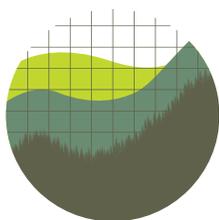




# Defining “Adequately Demonstrated”

EPA’s Long History of Forward-Looking Regulations  
Under Section 111 of the Clean Air Act



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## Introduction

In May 2023, the Environmental Protection Agency (EPA) proposed new limits for greenhouse gas (GHG) emissions from certain fossil-fuel-fired power plants under Section 111 of the Clean Air Act.<sup>1</sup> Section 111 requires EPA to set limits reflecting the emission reductions achievable by applying what the agency determines to be the “best system of emission reduction” (BSER) that “has been adequately demonstrated,” and that meets certain other statutory factors.<sup>2</sup> For existing coal-fired power plants scheduled to retire in 2040 or later, and new baseload gas-fired power plants, EPA proposed that the BSER include carbon capture and storage (CCS),<sup>3</sup> a set of technologies that filter out carbon dioxide before it reaches the atmosphere and discard it safely, for example, by sequestering it underground.

EPA’s record shows that some existing power plants have *already* successfully used CCS, and that the Infrastructure Investment and Jobs Act and the Inflation Reduction Act will spur higher adoption of the technology.<sup>4</sup> CCS has also been deployed in other industries and is in the planning stages at additional power plant sites.<sup>5</sup> Yet critics of the proposal have argued that CCS has not been “adequately demonstrated” because its use is not sufficiently widespread in the power sector today.<sup>6</sup>

**Dating back to the 1970’s, regulations reviewed in federal court confirm that technology can be “adequately demonstrated” even if it is not yet in widespread use.** If Congress had meant to require EPA to set limits based only on technologies already in widespread use, it easily could have said so. But it did not. It instead chose the phrase “adequately demonstrated.” In contrast, Congress tied other Clean Air Act provisions to the best-performing technology already implemented in the relevant sector, further indicating that Section 111 does not carry the same meaning. The Clean Air Act’s legislative history further reveals that Congress intended for regulation to spur industry to adopt new technologies and processes. The Clean Air Act would be woefully ineffective at reaching these goals if it used only technologies and processes that industry had already widely deployed. EPA’s standards are useful precisely because industry would not take these steps to protect public health and the environment in their absence.

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<sup>1</sup> New Source Performance Standards for Greenhouse Gas Emissions from New, Modified, and Reconstructed Fossil Fuel-Fired Electric Generating Units; Emission Guidelines for Greenhouse Gas Emissions from Existing Fossil Fuel-Fired Electric Generating Units; and Repeal of the Affordable Clean Energy Rule, 88 Fed. Reg. 33,240 (proposed May 23, 2023) (to be codified at 40 C.F.R. pt. 60) [hereinafter Proposed Rule].

<sup>2</sup> 42 U.S.C. § 7411(a)(1).

<sup>3</sup> See, e.g., Proposed Rule, 88 Fed. Reg. at 33,243. EPA’s proposed rule included additional BSERs for existing coal-fired and new gas-fired power plants that this report does not discuss. EPA also proposed to regulate some of the largest and the most heavily-used existing gas-fired power plants, but EPA subsequently announced that it intends to reconsider its approach and finalize limits for existing gas-fired power plants separately.

<sup>4</sup> See, e.g., *id.* at 33,291–98; ENV’T PROT. AGENCY, GREENHOUSE GAS MITIGATION MEASURES FOR STEAM GENERATING UNITS: TECHNICAL SUPPORT DOCUMENT (2023), <https://www.epa.gov/system/files/documents/2023-05/TSD%20-%20GHG%20Mitigation%20Measures%20for%20Steam%20EGUs.pdf> [<https://perma.cc/929J-332F>].

<sup>5</sup> See, e.g., *CCS Facilities Database*, GLOBAL CCS INST., <https://www.globalccsinstitute.com/co2re/> [<https://perma.cc/XBH2-NYV7>] (compiling data on facilities that use CCS); *US Carbon Capture Activity and Project Map*, CLEAN AIR TASK FORCE, <https://www.catf.us/ccsmapus/> [<https://perma.cc/J59Z-9XS5>] [hereinafter *CCS Map*] (mapping American CCS projects from different sectors and geological carbon dioxide storage capacity).

<sup>6</sup> See, e.g., Mario Loyola, *EPA’s Illegal Power Play*, HERITAGE FOUND. (Sept. 28, 2023), <https://www.heritage.org/government-regulation/commentary/epas-illegal-power-play> [<https://perma.cc/X882-LF6J>] (focusing on how few facilities have used CCS). These claims should be compared against evidence of more than a dozen CCS projects in the “Heat and Power” subsector and many more in other sectors. See *CCS Map*, *supra* note 5. This policy brief does not focus on whether the record indicates that CCS is widespread, focusing instead on whether being in widespread use is a necessary condition of being “adequately demonstrated.”

This policy brief summarizes the legal framework of Section 111 (including the legislative history and caselaw relevant to understanding its technology-forcing nature), walks through how courts have interpreted “adequately demonstrated,” reviews EPA’s past use of Section 111 to drive technology improvements, and explains why a potential Supreme Court decision that eliminates or curtails *Chevron* deference (a legal doctrine providing deference to reasonable agency interpretations of ambiguous statutory language) would not affect the longstanding interpretation of “adequately demonstrated.” More specifically, this policy brief makes the following points:

1. **Section 111’s Language and Purpose Reveal That It Looks Toward the Future, Not Only at Technologies in Widespread Use Today:** The specific language of Section 111 suggests particular attention to this technology-forcing aim when compared with language from other Clean Air Act sections that are, in contrast, based on the best performing technologies already implemented at the best performing target sources. As the U.S. Court of Appeals for the District of Columbia Circuit (D.C. Circuit) has noted, the Senate Report accompanying the 1970 Clean Air Act Amendments—which enacted Section 111—makes unambiguously clear that Congress did not intend that technology need “be in actual routine use somewhere” to undergird Section 111 standards.<sup>7</sup>
2. **Courts Have Long Upheld Technology-Forcing Clean Air Act Standards and Interpreted “Adequately Demonstrated” Not to Require Current Widespread Use:** Only a few years after Section 111 was enacted, the D.C. Circuit unambiguously “reject[ed] the suggestion . . . that the [Clean Air] Act’s requirement that emission limitations be ‘adequately demonstrated’ necessarily implies that any [stationary source] now in existence be able to meet the proposed standards.”<sup>8</sup> Over the subsequent decades, courts have continued to recognize that the Clean Air Act generally, and Section 111 specifically, are meant to spur technological development.
3. **EPA Has a Longstanding Practice of Setting Technology-Forcing Standards Under Section 111:** Beginning with some of its earliest Section 111 regulations, EPA has routinely set standards based on new technologies that were not then widespread. These regulations have been repeatedly upheld in court and have spurred deployment and innovation.
4. **The Longstanding Judicial Interpretation of “Adequately Demonstrated” Does Not Hinge on Chevron Deference:** The D.C. Circuit’s longstanding interpretation of “adequately demonstrated” in Section 111(a) is based on its own reading of the statute, not deference to EPA’s interpretation—and that reading also predates *Chevron*. Moreover, even if longstanding caselaw supporting EPA’s approach hypothetically did not exist, the D.C. Circuit adopted the best interpretation of the provision. Section 111’s specific language signals that Congress wanted EPA to use its expertise to determine whether technology is “adequately demonstrated.”

<sup>7</sup> S. REP. NO. 91-1196, at 16 (1970).

<sup>8</sup> *Portland Cement Ass’n v. Ruckelshaus*, 486 F.2d 375, 391 (D.C. Cir. 1973).

## Legal Background: Emission Limits Under Section 111 of the Clean Air Act

Section 111 requires EPA to regulate stationary source categories that cause, or significantly contribute to, air pollution that “may reasonably be anticipated to endanger public health or welfare.”<sup>9</sup> In 2011, the Supreme Court clarified that Section 111 grants EPA authority to regulate GHG emissions specifically from fossil-fuel-fired power plants.<sup>10</sup> In its 2022 *West Virginia v. Environmental Protection Agency* decision, the Court did not question EPA’s authority under Section 111 to reduce GHG emissions from power plants, but it held that EPA could not set emission limits that defined the BSER to include generation shifting from sources that emit GHGs more intensively (like coal-fired power plants) to lower- or zero-emitting sources (like wind and solar facilities).<sup>11</sup>

Section 111 divides EPA’s stationary-source authority into standards for *new or modified* sources, covered under Section 111(b),<sup>12</sup> and standards for *existing* sources, covered under Section 111(d).<sup>13</sup> Under Section 111(b), EPA sets “standards of performance” for new or modified sources within each covered source category.<sup>14</sup> Under Section 111(d), EPA determines the minimum stringency of emission limits for existing sources and guides states in developing “standards of performance” to implement them.<sup>15</sup> Section 111(a), in turn, guides EPA on how to set these “standards of performance” (or, for existing sources, emission guidelines): These standards must “reflect[] the degree of emission limitation achievable through the application of the best system of emission reduction” that “has been adequately demonstrated.”<sup>16</sup> In determining the stringency of these emission limits, EPA must take into account “the cost of achieving such reduction and any nonair quality health and environmental impact and energy requirements.”<sup>17</sup>

Notably, these emission standards do *not* constitute inflexible technology mandates. Rather, they reflect the emission reductions that are possible under certain systems—specifically, the BSER. In reality, source operators can achieve these limitations using any method that they choose, including any less costly approach, so long as it achieves the same reductions as the BSER.

Within a given source category, the optimal “standards of performance” may differ between new and existing sources, given the common differences in cost and technical feasibility that often occur between installing technology in newly built structures versus retrofitting existing ones. For instance, EPA adjusts its cost estimates for existing sources using a “retrofit difficulty factor” to reflect the added costs associated with a typical retrofit project.<sup>18</sup> But, while EPA may identify different BSERs for new versus existing sources based on how it applies statutory criteria like cost to those two differ-

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<sup>9</sup> 42 U.S.C. § 7411(b)(1)(A).

<sup>10</sup> *Am. Elec. Power Co. v. Connecticut*, 564 U.S. 410 (2011).

<sup>11</sup> *West Virginia v. Env’t Prot. Agency*, 142 S. Ct. 2587 (2022).

<sup>12</sup> 42 U.S.C. § 7411(b)(1)(B) (establishing a timeline for EPA to “publish proposed regulations[] establishing Federal standards of performance for new sources within” identified stationary-source categories); *id.* § 7411(a)(2) (defining “new source” to include both newly built sources and sources for which “modification . . . is commenced after the publication of regulations”).

<sup>13</sup> *Id.* § 7411(d)(1) (creating a procedure to “establish[] standards of performance for any existing source” that would be regulated under Section 111(b) if it were a new source, and for pollutants that are not otherwise covered under Sections 108(a) or 112).

<sup>14</sup> *Id.* § 7411(b)(1)(B).

<sup>15</sup> *Id.* § 7411(d)(1). Section 111(d) only applies to source categories regulated under 111(b) *and* to pollutants that are not otherwise regulated under the Clean Air Act’s hazardous air pollutant or national ambient air quality standards provisions.

<sup>16</sup> *Id.* § 7411(a)(1).

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

<sup>18</sup> See ENV’T PROT. AGENCY, CARBON CAPTURE AND STORAGE FOR COMBUSTION TURBINES: TECHNICAL SUPPORT DOCUMENT 12 (2023) (this cost adder accounts for issues such as limited spaces resulting in construction premiums, insufficient laydown areas, and long tie-in connections).

ent contexts, the fundamental requirements and formal definition guiding the standards are identical for both new and existing sources. Standards for both new and existing sources rely on the same Section 111(a) directions for determining stringency on the basis of adequate demonstration—so EPA should use the same forward-looking approach to set standards in both contexts.

## Section 111’s Language and Purpose Reveal That It Looks Toward the Future, Not Only at Technologies in Widespread Use Today

When Congress passed the Clean Air Act, it did not intend for EPA to settle for the emission-reduction technologies that companies happened to develop and implement. Congress wanted to protect the public more effectively by actively spurring industry innovation and deployment of new emission-reduction technologies and practices.

**The Clean Air Act’s forward-looking nature is clear from the context of the statute as a whole.** Congress issued the 1970 Clean Air Act Amendments, which included Section 111, to require serious and comprehensive air pollution abatement. Recognizing that the “air pollution problem [was] more severe, more pervasive, and growing at a more rapid rate than was generally believed,” Congress enacted the 1970 Amendments to “provide a much more intensive and comprehensive attack on air pollution” than the previous iterations of the Act.<sup>19</sup> Congress aimed to “broaden[ ]” “the requirements for State action,” “greatly increase[ ]” “the obligation on polluters,” and create a program “truly national in scope.”<sup>20</sup> As the Supreme Court explained, the 1970 Amendments served as “a drastic remedy to what was perceived as a serious and otherwise uncheckable problem of air pollution.”<sup>21</sup> To accomplish these goals, Congress designed the Act with the broad purpose “to protect and enhance the quality of the Nation’s air resources so as to promote the public health and welfare.”<sup>22</sup>

Section 111, as enacted in the 1970 Amendments, fulfills these broad and ambitious goals by envisioning regulations that advance the state of emission-reduction technology. **The Senate Report accompanying the 1970 Amendments—the congressional report that explains Section 111’s forward-looking character—makes unambiguously clear that technology need not “be in actual routine use somewhere” to undergird Section 111 standards.**<sup>23</sup> As if to remove any doubt, the Report continues: “Standards of performance should provide an incentive for industries to work toward constant improvement in techniques for preventing and controlling emissions from stationary sources . . . .”<sup>24</sup> This “constant improvement” could not occur without forcing some technological development and deployment for both new and existing sources.

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<sup>19</sup> S. REP. NO. 91-1196, at 4.

<sup>20</sup> *Id.* at 2.

<sup>21</sup> *Union Elec. Co. v. Env’t Prot. Agency*, 427 U.S. 246, 256 (1976).

<sup>22</sup> Pub. L. No. 91-604 § 101(b)(1), 42 U.S.C. § 1857 (1970).

<sup>23</sup> S. REP. NO. 91-1196, at 16. At the time of the report, the term proposed was “available control technology” rather than “the best system of emission reduction . . . adequately demonstrated,” and the section at issue was numbered 113 rather than 111. *See id.* But the report makes clear that the word “available” in “available control technology” “does not mean that the technology must be in actual, routine use somewhere.” *Id.* The same logic extends—if anything, even more strongly—to the language Congress ultimately passed, as Section 111 eschews the word “available” and instead uses “demonstrated.” 42 U.S.C. § 7411(a)(1).

<sup>24</sup> S. REP. NO. 91-1196, at 17. The accompanying House Report’s reference to “available” technology is consistent with this technology-forcing aim. As the D.C. Circuit explains, the House Report’s “caution that ‘in order to be considered “available” the technology may not be one which constitutes a purely theoretical or experimental means of preventing or controlling air pollution’ merely reflects the final language adopted [in Section 111], that it must be ‘adequately demonstrated’ that there will be ‘available technology.’” *Portland Cement*, 486 F.2d at 391 (citing H. REP. NO. 91-1146, at 10 (1970)).

**The specific language of Section 111 suggests particular attention to this technology-forcing aim when compared with language from other Clean Air Act sections.** For instance, Section 112, dealing with hazardous air pollutants, instructs EPA to set limitations for existing sources that are at least as stringent as is achievable at “the best performing 12 percent of the existing sources” (or the best performing five sources, for categories with fewer than thirty sources).<sup>25</sup> Section 129, dealing with solid waste combustion, has similar requirements for existing sources.<sup>26</sup> Congress knew how to tell EPA to look at what numerous existing sources have already achieved, making the absence of such benchmarking in Section 111 stand out. Put differently, Section 111, in contrast to Sections 112 and 129, looks at what has been *adequately demonstrated* instead of what has *already been widely achieved*, suggesting even more strongly that a “system of emission reduction” can be adequately demonstrated without being in widespread use.

## Courts Have Long Upheld Technology-Forcing Clean Air Act Standards and Interpreted “Adequately Demonstrated” Not to Require Current Widespread Use

Consistent with the focus on forcing technological development and deployment in the Clean Air Act generally, and in Section 111 specifically, courts have frequently upheld technology-forcing standards under that section. Indeed, the court responsible for hearing challenges to nationally applicable Clean Air Act actions,<sup>27</sup> the D.C. Circuit, has long held that “adequately demonstrated” technology need not be widely available at the time that a regulation is set. “Recognizing that the Clean Air Act is a technology-forcing statute,” the D.C. Circuit has repeatedly affirmed that EPA has the “authority to hold the industry to a standard of improved design and operational advances, so long as there is substantial evidence that such improvements are feasible and will produce the improved performance necessary to meet the standard.”<sup>28</sup>

This recognition from the D.C. Circuit dates back to Section 111’s early years. In 1973, the court unambiguously “reject[ed] the suggestion . . . that the [Clean Air] Act’s requirement that emission limitations be ‘adequately demonstrated’ necessarily implies that any [stationary source] now in existence be able to meet the proposed standards.”<sup>29</sup> **Instead, the D.C. Circuit followed the Congressional directives laid out in the statutory text and legislative history and recognized that “Section 111 looks toward what may fairly be projected for the regulated future, rather than the state of the art at present,” as long as EPA shows that the standards meet a threshold of “achievability.”**<sup>30</sup> In another 1973 case, that court reaffirmed that Section 111 “does not require that a [stationary source] be currently in operation which can at all times and under all circumstances meet the standards” and that such standards “need not necessarily be routinely achieved within the industry prior to its adoption.”<sup>31</sup> And the court subsequently allowed EPA to infer that, because “a new technology” successfully reduced emissions in one type of stationary source, it would similarly succeed in another type.<sup>32</sup>

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<sup>25</sup> 42 U.S.C. § 7412(d)(3).

<sup>26</sup> See *id.* § 7429(a)(2) (“Emissions standards for existing units in a category . . . shall not be less stringent than the average emissions limitation achieved by the best performing 12 percent of units in the category . . .”).

<sup>27</sup> See *id.* § 7607(b)(1).

<sup>28</sup> See, e.g., *Sierra Club v. Costle*, 657 F.2d 298, 364 (D.C. Cir. 1981) (applying this understanding of the Clean Air Act’s technology-forcing nature to support its finding that EPA did not exceed its statutory authority when setting Section 111 standards). Additional cases are discussed in the succeeding paragraphs.

<sup>29</sup> *Portland Cement*, 486 F.2d at 391.

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

<sup>31</sup> *Essex Chem. Corp. v. Ruckelshaus*, 486 F.2d 427, 433–34 (D.C. Cir. 1973).

<sup>32</sup> *Lignite Energy Council v. Env’t Prot. Agency*, 198 F.3d 930, 934 (D.C. Cir. 1999).

This caselaw aligns with judicial findings for the broader Clean Air Act. In a 1979 case about monitoring for national ambient air quality standards, the D.C. Circuit “discern[ed] from the [Clean Air Act] a technology-forcing objective.”<sup>33</sup> In a 1983 case about the statute’s noncompliance penalties, it confirmed that the Clean Air Act “was technology-forcing: it did not provide exemptions for sources unable to comply with requirements because the technology necessary was as yet undeveloped.”<sup>34</sup> In 1990, the U.S. Court of Appeals for the Seventh Circuit confirmed that Congress passed the Clean Air Act Amendments “to stimulate the advancement of pollution control technology.”<sup>35</sup> Other cases are similarly emphatic.<sup>36</sup> These repeated findings about the Clean Air Act’s technology-forcing purpose further confirm that Congress intended for EPA to look beyond the present status quo when setting Clean Air Act standards.

To be sure, Section 111’s BSER standard does not give EPA carte blanche to regulate based on “‘crystal ball’ inquiry.”<sup>37</sup> The agency must still show “that there will be ‘available technology’” within the lead time afforded.<sup>38</sup> But, provided that EPA makes that showing, courts have made clear that EPA is not limited to technology or other systems that are currently widely available or deployed when determining the BSER.

Even if EPA can demonstrate that CCS is cost reasonable and sufficiently developed to meet the “adequately demonstrated” threshold immediately, it can also consider what additional lead time will support deployment. Consistent with such considerations, in its proposed rule, EPA has laid out a phased compliance timeline, with less stringent standards based on some parts of the BSER taking effect sooner, and more stringent standards reflecting the full BSER taking effect years later.<sup>39</sup> This phased approach mirrors EPA’s frequent approach of using extended lead times and interim milestones.<sup>40</sup> EPA explains that it has provided this extended lead time to allow for permitting, construction, and deployment of the BSER and related infrastructure,<sup>41</sup> rather than due to concerns that the technology CCS is not yet sufficiently developed.

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<sup>33</sup> *Ala. Power Co. v. Costle*, 636 F.2d 323, 372 (D.C. Cir. 1979).

<sup>34</sup> *Duquesne Light Co. v. Env’t Prot. Agency*, 698 F.2d 456, 475 (D.C. Cir. 1983).

<sup>35</sup> *Wis. Elec. Power Co. v. Reilly*, 893 F.2d 901, 909 (7th Cir. 1990).

<sup>36</sup> See also, e.g., *Union Elec. Co.*, 427 U.S. at 257 (“These requirements [from the 1970 Amendments] are of a ‘technology-forcing character[.]’ . . .” (quoting *Train v. Nat. Res. Def. Council*, 421 U.S. 60, 91 (1975))); *Bluewater Network v. Env’t Prot. Agency*, 370 F.3d 1, 20 (D.C. Cir. 2004) (“Section 213(a)(3) [of the Clean Air Act] is a ‘technology-forcing’ provision . . .” (quoting *Husqvarna AB v. Env’t Prot. Agency*, 254 F.3d 195, 201 (D.C. Cir. 2001))); *Sierra Club v. Env’t Prot. Agency*, 325 F.3d 374, 378 (D.C. Cir. 2003) (“not disput[ing]” that “§ 202(1)(2) [of the Clean Air Act] is ‘technology-forcing,’ so that the agency must consider future advances in pollution control capability” (citing *Husqvarna*, 254 F.3d at 201)).

<sup>37</sup> *Portland Cement*, 486 F.2d at 391 (quoting *Int’l Harvester Co. v. Ruckelshaus*, 478 F.2s 615, 629 (D.C. Cir. 1973)).

<sup>38</sup> *Id.* (quoting H. REP. NO. 91-1146, at 10).

<sup>39</sup> See, e.g., Proposed Rule, 88 Fed. Reg. at 33,244–45 (explaining some aspects of this phased approach).

<sup>40</sup> See, e.g., *id.* at 33,289 (collecting examples of prior Section 111 rules that “have similarly provided the regulated sector with lead time to accommodate the availability of technology”); Standards of Performance for New Stationary Sources and Emission Guidelines for Existing Sources: Hospital/Medical/Infectious Waste Incinerators, 62 Fed. Reg. 48,348, 48,381 (Sept. 15, 1997) (requiring “State plans” to mandate applicable control technology by “September 16, 2002,” five years after the rule, and allowing such plans to “include provisions allowing designated facilities to petition the State for extensions beyond the compliance times” of three years). EPA has also long used a phased approach in standards for vehicles and criteria pollutants. See, e.g., Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles 43 tbl.1 & 45 tbl.2 (prepublication version, forthcoming 2024), <https://www.epa.gov/system/files/documents/2024-03/lmdv-veh-standrds-ghg-emission-frm-2024-03.pdf> [<https://perma.cc/7AD3-MTQM>] (phasing in progressively more stringent emission targets for successive model years, in line with the approach of prior vehicle standards); Federal “Good Neighbor Plan” for the 2015 Ozone National Ambient Air Quality Standards, 88 Fed. Reg. 36,654, 36,663 tbl.I.B-1 (June 5, 2023) (phasing in more stringent emission limits through smaller emission budgets between 2023 and 2029, in line with the approach of prior Good Neighbor Provision standards).

<sup>41</sup> See Proposed Rule, 88 Fed. Reg. at 33,289 (“Consistent with [D.C. Circuit] caselaw, the phased implementation of the standards of performance in this rule ensures that facilities have sufficient lead time for planning and implementation of the use of CCS . . . necessary to comply with the second phase of the standards, and thereby ensures that the standards are achievable.”).

While courts have, so far, had occasion to assess what is “adequately demonstrated” for regulations pertaining only to new sources under Section 111(b), the same general principles of urging technological innovation apply to regulations for existing sources under 111(d). Most tellingly, the operative statutory language is identical. Both subsections empower EPA to set or guide “standards of performance,”<sup>42</sup> which Section 111(a) defines as the “best system of emission reduction” that “has been adequately demonstrated,” without distinguishing between new and existing sources.<sup>43</sup> Again, Congress knew how to set different Clean Air Act standards for new and existing sources, as in, for instance, Sections 112 and 129<sup>44</sup>—so the use of the same definition for both source categories in Section 111 is telling. These “best systems” may vary between new and existing sources based on factors like cost and feasibility—but the fundamental aim to push industry forward is consistent between the two. There is no reason to think that Congress meant to limit its forward-leaning, technology-forcing aims to new sources.

## EPA Has a Longstanding Practice of Setting Technology-Forcing Standards Under Section 111

**With this well-established judicial support to look beyond already-widespread technologies, EPA has repeatedly embraced newer or less frequently deployed technologies in setting Section 111(b) “standards of performance.”** Again, Section 111(d) contains the same “standards of performance” language, which Section 111(a) defines consistently throughout Section 111. EPA issued some of these standards within months of President Nixon signing the 1970 Clean Air Act Amendments—and therefore Section 111—into law. For example, under Section 111(b), EPA has without objection from the courts, long set standards based on newly emerging technologies, including:

- Dual absorption systems for sulfuric acid plants that burn elemental sulfur, in a 1971 sulfur dioxide standard. At the time this standard was set, these “relatively new” systems were used in only one active American facility.<sup>45</sup>
- Sulfur scrubbers for recycle plants (another type of sulfuric acid plant), in the same 1971 sulfur dioxide standard.<sup>46</sup> At the time the standard was set, only one vendor made sulfur scrubbers and only three power plants used them.<sup>47</sup>
- Sulfur scrubbers for coal-fired generators, in the same 1971 sulfur dioxide standard.<sup>48</sup>

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<sup>42</sup> 42 U.S.C. § 7411(b)(1)(B); *id.* § 7411(d)(1).

<sup>43</sup> *Id.* § 7411(a)(1).

<sup>44</sup> *See id.* § 7412(d)(3) (requiring standards for new sources to be at least as “stringent than the emission control that is achieved in practice by the best controlled similar source,” but setting the analogous floor for existing sources as “the average emission limitation achieved by the best performing 12 percent of the existing sources,” or “the best performing 5 sources . . . for categories or subcategories with fewer than 30 sources”); *id.* § 7429(a)(2) (similar).

<sup>45</sup> *Essex Chem. Corp.*, 486 F.2d at 435, 437; *see id.* at 436 (noting that even “Petitioners do not object to the EPA’s selection of dual absorption as the ‘best system of emission reduction’ which has been ‘adequately demonstrated’ in” these plants).

<sup>46</sup> *Id.* at 438. The court faulted EPA for issuing this standard, but for reasons unrelated to scrubbers’ rarity. *See id.* at 439 (remanding this standard because EPA had given “no consideration [to] the significant land or water pollution potential resulting from disposal of the 52 lbs./ton liquid purge by-product” that scrubbers would create). The court did not find other fault in EPA’s determination that this standard was the “best system . . . adequately demonstrated.” *See id.* at 438–39.

<sup>47</sup> Margaret R. Taylor et al., *Regulation as the Mother of Innovation: The Case of SO<sub>2</sub> Control*, 27 L. & POL’Y 348, 360 tbl.2 (2005).

<sup>48</sup> *Essex Chem. Corp.*, 486 F.2d at 440. As with the standard for recycle plants, the court remanded this standard, but for reasons unrelated to scrubbers’ rarity. *See id.* at 441 (“[T]he record is remanded for further consideration and explanation by the Administrator of the adverse environmental effects of” using scrubbers, which “produce[] significant quantities of sludge by-product which present substantial disposal problems.”) Again, the court did not find other fault in EPA’s determination that this standard was the “best system . . . adequately demonstrated.” *See id.* at 440–41.

- Even more advanced scrubbers for coal-fired generators, in a 1979 sulfur dioxide standard.<sup>49</sup>
- Selective catalytic reduction for coal-fired industrial boilers, in a 1998 nitrogen oxide standard.<sup>50</sup> Selective catalytic reduction had only been installed in seven American coal-fired units, all of which were electric utility units (as opposed to the industrial boilers being regulated).<sup>51</sup>

Standards based on newly emerging technologies have spurred important shifts in technology, enabling substantial emission reductions in line with Congress’s lofty goals for the 1970 Amendments. Take the dual absorption system described above: The court was unfazed by the fact that it was used in only one American facility.<sup>52</sup> Or take the sulfur scrubbers described above for multiple categories of stationary sources: By the end of the decade in which EPA first set sulfur dioxide standards, the one vendor and three power plants described above jumped to 16 vendors and 119 facilities<sup>53</sup>—increases of 1600% and 3967%, respectively. Neither the 1979 sulfur dioxide standard for coal-fired generators nor the 1998 nitrogen oxide standard for coal-fired boilers were premised on widespread use of the BSER technologies. In fact, for the 1998 nitrogen oxide standard for coal-fired industrial boilers, litigants argued that EPA should reject selective catalytic reduction because of its above-described rarity, but, recognizing the language and purpose of Section 111, the D.C. Circuit approved the standard anyway.<sup>54</sup>

What is more, courts approved those earlier Section 111 standards based on much thinner records than EPA has provided for the Proposed Rule. For instance, EPA’s entire explanation for its 1971 sulfur dioxide standards took up a bit over one *Federal Register* page.<sup>55</sup> The analogous page counts were thirty-three for the 1979 sulfur dioxide standard<sup>56</sup> and twelve for the 1998 nitrogen oxide standard<sup>57</sup>—all with minimal separate technical analyses. The Proposed Rule, in contrast, includes 181 pages of explanations in the *Federal Register*,<sup>58</sup> along with hundreds more pages’ worth of separate technical analyses.<sup>59</sup> The Proposed Rule’s lengthy explanations include multiple sections specifically dedicated to explaining EPA’s compliance with the “adequately demonstrated” standard<sup>60</sup>—explanations that are, in total, longer than the entire *Federal Register* notices for some of those judicially upheld prior Section 111 standards. While these analyses’ contents,

<sup>49</sup> *Costle*, 657 F.2d at 364 (“[W]e uphold EPA’s judgment that the standard can be set at a level that is higher than has been actually demonstrated over the long term by currently operating lime scrubbers at plants burning high sulfur coal.”).

<sup>50</sup> *Lignite Energy Council*, 198 F.3d at 933–34 (holding that, while “EPA was unable to collect emissions data” specific to the regulated facilities, the agency “compensate[d] for a shortage of data through the use of other qualitative methods, including the reasonable extrapolation of a technology’s performance in other industries,” so EPA’s “adequately demonstrated” determination was proper).

<sup>51</sup> Revision of Standards of Performance for Nitrogen Oxide Emissions from New Fossil-Fuel Fired Steam Generating Units; Revisions to Reporting Requirements for Standards of Performance for New Fossil-Fuel Fired Steam Generating Units, 63 Fed. Reg. 49,442, 49,444 (Sept. 16, 1998).

<sup>52</sup> See *Essex Chem. Corp.*, 486 F.2d at 435; *id.* at 436 (noting that even “[p]etitioners do not object to the EPA’s selection of dual absorption as the ‘best system of emission reduction’ which has been ‘adequately demonstrated’ for” some sulfur plants).

<sup>53</sup> See Taylor, *supra* note 47, at 356 (“[T]he number of U.S. [sulfur] scrubber vendors went from one to sixteen in the 1970s.”); Env’t Prot. Agency, *Press Release, EPA Says Scrubbers Necessary for Health Protection Under Coal Conversion Plan* (July 14, 1977), <https://www.epa.gov/archive/epa/aboutepa/epa-says-scrubbers-necessary-health-protection-undercoal-conversion-plan.html> [<https://perma.cc/FWV9-K9UT>].

<sup>54</sup> *Lignite Energy Council*, 198 F.3d at 933–34.

<sup>55</sup> See Standards of Performance for New Stationary Sources, 36 Fed. Reg. 24,876, 24,876–77 (Dec. 23, 1971).

<sup>56</sup> See New Stationary Sources Performance Standards; Electric Utility Steam Generating Units, 44 Fed. Reg. 33,580, 33,580–612 (June 11, 1979).

<sup>57</sup> See Revision of Standards of Performance for Nitrogen Oxide Emissions from New Fossil-Fuel Fired Steam Generating Units; Revisions to Reporting Requirements for Standards of Performance for New Fossil-Fuel Fired Steam Generating Units, 63 Fed. Reg. 49,442, 49,442–53 (Sept. 16, 1998).

<sup>58</sup> See Proposed Rule, 88 Fed. Reg. at 33,240–420.

<sup>59</sup> See *Greenhouse Gas Standards and Guidelines for Fossil Fuel-Fired Power Plants*, ENV’T PROT. AGENCY (Nov. 27, 2023), <https://www.epa.gov/stationary-sources-air-pollution/greenhouse-gas-standards-and-guidelines-fossil-fuel-fired-power> [<https://perma.cc/L6FB-C92K>] (linking to nine Technical Support Documents, along with other analytical and explanatory documents).

<sup>60</sup> See Proposed Rule, 88 Fed. Reg. at 33,272–73, 33,287, 33,290–98, 33,311–13, 33,346–47, 33,351–52, 33,355, 33,363–65, 33,367–68.

rather than their page count, constitute the significant criterion, the length of the explanations in the Proposed Rule is illustrative of EPA’s careful, expert consideration of why it sees CCS as adequately demonstrated now, cost-reasonable, and feasible at scale within the rule’s compliance timeline.

The above examples show that EPA has long set forward-looking Section 111 standards consistent with the “technology-forcing” nature of the Clean Air Act.<sup>61</sup> Such regulations have long had significant effects on regulated sectors—**but influence on the technologies used by a regulated sector is fundamentally different from transforming a regulatory program.** This distinction was significant in *West Virginia*, in which the Supreme Court found that EPA’s use of generation shifting to determine the BSER exceeded EPA’s Section 111 authority. The Court reached this conclusion by applying the major questions doctrine—which the Court specified is triggered only in extraordinary cases involving unprecedented and transformative applications of agency authority.<sup>62</sup> But unlike the Clean Power Plan’s designation of generation shifting as a BSER, a technology-forcing regulation with emission limits premised on what emission reductions can be achieved through “add-on” controls, like CCS, fits well within EPA’s historically asserted authority under Section 111.<sup>63</sup>

## The Longstanding Judicial Interpretation of “Adequately Demonstrated” Does Not Hinge on *Chevron* Deference

The Supreme Court will soon hand down decisions in *Loper Bright Enterprises v. Raimondo*<sup>64</sup> and *Relentless, Inc. v. Department of Commerce*<sup>65</sup> that may end or curtail *Chevron* deference—a decades-old judicial precedent that directs courts to defer to agencies’ reasonable interpretations of ambiguous statutory language.<sup>66</sup> Regardless of what the Court decides, however, it should not affect EPA’s authority to set technology-forcing standards under Section 111.

First, the D.C. Circuit’s longstanding interpretation of “adequately demonstrated” in Section 111(a) is based on its own analysis of the statute,<sup>67</sup> not deference to EPA’s interpretation under *Chevron* (or any other doctrine). As noted above, since it first considered the issue in 1973, the D.C. Circuit has “reject[ed] the suggestion . . . that the [Clean Air] Act’s requirement that emission limitations be ‘adequately demonstrated’ necessarily implies that any [stationary source] now in existence be able to meet the proposed standards.”<sup>68</sup> **The D.C. Circuit’s interpretation predates *Chevron*—and, in any event, it does not turn on *Chevron* because it is the court’s own interpretation rather than the agency’s.** Accordingly, losing or curtailing *Chevron* deference would not affect this interpretation.

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<sup>61</sup> *Costle*, 657 F.2d at 364.

<sup>62</sup> The bulk of the Court’s analysis of the doctrine’s triggers examined whether EPA had “‘claim[ed] to discover in a long-extant statute [1] an unheralded power’ [2] representing a ‘transformative expansion in [its] regulatory authority.’” *West Virginia*, 142 S. Ct. at 2610 (quoting *Utility Air Regul. Grp. v. Env’t Prot. Agency*, 573 U.S. 302, 324 (2014)). In its subsequent decision relying on the major questions doctrine, *Biden v. Nebraska*, the Supreme Court again reiterated the importance of weighing “the ‘history and the breadth of the authority that the agency had asserted.’” *Biden v. Nebraska*, 143 S. Ct. 2355, 2372 (2023) (quoting *West Virginia*, 142 S. Ct. at 2608) (alterations omitted).

<sup>63</sup> See DENA ADLER & ANDREW STAWASZ, INST. FOR POL’Y INTEGRITY, WITHIN ITS WHEELHOUSE: EPA’S NEW POWER PLANT REGULATIONS RELY ON TRADITIONAL APPROACHES LEFT AVAILABLE AFTER WEST VIRGINIA (forthcoming), <https://policyintegrity.org/publications/detail/within-its-wheelhouse>.

<sup>64</sup> No. 21-5166 (argued Jan. 17, 2024).

<sup>65</sup> No. 22-1219 (argued Jan. 17, 2024).

<sup>66</sup> See, e.g., Adam Liptak, *Conservative Justices Appear Skeptical of Agencies’ Regulatory Power*, N.Y. TIMES (Jan. 17, 2024), <https://www.nytimes.com/2024/01/17/us/supreme-court-chevron-case.html> (“Members of the Supreme Court’s conservative majority seemed inclined on Wednesday to limit or even overturn [*Chevron* deference] . . .”).

<sup>67</sup> See, e.g., *Portland Cement*, 486 F.2d at 391; *Essex Chem. Corp.*, 486 F.2d at 433–34; *Lignite Energy Council*, 198 F.3d at 934.

<sup>68</sup> *Portland Cement*, 486 F.2d at 391. Further, there is “evidence that . . . Member[s] of Congress interpreted the statutory text that way,” *Bostock v. Clayton Cty.*, 140 S. Ct. 1731, 1757 (2020) (Alito, J., dissenting), when the 1970 Amendments were enacted.

Second, even if, hypothetically, longstanding caselaw supporting EPA's approach here did not exist, the best reading of Section 111's statutory text is that "adequately demonstrated" does not require the BSER to be in widespread use. As explained above, Congress could have easily benchmarked the standard to the state of the art at present, as it does in other CAA provisions.<sup>69</sup> But it did not. The legislative history on which the D.C. Circuit relied further confirms this reading.<sup>70</sup>

Further, Congress did not ask EPA merely to select the BSER that "has been adequately demonstrated"; it specified it should be the BSER that "*the Administrator determines* has been adequately demonstrated."<sup>71</sup> This language further suggests that Congress intended to grant EPA respect in determining what is "adequately demonstrated."<sup>72</sup> **After decades of implementing pollution-reduction regulations, in which industry has routinely adopted technology faster and at lower cost than projected,<sup>73</sup> EPA has expert knowledge that informs how to identify "adequately demonstrated" technologies based on projections about the future rather than merely the state of the art at present. As part of identifying the "best system of emission reduction" under Section 111, EPA weighs factors like cost and energy requirements that require its expert review of the factual record. Courts have long granted EPA considerable latitude to use its expert determination to balance these factors.**<sup>74</sup> Any viable interpretation of "adequately demonstrated" should allow EPA enough discretion to address these fact-intensive technical issues.

EPA's determination of the BSER fits squarely within EPA's pollution-reduction wheelhouse. As noted above, the determination rests on an extensive, technical record that includes power sector modeling refined over decades, as well as analyses of different emission reduction technologies, including their costs and energy requirements. EPA relies on its expertise to determine what the industry can reasonably achieve during the compliance period by weighing these different technical factors based on the factual record. Even though it should retain latitude to use its expertise, EPA's identification of the BSER is not without limits; any regulation must still be based on reasoned decisionmaking reviewable under the *State Farm* standard.<sup>75</sup> Under the *State Farm* standard, challengers would need to show that EPA's decision was arbitrary and capricious by, among other things, showing it did not consider an important aspect of the problem.<sup>76</sup> But provided that EPA uses reasoned decisionmaking to carefully and thoroughly consider the matter before it, such tech-

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<sup>69</sup> See *supra* notes 25–26 and related text.

<sup>70</sup> See *supra* note 23 and related text.

<sup>71</sup> 42 U.S.C. § 7411(a)(1) (emphasis added).

<sup>72</sup> See, e.g., Adrian Vermeule, *The Deference Dilemma 5* (Harvard Public Law Working Paper No. 23-38, 2023), <https://ssrn.com/abstract=4594638> ("When a court interprets a statute de novo, it may decide that the statute itself, rightly understood according to the traditional tools of statutory interpretation, either explicitly or implicitly delegates to an agency the primary or initial power to determine or complete the statutory scheme (whether by rulemaking or by adjudication or by a mix; which of these powers an agency holds is a separate question). In such cases, the agency gives concrete specification to statutory terms or fills in statutory gaps or ambiguities, subject of course to judicial review to ensure that that the agency's specification has remained within the scope of the delegation." (citations omitted)).

<sup>73</sup> See, e.g., Env't Prot. Agency, *The Benefits and Costs of the Clean Air Act, 1970-1990* (1997), <https://www.epa.gov/sites/default/files/2015-06/documents/contsetc.pdf> [<https://perma.cc/QDM8-ZP5Q>]; SMALL BUSINESS MAJORITY & THE MAIN STREET ALLIANCE, *THE CLEAN AIR ACT'S ECONOMIC BENEFITS: PAST, PRESENT, AND FUTURE 6–7* (2010), [https://smallbusinessmajority.org/our-research/clean-energy-economy/clean-air-acts-economic-benefits-past-present-and-future?gad\\_source=1&gclid=EAIaIQobChMIinc7269GUhQMVVkVHAR2acwwZEAAYASAAEgLBZfD\\_BwE](https://smallbusinessmajority.org/our-research/clean-energy-economy/clean-air-acts-economic-benefits-past-present-and-future?gad_source=1&gclid=EAIaIQobChMIinc7269GUhQMVVkVHAR2acwwZEAAYASAAEgLBZfD_BwE) [<https://perma.cc/N2R5-6TDS>].

<sup>74</sup> See, e.g., *Am. Elec. Power Co.*, 564 U.S. at 426 (noting that Congress left the decisions of whether and how to regulate GHGs under Section 111 to EPA's "expert determination"); *Costle*, 657 F.2d at 330 (explaining that "section 111 most reasonably seems to require that EPA identify the emission levels that are "achievable" with "adequately demonstrated technology" and that EPA "must exercise its discretion to choose an achievable emission level which represents the best balance of economic, environmental, and energy considerations"); *Lignite Energy Council*, 198 F.3d at 933 ("Because section 111 does not set forth the weight that should be assigned to each of these factors, we have granted the agency a great degree of discretion in balancing them . . ." (citations omitted)).

<sup>75</sup> *Motor Vehicle Mfrs. Ass'n of U.S., Inc. v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29 (1983).

<sup>76</sup> *Id.* at 43 ("Normally, an agency rule would be arbitrary and capricious if the agency has relied on factors which Congress has not intended it to consider, entirely failed to consider an important aspect of the problem, offered an explanation for its decision that runs counter to the evidence before the agency, or is so implausible that it could not be ascribed to a difference in view or the product of agency expertise.").

nical issues fall within the sphere where courts afford EPA respect. Given EPA’s longstanding expertise in reducing air pollution, “a court is not to substitute its judgment for that of the agency.”<sup>77</sup>

## Conclusion

Some critics of EPA’s proposed regulation argue that the statutory term “adequately demonstrated” requires that the technology undergirding EPA’s Section 111 standards already be in widespread use at the time of the regulation. That reading disregards EPA’s long history of implementing the Clean Air Act, and specifically its decades of implementing Section 111 regulations, to steer polluting industries in even cleaner directions based on what is possible in the lead time for compliance. Congress clearly refused to freeze the existing state of the art in place. The D.C. Circuit has long rejected that sort of reading, finding that forecasting technological development is squarely within EPA’s technical wheelhouse. EPA’s use of CCS to define the Section 111 emission limits fits well within the agency’s normal practice of looking ahead.

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<sup>77</sup> *Dep’t of Homeland Sec. v. Regents of the Univ. of Cal.*, 140 S. Ct. 1891, 1905 (2020) (quoting *Fed. Commc’ns Comm’n v. Fox Television Stations, Inc.*, 556 U.S. 502, 513 (2009)).

Cover photo (left) is of the coal-fired Navajo Generating Station located on leased land in the Navajo Indian Reservation, near Page, Arizona.  
Cover photo (right) is of SaskPower's Boundary Dam, a coal-fired power plant with a CCS system in Saskatchewan, Canada  
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