeled peak demand and reserve margin in each of the model years are increased in accordance with the IPM in each of the MISO subregions.

Time horizon studied
This analysis studies the impact of the finalized carbon rules from 2024 through 2055 to capture the long-term reliability impacts and cost of the regulations and to compare these costs to those generated by EPA.

Hourly load, capacity factors, and peak demand assumptions
Hourly load shapes and wind and solar generation were determined using data for the entire MISO region obtained from EIA's Hourly Grid Monitor. Load shapes were obtained for 2019, 2020, 2021, 2022, and 2023. [93]

These inputs were entered into the model to assess hourly load shapes, capacity shortfalls, and calculate storage capacity needs.

[93] Energy Information Administration, "Hourly Electric Grid Monitor," Accessed August 12, 2022, https://www.eia.gov/ electricity/gridmonitor/dashboard/electric_overview/balancing_authority/MISO

Capacity factors used for wind and solar facilities were adjusted upward to match EPA assumptions that new wind and solar facilities will have capacity factors as high as 43.5 percent and 25.3 percent, respectively. This is a generous assumption because the current MISO-wide capacity factor of existing wind turbines is only 36 percent, and solar is 19 percent.

Value of lost load

The value of lost load (VoLL) is a monetary indicator *expressing the costs associated with an interruption of electricity supply*, expressed in dollars per megawatt hour (MWh) of unserved electricity.

MISO has recently applied to revise its VOLL metric to $10,000 per MWh of unserved load. However, Potomac Economics, the Independent Market Monitor for MISO has recommended a value of $25,000 per MWh for the MISO region.[94] AOER used a MISO's latest request of $10,000 per MWh of unserved load to calculate the social cost of the blackouts under EPA's 2024 Final Rules.

Load modifying resources, demand response, and imports

Our model allows for the use of 7,875 MW of Load Modifying Resources (LMRs) and annual import assumptions for MISO are taken from the Final Rule Resource Adequacy Technical Support Document.

Transmission

This study assumes a "copper sheet" transmission model that allows electricity generated throughout the MISO footprint to be transported across the region.

Battery storage

Battery storage assumes a 5 percent efficiency loss on both ends (charging and discharging). Maximum discharge rates for the MISO system model runs were held at the max capacity of the storage fleet, less efficiency losses. Battery storage is assumed to be 4-hour storage, while pumped storage is assumed to be 8-hour storage.

[94] https://cdn.misoenergy.org/20230713%20MSC%20Item%2006%20IMM%20State%20of%20the%20Market%20Recommendations629500.pdf