

United States Court of Appeals For the First Circuit

No. 19-1794

TOWN OF WEYMOUTH, MASSACHUSETTS; ROBERT HEDLUND, Mayor of Town of Weymouth; PATRICK M. O'CONNOR, State Senator; MICHAEL SMART, Vice President District Six; KENNETH J. DIFAZIO, District Three Councilor; JANE HACKETT, Councilor at Large; ED HARRINGTON, District Five Councilor; REBECCA HAUGH, District One Councilor; ARTHUR MATHEWS, District Four Councilor; MICHAEL MOLISSE, Councilor at Large; SCOTT DOWD, Conservation Commissioner; GEORGE LORING, Conservation Commissioner; THOMAS TANNER, Conservation Commissioner; FRANK SINGLETON, Conservation Commissioner; JOHN REILLY, Conservation Commissioner; CITY OF BRAINTREE, MASSACHUSETTS; TOWN OF HINGHAM, MASSACHUSETTS; CITY OF QUINCY, MASSACHUSETTS,

Petitioners,

v.

MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION,

Respondent,

ALGONQUIN GAS TRANSMISSION, LLC,

Intervenor.

No. 19-1797

ELIZABETH MOULDS; JENNIFER MATHIAN; OLIVIA LANNA; PRIYA HOWELL; KATHERINE ROGERS; MICHAEL MULLALEY; HEATHER KAAS; KATIE MCBRINE; JANICE DEYOUNG; A. SILVIA FABRIZIO; KATHLEEN CRONIN,

Petitioners,

v.

MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION,

Respondent,

ALGONQUIN GAS TRANSMISSION, LLC,

Intervenor.

No. 19-1803

DOROTHY ANDERSON; ALICE ARENA; MARGARET BELLAFFIORE; WENDY
CULLIVAN; SUSAN GREENE; REBECCA HAUGH; ANDREA HONORE; MICHAEL
LANG; CURTIS NORDGAARD, M.D.; THOMAS PENDERGAST; JUDY ROBERTS;
FRANK SINGLETON; BETSY SOWERS; BERNADETTE WILSON,

Petitioners,

v.

MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION,

Respondent,

ALGONQUIN GAS TRANSMISSION, LLC,

Intervenor.

PETITIONS FOR REVIEW OF AN ORDER OF
THE MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION

Before

Thompson, Lipez, and Kayatta,
Circuit Judges.

Brian F. Bertram, J. Raymond Miyares, Katherine E. Stock,
Miyares and Harrington, LLP, Joseph Callanan, Town Solicitor, Town
of Weymouth, Nicole I. Taub, Town Solicitor, Town of Braintree,
Kerry T. Ryan, Special Counsel, Town of Hingham, Bogle, DeAscentis
& Coughlin, P.C., and Janet Petkun, Assistant City Solicitor, City
of Quincy, on brief for petitioners Town of Weymouth, et. al.

Lawrence K. Kolodney, Adam J. Kessel, Natalie Galley, Eda
Stark, Kayleigh E. McGlynn, and Fish & Richardson P.C. on brief
for petitioners Moulds, et. al.

Michael H. Hayden and Morrison Mahoney LLP on brief for
petitioners Anderson, et. al.

Seth Schofield, Senior Appellate Counsel, Office of the

Attorney General of Massachusetts, Maura Healey, Attorney General for the Commonwealth of Massachusetts, Julie E. Green, Assistant Attorney General, Office of the Attorney General of Massachusetts, and Joshua Olszewski-Jubelirer, Assistant Attorney General, Office of the Attorney General of Massachusetts, on brief for respondent.

Jeremy C. Marwell, Joshua S. Johnson, Vinson & Elkins LLP, James T. Finnigan, and Rich May, P.C. on brief for intervenor.

June 3, 2020

KAYATTA, Circuit Judge. These consolidated cases involve a proposed natural gas compressor station set to be built in Weymouth, Massachusetts, as part of Algonquin Gas Transmission, LLC's "Atlantic Bridge Project," a natural gas pipeline connecting the Northeastern United States and Canada. The Massachusetts Department of Environmental Protection (DEP) approved Algonquin's non-major comprehensive plan application for the station and granted the station's air permit, certifying its compliance with the Massachusetts Clean Air Act (CAA), Mass. Gen. Laws ch. 111, §§ 142A-142F. Nearby municipalities and two citizen-petition groups challenge DEP's decision in this court, invoking original jurisdiction pursuant to the Natural Gas Act, 15 U.S.C. § 717r(d)(1). The petitioners raise a slew of arguments that DEP violated the Massachusetts CAA and related laws and regulations. Because we find that DEP did not follow its own established procedures for assessing whether an electric motor was the Best Available Control Technology (BACT), we vacate the air permit and remand to the agency to redo that analysis. We resolve the remaining issues in favor of DEP. See, e.g., Swajian v. Gen. Motors Corp., 916 F.2d 31, 35 (1st Cir. 1990) ("The remainder of this opinion will discuss other issues raised by the parties which are likely to recur [on remand] and should therefore be passed upon by us.").

I.

Algonquin, a natural gas transmission company based in Houston, Texas, proposed its Atlantic Bridge Project in response to rising demand for natural gas in the Northeastern United States and Canada. See Algonquin Gas Transmission, LLC v. Weymouth, 919 F.3d 54, 59 (1st Cir. 2019). Algonquin submitted its proposal for the project to the Federal Energy Regulatory Commission (FERC) in October 2015, id., and at the same time filed its air-permit application with DEP seeking the agency's approval of the project, see 310 Mass. Code Regs. § 7.02.

As with all natural gas pipelines, the Atlantic Bridge Project needs "[c]ompressor stations" to be "strategically placed along the pipeline to boost the system pressure to maintain required flow rates." FERC, An Interstate Natural Gas Facility on My Land?: What Do I Need to Know? 28 (2015), <http://bit.ly/2PBe0Tz>. One of the compressor stations that Algonquin plans to build will be located in Weymouth, Massachusetts, near the Fore River Energy Center (an unrelated power plant) and King's Cove recreation area (a public park). Algonquin proposed to operate the Weymouth station using a "SoLoNOx" Solar Taurus 60 combustion turbine, which is a proprietary model of a Dry Low Nitrogen Oxide (NO_x) combustion

turbine owned by Solar.¹ Dry Low NO_x turbines burn natural gas and reduce emissions of NO_x by operating at a lower combustion temperature. In layman's terms, the Weymouth station will burn a small amount of natural gas in order to generate pressure that will allow the bulk of the gas to flow through the pipeline.

FERC, for its part, approved Algonquin's plans for the Atlantic Bridge Project, including the Weymouth Station, and issued a "certificate of public convenience and necessity" under 15 U.S.C. § 717f(c) in January 2017. Algonquin Gas Transmission, 919 F.3d at 57, 59 (citing Algonquin Gas Transmission, LLC Mars. & Ne. Pipeline, LLC, 158 FERC ¶ 61061, 2017 WL 383829, at *1 (Jan. 25, 2017)); see also Town of Weymouth v. FERC, No. 17-1135, 2018 WL 6921213, at *1 (D.C. Cir. Dec. 27, 2018) (per curiam) (denying Weymouth's petition challenging FERC's certificate). This approval came after FERC completed its environmental assessment pursuant to the National Environmental Policy Act (NEPA), 42 U.S.C. § 4332(2)(C), finding that, "with appropriate mitigating measures," the project "would not constitute a major federal action significantly affecting the quality of the human environment." FERC's approval, however, is conditioned on Algonquin's compliance with the CAA (state and federal²) as

¹ "Solar" is a turbine manufacturer owned by Caterpillar, Inc. "Taurus" is a family of turbines that Solar manufactures.

² The Environmental Protection Agency (EPA) has approved the Massachusetts CAA and accompanying regulations as a State

determined by DEP. Algonquin Gas Transmission, 2017 WL 383829, at *45; see also 15 U.S.C. § 717b(d)(2) ("[N]othing in this chapter affects the rights of States under . . . the Clean Air Act"); cf. Algonquin Gas Transmission, 919 F.3d at 57-60, 63-66 (dealing with DEP's approval under the Coastal Zone Management Act).

DEP staff reviewed Algonquin's air-permit application and issued a "draft permit" in March 2017 stating that the proposed Weymouth station was "in conformance with the Air Pollution Control regulations and current air pollution control engineering practice." DEP provided a public comment period on the draft permit, and in response to public concerns, Massachusetts Governor Charles Baker directed DEP and the Massachusetts Department of Public Health to prepare a health impact assessment (HIA) of the Weymouth station.

Frustrated by the protracted approval process, Algonquin sued DEP in the D.C. Circuit under 15 U.S.C. § 717r(d)(2) seeking to hurry along DEP's final decision. See Petition for Review, Algonquin Gas Transmission, LLC v. Mass. Dep't of Env'tl. Prot., No. 18-1045 (D.C. Cir. Feb. 16, 2018). The result of that lawsuit

Implementation Plan (SIP) under the federal CAA. See 40 C.F.R. §§ 52.1119-52.1169; see also 42 U.S.C. § 7410(a). As such, "[t]he EPA has delegated authority to the Massachusetts DEP to administer the [federal] CAA in Massachusetts." Algonquin Gas Transmission, 2017 WL 383829, at *45.

was an out-of-court agreement between DEP and Algonquin to the following timeline: DEP promised to complete the HIA by January 2019 and to limit any subsequent adjudicatory hearings on the air permit to six months.

In keeping with the established timeline, DEP completed the HIA on January 4, 2019, "predict[ing] no substantial changes in health from direct exposures from the station itself with the exception of estimated sound levels during construction." The following week, DEP's regional Air Quality Section Chief issued a "Non-Major Comprehensive Air Quality Plan Approval" (i.e., air-permit approval) for the Weymouth station.

Petitioners in this case (described below) filed an administrative appeal to DEP's Office of Appeals and Dispute Resolution, raising a number of claims that the permit violated Massachusetts law. The Presiding Officer of that appeal dismissed some of these claims without opinion on April 11, 2019, and then, after a hearing, issued a full "Recommended Final Decision" on June 27, 2019. That decision affirmed the air permit with some revisions. On July 12, 2019, the DEP Commissioner issued a "Final Decision" adopting in full the Presiding Officer's Recommended Final Decision. In response to the Commissioner's request for clarification (on issues not relevant to this case), the Presiding Officer issued a "Recommended Final Decision on Reconsideration"

on August 5, 2019, and the Commissioner adopted this decision in full on August 7, 2019.

The three groups of petitioners all challenge DEP's approval of the Weymouth station air permit. In case 19-1794 (docketed Aug. 8, 2019), petitioners include the Town of Weymouth, several nearby municipalities, and state and local officials. In cases 19-1797 and 19-1803 (both docketed Aug. 9, 2019), petitioners are eleven and fourteen (respectively) residents of these nearby municipalities. See Mass. Gen. Laws ch. 30A, § 10A (authorizing "not less than ten persons [to] intervene in any adjudicatory proceeding . . . in which damage to the environment . . . is or might be at issue"). We have original jurisdiction³ under the Natural Gas Act, which states that:

The United States Court of Appeals for the circuit in which a facility subject to [15 U.S.C. § 717f] is proposed to be constructed, expanded, or operated shall have original and exclusive jurisdiction over any civil action for the review of an order or action of a Federal agency (other than [FERC]) or State administrative agency acting pursuant to Federal law to issue, condition, or deny any permit, license, concurrence, or approval . . . required under Federal law, other than the Coastal Zone Management Act of 1972

³ No party has argued that any justiciability barrier (mootness, ripeness, finality, standing, etc.) precludes our review of these cases. See generally *Berkshire Envtl. Action Team, Inc. v. Tenn. Gas Pipeline Co.*, 851 F.3d 105 (1st Cir. 2017) (addressing the finality requirement under 15 U.S.C. § 717r(d)(1)). We are satisfied that there are no such barriers.

15 U.S.C. § 717r(d)(1). Here, we review "an order" of a "State administrative agency" (DEP) "acting pursuant to Federal law" (the CAA⁴) "to issue" a "permit" required by that federal law. We consolidated these cases, and Algonquin intervened as a respondent. As required by the Natural Gas Act, we expedited our review. See 15 U.S.C. § 717r(d)(5).

II.

A. Standard of Review

The Natural Gas Act does not provide a standard of review, so we are left to look elsewhere. The parties dispute, however, where we should look. According to petitioners, we can consult the federal Administrative Procedure Act (APA), 5 U.S.C. § 706(2), and "borrow" its standards of review. And several other circuits have done so in reviewing state approval of natural-gas facilities. See Del. Riverkeeper Network v. Sec'y Pa. Dep't of Env'tl. Prot., 833 F.3d 360, 377 (3d Cir. 2016); AES Sparrows Point

⁴ As indicated, see supra note 2, the CAA adopts a "cooperative federalism" approach, see Berkshire Env'tl. Action Team, 851 F.3d at 113, such that DEP, in enforcing the Massachusetts CAA, is in fact acting pursuant to the federal CAA. This also provides the federal "ingredient" for purposes of Article III jurisdiction. See Osborn v. Bank of U.S., 22 U.S. (9 Wheat.) 738, 823 (1824) ("[W]hen a question to which the judicial power of the Union is extended by the constitution, forms an ingredient of the original cause, it is in the power of Congress to give the Circuit Courts jurisdiction of that cause, although other questions of fact or of law may be involved in it."); see also Verlinden B.V. v. Cent. Bank of Nigeria, 461 U.S. 480, 494-95 (1983) (describing Article III "arising under" jurisdiction).

LNG, LLC v. Wilson, 589 F.3d 721, 727 (4th Cir. 2009); Islander E. Pipeline Co. v. Conn. Dep't of Env'tl. Prot., 482 F.3d 79, 94 (2d Cir. 2006). But DEP says the Massachusetts APA, Mass. Gen. Laws ch. 30A, § 10A, applies. This makes some sense, as we will be mostly looking to Massachusetts substantive law to resolve the issues in this case, and because the federal APA by its terms does not apply to states. See 5 U.S.C. § 551(1).

Fortunately, the issue appears to be strictly academic in this case, for no party has demonstrated how it would make any difference whether the Massachusetts APA or federal APA applies. As relevant here, the standards do not vary materially, so we will apply those standards without worrying about their source. Cf. Friends of Buckingham v. State Air Pollution Control Bd., 947 F.3d 68, 80-82 (4th Cir. 2020) (likewise avoiding the issue where the Virginia standards matched the federal standards). As in most cases involving a decision of an administrative agency, we review formally adjudicated findings of fact for "substantial evidence," and reverse agency decisions if they are "arbitrary and capricious." Cent. Me. Power Co. v. FERC, 252 F.3d 34, 40 n.3 (1st Cir. 2001); accord Friends & Fishers of Edgartown Great Pond, Inc. v. Dep't of Env'tl. Prot., 848 N.E.2d 393, 399 (Mass. 2006). We will defer to an agency's otherwise lawful interpretation of its own regulation unless the regulation unambiguously forecloses that interpretation. See Kisor v. Wilkie, 139 S. Ct. 2400, 2414-

23 (2019) (reaffirming and clarifying Auer v. Robbins, 519 U.S. 452 (1997)); Town of Brookline v. Comm'r of Dep't of Env'tl. Quality Eng'g ("Brookline II"), 497 N.E.2d 9, 15 (Mass. 1986).

B. Discussion

1. Best Available Control Technology

All parties agree that, under Massachusetts regulations, the Weymouth station, a non-major source of air pollution, must employ the Best Available Control Technology (BACT) for reducing NO_x emissions. See 310 Mass. Code Regs. § 7.02(8)(a)(2). BACT is defined as:

[A]n emission limitation based on the maximum degree of reduction of any regulated air contaminant emitted from or which results from any regulated facility which the Department, on a case-by-case basis taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such facility through application of production processes and available methods, systems and techniques for control of each such contaminant. The best available control technology determination . . . may include a design feature, equipment specification, work practice, operating standard, or combination thereof.

Id. § 7.00; see also 42 U.S.C. § 7479(3). BACT is distinct from more stringent standards, like Lowest Achievable Emission Rate (LAER), in that BACT takes into consideration economic factors (i.e., costs). See 310 Mass. Code Regs. § 7.00.

The Environmental Protection Agency (EPA) has established a five-step "top-down" approach for determining BACT, see EPA, New Source Review Workshop Manual: Prevention of Significant Deterioration and Nonattainment Area Permitting B.5-B.6 (1990)⁵ [hereinafter NSR Workshop Manual], and DEP has adopted this approach, see DEP, Best Available Control Technology (BACT) Guidance: Air Pollution Control Requirements for Construction, Substantial Reconstruction or Alteration of Facilities that Emit Air Contaminants 3 (2011) [hereinafter BACT Guidance]. The five steps are:

- STEP 1: IDENTIFY ALL CONTROL TECHNOLOGIES.
- STEP 2: ELIMINATE TECHNICALLY INFEASIBLE OPTIONS.
- STEP 3: RANK REMAINING CONTROL TECHNOLOGIES BY CONTROL EFFECTIVENESS.
- STEP 4: EVALUATE MOST EFFECTIVE CONTROLS AND DOCUMENT RESULTS.
- STEP 5: SELECT BACT.

NSR Workshop Manual, supra, at B.6.

Algonquin's air permit application applied the five-step approach and concluded that the SoLoNOx turbine was the BACT for NO_x for the Weymouth station. DEP agreed. Petitioners argue that

⁵ Despite being marked as a "draft," this document is frequently cited by courts as authoritative on BACT issues. See, e.g., Sierra Club v. EPA, 499 F.3d 653, 654 (7th Cir. 2007).

that conclusion (or at least the analysis getting there) was flawed in two respects: (1) it excluded consideration of using an electric motor instead of the SoLoNO_x turbine, and (2) it wrongly determined that a Dry Low NO_x turbine plus a selective catalytic reduction (SCR) was not cost feasible. We address each argument in turn.

a. Electric Motor

Algonquin's air-permit application initially made no mention of an electric-motor option. But during the adjudication process, petitioners asserted that an electric motor would be a more effective and economically feasible alternative to the SoLoNO_x turbine. Essentially, the petitioners proposed that the compressor station could be hooked up to the existing electrical grid and create the necessary pressure without burning any natural gas. This would eliminate all emissions of NO_x from the Weymouth station. And at least some compressor stations in other parts of the country operate with such an electric motor.

Algonquin revised its application in May 2018 to address the feasibility of an electric motor. Algonquin explained that this option was excluded for several reasons, including the high cost of upgrading the existing power infrastructure. Algonquin also cited the fact that FERC's environmental assessment concluded that an electric motor would not offer a significant environmental advantage over the proposed gas-fired turbine. DEP staff accepted

Algonquin's exclusion, relying on FERC's assessment and concededly not making an independent determination for purposes of BACT.

Algonquin and DEP refocused their position before the Presiding Officer, arguing that the electric-motor option was properly excluded from Step 1 of the BACT analysis as a project "redesign." Per the NSR Workshop Manual, Step 1 is a wide-ranging process, in which applicants "should initially identify all control options with potential application to the emissions unit under review." NSR Workshop Manual, supra, at B.7 (emphasis added). However, a technology may be excluded from Step 1 if it would "redefine the source." Helping Hand Tools v. EPA, 848 F.3d 1185, 1194 (9th Cir. 2016). "In a classic and simple example, a coal-burning power plant need not consider a nuclear fuel option as a 'cleaner' fuel because it would require a complete redesign of the coal-burning power-plant." Id. (citing Sierra Club v. EPA, 499 F.3d 653, 655 (7th Cir. 2007)); see also Friends of Buckingham, 947 F.3d at 74, 82-85 (analyzing whether an electric motor would redefine the source of a proposed gas-fired compressor station turbine).

The Presiding Officer was not persuaded by the "redesign" argument. She stated that DEP erred in relying on FERC's environmental assessment and that DEP should have included "all control technologies in the BACT analysis" (emphasis in original). She left unresolved whether the electric motor would

in fact constitute a redesign if properly analyzed as such by DEP staff.⁶ Instead, she determined that, "even assuming use of an electric driven compressor would not redefine the source," the electric motor would properly be excluded at Step 4 of the BACT analysis as not cost feasible.

The support for the Presiding Officer's cost-feasibility conclusion came largely from the testimony of Algonquin witness William Welch. Welch testified, with respect to the redesign issue, that an electric motor at the Weymouth station would require substantial infrastructure investment, including construction of a new substation and the laying of half a mile of underground electric transmission line. In total, Welch estimated that these upgrades could cost between \$9 million and \$12 million. The Presiding Officer acknowledged that "there is no corroboration of these numbers, and [that] they seem to be based on several conversations or meetings at which no notes apparently were taken." However, she stated, "there is no evidence disputing them," since petitioners' witness did not take into account these

⁶ Neither DEP nor Algonquin argue on this appeal that we can affirm on the ground that an electric motor would constitute a redesign. Nor could they, since DEP's final decision does not rest on that ground. See Motor Vehicle Mfrs. Ass'n of U.S., Inc. v. State Farm Mut. Auto. Ins. Co., 463 U.S. 29, 50 (1983) (citing SEC v. Chenery Corp., 332 U.S. 194, 196 (1947)); NSTAR Elec. Co. v. Dep't of Pub. Utils., 968 N.E.2d 895, 900-01 (Mass. 2012). Algonquin reserves the right to reassert its redesign argument on remand to DEP.

infrastructure costs in his own cost estimates. She thus "infer[red] that the total cost for this infrastructure would be substantial." So, she concluded, Algonquin's evidence, "though scant and uncorroborated by any documentation, at least provides some basis to infer that" the electric motor would not be cost feasible.

Petitioners challenge that conclusion on three grounds: (1) they assert that "scant and uncorroborated" evidence of infrastructure costs cannot be considered "substantial evidence," as would be needed for us to affirm an agency's finding of fact; (2) they argue that neither the Presiding Officer nor anyone else at DEP ever provided a full Step 4 analysis as required by DEP's BACT Guidance; and (3) they contend that the Presiding Officer raised the Step 4 issue sua sponte after the hearing without providing an opportunity for the parties to weigh in, thus denying them their Due Process rights and violating Massachusetts law.

We easily dispatch with the first of these arguments. Welch offered an estimate that does not seem irrational on its face, and petitioners offered no contrary estimate of what must be a real cost. So while the Presiding Officer fairly noted the unimpressive support for the estimate, we cannot say that the evidence was insubstantial as a matter of law. See Bath Iron Works Corp. v. U.S. Dep't of Labor, 336 F.3d 51, 56 (1st Cir. 2003) (recognizing that, under the "substantial evidence" standard, "we

will accept the findings and inferences drawn" by an agency so long as they are not "irrational," meaning that "the record contains 'such relevant evidence as a reasonable mind might accept as adequate to support a conclusion'" (quoting Barker v. U.S. Dep't of Labor, 138 F.3d 431, 434 (1st Cir. 1998), and Sprague v. Dir., Office of Workers' Comp. Programs, U.S. Dep't of Labor, 688 F.2d 862, 865 (1st Cir. 1982))).

Petitioners' second argument fares better.⁷ According to the NSR Workshop Manual, "[c]ost effectiveness is the economic criterion used to assess the potential for achieving an objective at least cost. Effectiveness is measured in terms of tons of pollutant emissions removed." NSR Workshop Manual, supra, at B.36. So at Step 4 of the BACT analysis, the agency (or the applicant) must calculate the cost effectiveness of the most effective technology remaining after Step 3 and eliminate that technology if it falls above a predetermined cost-feasibility threshold. For NO_x, DEP has established that technologies falling in (or below) the range of \$11,000 to \$13,000 per ton of NO_x removed per year will be considered cost feasible. BACT Guidance, supra, at 5.

DEP never calculated cost effectiveness for an electric motor, nor did it compare that figure to the range established in

⁷ Because we vacate DEP's decision on this ground, see infra subpart II(C), we need not address petitioners' third argument or Algonquin's response that petitioners waived that particular argument by not moving for reconsideration.

its BACT Guidance. And even in their briefs before us, DEP and Algonquin do not attempt to perform the required mathematical calculations. Instead, DEP states that "the full calculation was unnecessary because the infrastructure costs were so obviously substantial." Effectively, DEP argues that a \$9-12 million infrastructure cost is so high that the cost effectiveness, if calculated, would necessarily exceed the \$13,000-per-ton cutoff.

Without a more detailed explanation by DEP, we cannot be so sure. According to the NSR Workshop Manual, "[c]ost effectiveness calculations can be conducted on an average, or incremental basis." NSR Workshop Manual, supra, at B.36. Starting with average cost effectiveness, the manual provides us with the following formula:

$$\begin{aligned} &\text{Average cost Effectiveness (in dollars per} \\ &\text{ton removed) =} \\ &\quad (\text{Control option annualized cost}) / \\ &\quad (\text{Baseline emissions rate} - \text{Control option} \\ &\quad \text{emissions rate}) \end{aligned}$$

Id. at B.37 (mathematical notations reformatted). And, to annualize costs for capital investments, the manual tells us to multiply up-front costs by:

$$\begin{aligned} &(\text{real interest rate}) * \\ &(\text{1} + \text{real interest rate})^{(\text{economic life of} \\ &\text{equipment in years})} / \\ &((\text{1} + \text{real interest rate})^{(\text{economic life of} \\ &\text{equipment in years})} - \text{1}) \end{aligned}$$

Id. at b.10 (mathematical notations reformatted).

When we attempt to solve for average cost effectiveness, it becomes apparent that the record before us does not contain enough information. As to the numerator, we are assuming that the infrastructure costs of the electric motor would be between \$9 million and \$12 million based on Welch's testimony. But we cannot annualize that figure because we do not know the lifespan of the equipment. The NSR Workshop Manual tells us that "[t]he economic life of a control system typically varies between 10 to 20 years and longer," id., but that hardly narrows things. We also do not know what interest rate DEP would use. The manual says that "[t]he value used in most control analyses is 10 percent," id. at b.11, but again this is not a categorical pronouncement. So we cannot tell what the annualized cost of the electric motor infrastructure would be. We also have no information on the annual operating expenses for the electric motor, although anything above zero would be helpful to DEP in this exercise.

Even more difficult is the denominator. We know that the emissions rate for the electric motor is zero, but the record is incomplete as to what the baseline emissions rate would be. According to Algonquin's air-permit application, the "Base Case" is "Good Combustion Practices" (presumably a gas-fired turbine

that, unlike SoLoNOx, employs no control of NO_x emissions).⁸ But the application does not give a value for "Potential NO_x Emissions" for this option. The control technology just above "Good Combustion Practices" is "Water Injection," which the application tells us has an emissions rate of "20 to 42 ppm (water)." So, it is probably safe to assume that the baseline emissions rate is at least that high, and probably higher. We are also not provided with a formula for converting ppm (parts per million) to tons per year. We know that the SoLoNOx turbine will result in 10.03 tons of NO_x per year and that it has an emissions rate of 9 ppm, so for ballparking purposes a one-to-one conversion would seem to be good enough (although we must accept a wide margin of error, especially since we do not know what "(water)" means).

So, if we assume, reasonably, that the interest rate is 10% and that the lifespan of the electric motor infrastructure is twenty years, then the average cost effectiveness of a \$12 million electric motor would be below \$13,000 per ton per year if the "Good Combustion Practices" emissions exceed 108 tons per year.⁹ For a

⁸ The electric motor, unlike the SCR discussed below, is a process-control technology, rather than an add-on technology (i.e., the compressor station needs either an electric motor or a SoLoNOx turbine, but not both). As such, the baseline emissions rate is not the emissions rate of the SoLoNOx turbine.

⁹ $\$13,000 \text{ per ton} \geq (\$12,000,000 * 0.1 * (1.1^{20}) / (1.1^{20} - 1)) / (\text{Baseline emissions rate} - 0).$

$\text{Baseline emissions rate} \geq (\$12,000,000 * 0.1 * (1.1^{20}) / (1.1^{20} - 1)) / (\$13,000 \text{ per ton}).$

$\text{Baseline emissions rate} \geq 108.42 \text{ tons}.$

\$9 million motor, that value would drop to 81 tons per year.¹⁰ These values are higher than the 42 ppm for "Water Injection" (as we expected they would be), but not so high as to be unthinkable, given what we know from this incomplete record.¹¹

Turning to incremental cost effectiveness, we run into similar, though different, problems. The NSR Workshop Manual gives us this formula:

Incremental Cost (in dollars per incremental ton removed) =
 (Total costs (annualized) of control option - Total costs (annualized) of next control option) /
 (Next control option emission rate - Control option emissions rate)

Id. at B.41 (mathematical notations reformatted).

Here the "control option" is the electric motor, and the "next control option" is the SoLoNOx turbine. And we know the denominator will be 10.03 tons (10.03 minus zero). But we run

¹⁰ $\$13,000 \text{ per ton} \geq (\$9,000,000 * 0.1 * (1.1^{20}) / (1.1^{20} - 1)) / (\text{Baseline emissions rate} - 0).$

$\text{Baseline emissions rate} \geq (\$9,000,000 * 0.1 * (1.1^{20}) / (1.1^{20} - 1)) / (\$13,000 \text{ per ton}).$

Baseline emissions rate $\geq$ 81.32 tons.

¹¹ To illustrate how much wiggle room there is in these numbers, we can adjust our assumptions to a 1% interest rate and a fifty-year equipment lifespan. At that point, a \$9 million electric motor would be cost feasible if the uncontrolled emissions rate is above 17.7 tons per year (which, based on the "Water Injection" figures, it almost certainly is).

$\$13,000 \text{ per ton} \geq (\$9,000,000 * 0.01 * (1.01^{50}) / (1.01^{50} - 1)) / (\text{Baseline emissions rate} - 0).$

$\text{Baseline emissions rate} \geq (\$9,000,000 * 0.01 * (1.01^{50}) / (1.01^{50} - 1)) / (\$13,000 \text{ per ton}).$

Baseline emissions rate $\geq$ 17.66 tons.

into the same problems as before with annualizing the costs of the electric motor, and more importantly, we have no information from the record of what the costs -- annual or capital -- are for the SoLoNOx turbine. Indeed, Algonquin's application includes a line-item cost breakdown of the SCR (discussed below), but in the column for SoLoNOx, the fields are all blank. Sticking with our ballparking approach and assuming a 10% interest rate and twenty-year lifespan on the electric motor (and zero costs for the electric motor beyond capital expenses), a \$9 million electric motor would be cost feasible if the annualized SoLoNOx costs (factoring in capital investments and operating costs) are \$926,747 or higher.¹² The actual costs for SoLoNOx may in fact be far less than that, but not so "obviously" that we can shrug off the lack of data in the record. And, in any event, it is DEP's job, not ours, to do these calculations properly. See Motor Vehicle Mfrs. Ass'n of U.S., Inc. v. State Farm Mut. Auto. Ins.

¹² $\$13,000 \text{ per ton} \geq ((\$9,000,000 * 0.1 * (1.1^{20}) / (1.1^{20} - 1)) - \text{annualized SoLoNOx costs}) / (10.03 \text{ tons} - 0).$

$\text{Annualized SoLoNOx costs} \geq ((\$9,000,000 * 0.1 * (1.1^{20}) / (1.1^{20} - 1)) - (\$13,000 \text{ per ton} * 10.03 \text{ tons})).$

$\text{Annualized SoLoNOx costs} \geq \$926,746.62.$

With a 1% interest rate and a fifty-year lifespan, see supra note 11, the \$9 million motor would be cost feasible if the annualized SoLoNOx costs exceed \$99,225.

$\$13,000 \text{ per ton} \geq ((\$9,000,000 * 0.01 * (1.01^{50}) / (1.01^{50} - 1)) - \text{annualized SoLoNOx costs}) / (10.03 \text{ tons} - 0).$

$\text{Annualized SoLoNOx costs} \geq ((\$9,000,000 * 0.01 * (1.01^{50}) / (1.01^{50} - 1)) - (\$13,000 \text{ per ton} * 10.03 \text{ tons})).$

$\text{Annualized SoLoNOx costs} \geq \$99,224.58.$

Co., 463 U.S. 29, 50 (1983) ("It is well-established that an agency's action must be upheld, if at all, on the basis articulated by the agency itself." (citing SEC v. Chenery Corp., 332 U.S. 194, 196 (1947))); NSTAR Elec. Co. v. Dep't of Pub. Utils., 968 N.E.2d 895, 900-01 (Mass. 2012).

Algonquin tries to paper over the gaps in the record by pointing to something for which there is ample evidence: the costs for the SCR. As will be discussed in the next section, the Presiding Officer found that the SCR/turbine combination was not cost feasible. And, based on Algonquin's line-item analysis in its application, the total capital costs for SCR were \$1,432,058, which Algonquin translated into \$135,176 annualized. So, Algonquin reasons, a technology with a \$9-12 million capital cost must be even more infeasible.

We consider the comparison to the SCR unhelpful for two reasons. First, SCR is an add-on technology, and, as will be discussed shortly, the calculations for cost effectiveness for add-on technologies differ from those for process-control technologies like the electric motor. See also supra note 8. Second, Algonquin compares only one variable -- capital costs -- where the formulae encompass multiple variables. Even assuming the lifespan and annual operating costs of each technology are identical, we know that the electric motor is more effective at reducing NO_x emissions than the SCR. So the denominator of each

formula (average and incremental cost effectiveness) would be higher for the electric motor, thus offsetting (at least in part) the higher numerator.

We concede that our own calculations are not obviously correct. The problem for the DEP and Algonquin is that no one has provided a basis for concluding that our calculations are so obviously incorrect as to obviate the need for any calculation at all by Algonquin or DEP. The record does not even contain a Fermi estimate¹³ fixing the magnitude of the quotient above the regulatory cost-effectiveness cut-off.

The bottom line is this: DEP's established BACT protocol requires a cost-effectiveness analysis before eliminating a technology at Step 4, and the results of such an analysis do not strike us as so obvious as to overlook as harmless DEP's failure either to follow that protocol or at least do enough to make it clear that following the protocol would eliminate the electric motor as a cost-effective option. "An agency may not . . . depart from a prior policy sub silentio or simply disregard rules that are still on the books." FCC v. Fox Television Stations, Inc., 556 U.S. 502, 515 (2009); see also Nat'l Env'tl. Dev. Ass'n's Clean Air Project v. EPA, 752 F.3d 999, 1009 (D.C. Cir. 2014) ("[A]n

¹³ See Robert N. Ronau, Number Sense, 81 Mathematics Tchr. 437, 439-40 (1988). See generally Hans Christian von Baeyer, The Fermi Solution: Essays on Science (1993).

agency action may be set aside as arbitrary and capricious if the agency fails to 'comply with its own regulations.'" (quoting Environmental, LLC v. FCC, 661 F.3d 80, 85 (D.C. Cir. 2011)); Tofias v. Energy Facilities Siting Bd., 757 N.E.2d 1104, 1111 (Mass. 2001); Town of Northbridge v. Town of Natick, 474 N.E.2d 551, 556 (Mass. 1985). Thus, we find that DEP's final decision excluding the electric motor on this ground was arbitrary and capricious.

b. Selective Catalytic Reduction

Unlike the electric motor, the SCR was analyzed in Algonquin's application. According to the application, "SCR is a post-combustion gas treatment process in which NH₃ [ammonia] is injected into the exhaust gas upstream of a catalyst bed." SCR can reduce NO_x emissions from a gas-fired turbine like SoLoNO_x by up to 90%.

In Step 3 of the BACT analysis, Algonquin's application ranked the SCR as the most effective technology at reducing NO_x emissions, and the only technology included that outranked SoLoNO_x. However, Algonquin excluded the SCR at Step 4 as not cost feasible. Using the 9-ppm SoLoNO_x emissions rate as a baseline, Algonquin calculated the SCR's cost effectiveness at \$41,541 per ton of NO_x removed, which well exceeded DEP's \$11,000-\$13,000 range. DEP agreed, leaving SoLoNO_x as the BACT.

Petitioners argued before the Presiding Officer, and now before us, that Algonquin incorrectly calculated the SCR's cost effectiveness. They claim that Algonquin should have used a baseline emissions rate of 25 ppm, which represents the emissions rate of older models of Dry Low NO_x turbines. Put differently, petitioners fault Algonquin for considering only the SCR added to its preferred technology, SoLoNO_x, without considering the combination of SCR plus a cheaper, less effective turbine.

According to petitioners, the SCR-plus-older-turbine combination would be more effective at reducing emissions than SoLoNO_x alone and would have a cost effectiveness of \$14,483. That value is still over the \$13,000 threshold, but petitioners go on to argue that DEP set that threshold in 1990 and that it should be updated for inflation at a minimum.¹⁴ So adjusting, petitioners claim, would make the SCR/turbine combination cost feasible.

We need not reach the inflation issue because we agree with DEP that 9 ppm was the correct baseline under the applicable BACT guidance.¹⁵ The NSR Workshop Manual addresses this situation under the instructions for average cost effectiveness: "When calculating the cost effectiveness of adding post process

¹⁴ The Presiding Officer rejected petitioners' argument in this case but recommended that DEP consider updating its thresholds for inflation going forward.

¹⁵ Petitioners do not argue that an inflation adjustment alone would make \$41,541 per ton cost feasible.

emissions controls to certain inherently lower polluting processes, baseline emissions may be assumed to be the emissions from the lower polluting process itself. In other words, emission reduction credit can be taken for use of inherently lower polluting processes." NSR Workshop Manual, supra, at B.37. The SCR is a post-process emissions control, and SoLoNOx is an inherently lower polluting process (as compared to other Dry Low NO_x turbines), so SoLoNOx's 9-ppm emissions rate is the proper baseline.

If there was any doubt as to whether the above rule applies here, DEP's 2011 BACT Guidance offers an even more on-point case study. It says:

In the recent past, boiler manufacturers have developed "ultra-low NO_x burners" (UNLBs) which can achieve an oxides of nitrogen emission rate of 9 parts per million (ppm). Before the advent of UNLBs, BACT for NO_x for boilers with capacity above approximately 50 million British thermal units per hour was achieved by the use of Selective Catalytic Reduction (SCR) to reduce NO_x emissions to 5 ppm, accompanied by a 5 ppm ammonia (NH₃) slip. When analyzing the incremental cost of using SCR to reduce the 9 ppm NO_x emission rate attained by UNLB to reach a 5 ppm NO_x emission limit, it became readily apparent that requiring SCR with added NH₃ emissions would be economically infeasible, on a dollar-per-ton-of-pollutant-removed basis. Therefore, NO_x BACT for this category of emission units is now 9 ppm, with no NH₃ emissions.

BACT Guidance, supra, at 5 (footnote omitted). Algonquin and DEP followed this guidance to a T, so we can hardly call DEP's decision arbitrary and capricious.¹⁶

Petitioners argue that DEP's approach yields undesirable results. "Algonquin's 9-ppm turbine may be state-of-the-art," they say, "but the BACT process is focused not on technological progress for its own sake. . . . If pairing two older or less effective technologies will achieve a better result than cutting edge, standalone technology, BACT favors the former."

Perhaps. But on the other hand, there may be good policy reasons for DEP's current approach. Requiring applicants to fully analyze every combination of add-on technology and process-control technology, including different models of the same technology, would make an already drawn out and expensive process even more so. And, as the case study shows, exclusion of the SCR in this situation may result in slightly higher NO_x emissions, but it also results in lower emissions of ammonia, another air pollutant.

¹⁶ Petitioners attempt to distinguish the NSR Workshop Manual rule by arguing that the phrase "inherently lower polluting processes" does not apply to newer models of an existing technology like SoLoNO_x, which provide "incremental refinement." But as the BACT Guidance case study suggests, that is not necessarily the case. See also 310 Mass. Code Regs. § 7.00 ("The best available control technology determination . . . may include a[n] . . . equipment specification . . ."). The better understanding of the phrase "inherently lower polluting processes," as DEP has interpreted it, is any control technology yielding a lower emissions rate that is not an add-on technology (i.e., a process-control technology).

Lastly, promoting technological development of cleaner technologies may indeed be a goal of the BACT framework. Even if the application of that technology in the instant case does not reduce emissions, the fact that there is an economic incentive for manufacturers to develop cleaner technologies may benefit the state as a whole by, for example, improving the New Source Performance Standards (NSPS) applicable to other facilities. See 42 U.S.C. § 7411; 310 Mass. Code Regs. § 7.00 (citing 40 C.F.R. pt. 60).

In any event, our task is not to pick the better policy. As DEP points out, nothing in its rules or regulations requires applicants to consider every possible combination of older, dirtier technologies in order to achieve the lowest possible emissions outcome.

Finally, we note that petitioners argue that Algonquin used the wrong formula in calculating the SCR's cost effectiveness, saying that Algonquin "focused only on incremental costs when the analysis required demands a focus on average cost." Petitioners miss the point. The NSR Workshop Manual says that, for add-on technologies, the baseline for the average-cost-effectiveness calculation is the emissions rate for the technology to which it is being added (here, SoLoNOx). Incremental cost effectiveness compares one control technology to the next most effective technology (again, SoLoNOx). So for the SCR, the two formulae

would yield the same result of \$41,541 per ton. It matters not whether Algonquin called this "average" or "incremental" cost effectiveness.

2. Toxic Emissions

Petitioners raise two arguments concerning the Weymouth station's emissions of toxic air pollutants. According to DEP, the Weymouth station's SoLoNO_x turbine may emit up to 0.91 tons of toxic pollutants (combined) per year, with up to 0.41 tons of that being attributable to formaldehyde emissions. Formaldehyde is a genotoxic carcinogenic chemical that can form from incomplete combustion of natural gas. Incomplete combustion can occur at lower temperatures, so formaldehyde can be a particular problem for Dry Low NO_x turbines.

Since the 1980s, DEP has handled air toxics through Allowable Ambient Limits (AAL) and Threshold Effects Exposure Limits (TEL).¹⁷ See DEP Office of Research & Standards, Methodology for Updating Air Guidelines: Allowable Ambient Limits (AALS) and Threshold Effects Exposure Limits (TELS) 1-2 (2011); see also DEP, Ambient Air Toxics Guidelines, <https://www.mass.gov/files/documents/2017/11/07/Ambient%20Air%20Toxics%20Guidelines.pdf>. TEL

¹⁷ For context, EPA regulates air toxics at the federal level through the National Emission Standards for Hazardous Air Pollutants (NESHAP). See 42 U.S.C. § 7412. Petitioners do not argue that the Weymouth station will exceed or in any way implicate the NESHAP for formaldehyde or any other pollutant.

is a 24-hour-based measurement reflecting toxic concentrations at a low-enough level that no health effects at all, even noncarcinogenic effects like eye irritation, "are expected in the population, including sensitive populations, over a lifetime of continuous exposure." In common parlance, the record labels the risk at these levels "de minimis; i.e., the added risk is so small that it makes no meaningful difference." AAL is an annual measurement focused on risks of cancer in humans and is determined by the lower of the TEL and the Non-Threshold Effects Exposure Limits (NTEL). For certain air toxics, scientists consider any non-zero concentration in the air to produce some risk of cancer in humans, see Brookline II, 497 N.E.2d at 11, so NTEL represents a de minimis cancer risk rather than no risk at all.

We turn now to each of the petitioners' arguments concerning AAL and TEL.

a. Background Toxic Levels

Petitioners claim that DEP violated the Massachusetts CAA and associated regulations because it failed to account for background levels of air toxics near the Weymouth station when considering AAL and TEL. They point to three chemicals: formaldehyde, benzene, and acrolein. They accept, for purposes of this argument, but see infra section II(B)(2)(b), that the marginal emissions from the Weymouth station for each of these air toxics fall below the AAL and TEL, but they contend that the

Weymouth emissions plus the already-existing background concentrations exceed those values. In fact, even without the Weymouth emissions, background levels from other sources in that area already exceed the AAL and TEL for these three air toxics, such that any additional emissions would, as petitioners argue, contribute to an exceedance. Since Algonquin and DEP ignored this cumulative effect and only compared the marginal increase to the AAL and TEL, petitioners claim the air permit violates Massachusetts law.

In support of their position, petitioners point us to two Massachusetts regulations. First, they point us to the definition of "air pollution," which says in full:

AIR POLLUTION means the presence in the ambient air space of one or more air contaminants or combinations thereof in such concentrations and of such duration as to:

- (a) cause a nuisance;
- (b) be injurious, or be on the basis of current information, potentially injurious to human or animal life, to vegetation, or to property; or
- (c) unreasonably interfere with the comfortable enjoyment of life and property or the conduct of business.

310 Mass. Code Regs. § 7.00 (second emphasis added). Second, the "General Regulations to Prevent Air Pollution" state:

No person owning, leasing, or controlling the operation of any air contamination source shall willfully, negligently, or through failure to provide necessary equipment or to take necessary precautions, permit any emission for said air contamination source or

sources of such quantities of air contaminants which will cause, by themselves or in conjunction with other air contaminants, a condition of air pollution.

Id. § 7.01(1) (emphasis added). Because these regulations contemplate "combinations" of air contaminants, or contaminants "in conjunction" with one another, petitioners say that DEP is mandated to consider background levels of air toxics.

DEP responds that its "longstanding policy" is to compare only emissions from the new source to the applicable AAL and TEL, without regard to background levels. According to its 1989 policy statement, DEP requires new or modified sources of air contaminants to "assess, through computer modeling, the ambient concentrations caused solely by that source's emissions," and "[t]hese modelled concentrations are then compared to the AALs to determine whether there may be potentially unacceptable risks associated with that particular source." DEP Div. of Air Quality Control, Air Toxics Implementation Update 2 (1989) [hereinafter 1989 Air Toxics Update] (emphasis added). DEP calls the AAL and TEL "screening guidelines," whereby new sources that exceed these values are subject to "further evaluation" and new sources below these values receive no further scrutiny. And, DEP points out, most states have a similar two-step approach to air toxics, whereby

step one (here AAL and TEL comparison) is for screening purposes only.¹⁸

Petitioners argue, in substance, that to interpret the regulation's "in conjunction with" language as not requiring an assessment of the cumulative level of background and proposed new emissions would be to adopt an irrational or absurd interpretation of the regulation. We disagree, finding it perfectly rational to use a low threshold to identify those instances in which additional, cumulative impacts need be examined. Consider, for the sake of analogy, a baking hobbyist who plans on making a pie for a family reunion. The baker knows he has sugar, but he is not certain how much, and he may not even have the full cup needed for the recipe. Before he can start baking, his neighbor knocks on his door and asks to borrow some sugar. And, to make this analogy more like this case, imagine that measuring the baker's current supply of sugar would be "resource intensive" for the baker and his neighbor at that particular moment when the neighbor needs the sugar.

It would be a perfectly reasonable response in this scenario for the baker to ask his neighbor how much sugar he needs. If the neighbor wants only a teaspoon, the baker might simply give

¹⁸ In practice, it appears, that applicants regard surviving step-one screening as essential, given that DEP Air Quality Section Chief Thomas Cushing could recall no instance in which DEP received an application for a project that exceeded an AAL or TEL.

it to the neighbor without first measuring his own supply. A teaspoon is likely too little to make a difference between having and not having a cup, and even if it would, the practical effect will not be noticeable. But if the neighbor wants a quarter cup, then the baker might decide to spend the resources to measure his supply before agreeing to the neighbor's request.

This is in essence the purpose of AAL and TEL. Before deciding whether to require that the resources be spent to measure the current cumulative amount of air toxics, DEP asks whether the amount to be produced by the new source is like the teaspoon or like the quarter cup. If it is like the teaspoon, DEP decides that it is unlikely to make a practical difference. And here DEP's case is perhaps even stronger than the pie example, because petitioners have not pointed us to any other cap on how much pollutant is too much cumulatively (other than NESHAP, see supra note 17, and petitioners do not allege that the Weymouth station is even close to violating that standard). In other words, it would be as if the pie recipe said "roughly one cup, depending on how sweet you want it."

Petitioners, for their own analogy, point us to California's rules for automobile tailpipe emissions. See Motor Vehicle Mfrs. Ass'n of U.S., Inc. v. N.Y. Dep't of Env'tl. Conservation, 17 F.3d 521, 524-25 (2d Cir. 1994) (explaining California's unique exemption from federal preemption over mobile-

source regulations). "[P]rior to the creation of California's stringent air pollution regulations," petitioners tell us, "daily emissions from millions of . . . vehicles resulted in a chronic condition of air pollution -- smog -- in the City of Los Angeles . . . even though the incremental emissions from each of those individual vehicles undoubtedly represented a tiny contribution to the overall problem, and a de minimis risk to human health."

The tailpipe example would be like our hypothetical example if the baker had twelve neighbors at his door all asking for sugar. In that case, he might want to measure his supply even if each neighbor wanted only a teaspoon. But surely there are not "millions" of proposed stationary sources of formaldehyde, benzene, and acrolein around Weymouth. It is completely rational for DEP to treat this limited number of sources differently for screening purposes than California treats personal automobiles. Cf. 310 Mass. Code Regs. § 7.02(2)(b)(7) (excluding stationary sources not capable of emitting one ton or more of any pollutant from the air-permit requirement). Moreover, there are plenty of other examples of air-pollution regulatory schemes that similarly screen out de minimis sources. In addition to other states' rules on air toxics, DEP points us to the Significant Impact Limits (SILs) used by EPA when assessing compliance with the National Ambient Air Quality Standards (NAAQS). See Sierra Club v. EPA,

705 F.3d 458, 461 (D.C. Cir. 2013) (explaining SILs); see also Sierra Club v. EPA, 955 F.3d 56, 58-60 (D.C. Cir. 2020); 40 C.F.R. § 51.166(b) (23) (i) (setting net-emissions-increase levels deemed "[s]ignificant" for purposes of Prevention of Significant Deterioration (PSD)). The fact that some regulatory programs take a different approach does not make these programs irrational.

Of course, the fact that DEP's two-step approach is rational does not dispense with petitioners' argument that the Massachusetts regulations compel consideration of background levels. Nevertheless, we defer to the agency's interpretation. The regulations to which petitioners point us, 310 Mass. Code Regs. §§ 7.00, 7.01(1), are broad regulations concerning all air pollution generally, not just air toxics. See Town of Brookline v. Comm'r of Dep't of Env'tl. Quality Eng'g ("Brookline I"), 439 N.E.2d 792, 799 (Mass. 1982) (giving DEP discretion to interpret 310 Mass. Code Regs. § 7.01); see also Brookline II, 497 N.E.2d at 13 ("The Legislature has granted [DEP] broad authority."). And we do not think that the language from those general regulations unambiguously forecloses DEP's approach to air toxics. The phrases "in conjunction with other air contaminants," 310 Mass. Code Regs. §§ 7.01(1), and "combinations thereof," id. § 7.00, might mean, as petitioners argue, that DEP should consider background levels of a given pollutant. Or they might reasonably be read as referring to situations where two different air pollutants produce a chemical

reaction in the air, as with ozone precursors, see Ill. State Chamber of Commerce v. EPA, 775 F.2d 1141, 1143 & n.3 (7th Cir. 1985), in which case the regulations do not compel petitioners' approach. Since the text is ambiguous, and traditional tools of construction do not resolve that ambiguity, we defer to DEP's reasonable interpretation. See Kisor, 139 S. Ct. at 2414-18; Brookline II, 497 N.E.2d at 15.

b. Startup Emissions

Petitioners also argue that the formaldehyde emissions solely from the Weymouth station will, in fact, exceed the applicable AAL and TEL. They argue that Algonquin's air-dispersion model, which showed that formaldehyde emissions would be no more than 70% of the AAL, underestimated the actual emission rate because it did not include emissions during intermittent startup events.

The proposed SoLoNOx turbine will not run continuously. Instead, it will be shut down and restarted up to 416 times per year. Normally, the turbine will employ an oxidation catalyst to reduce formaldehyde emissions, but during the time it takes the turbine to start up, this catalyst will not be fully operational, meaning formaldehyde emissions will be higher. Algonquin estimates that startups will usually last only nine minutes, though the time may be longer if a startup fails initially.

The air permit as initially drafted by DEP staff allowed for startup times up to thirty minutes. Petitioners opposed the allowed startup period before the Presiding Officer. Their witness, John Hinckley, performed his own dispersion modeling that, unlike Algonquin's initial modeling,¹⁹ accounted for startup emissions -- one model representing thirty-minute startups, and another representing nine-minute startups. Hinckley's thirty-minute model showed that formaldehyde emissions from the Weymouth station would exceed the AAL and TEL when measured at the property line as required by DEP guidance. See 1 DEP, The Chemical Health Effects Assessment Methodology and the Method to Derive Allowable Ambient Limits 21 (1990). Hinckley's nine-minute model showed an exceedance of the AAL, but not the TEL, at the property line. In response, Algonquin's witness, Justin Fickas, put together a model representing eighteen-minute startups, which also showed an exceedance of the AAL.

The Presiding Officer acknowledged that EPA's guidance does not require modeling of intermittent startups at all, but nevertheless expressed concern over the modeled exceedances. As

¹⁹ DEP policy requires an applicant to model emissions of air toxics only for sources subject to PSD, plus a few other types of facilities. See 1989 Air Toxics Update, supra, at 3. The Weymouth Station does not meet any of these criteria, but DEP exercised its discretion to request that Algonquin perform this modeling. See 310 Mass. Code Regs. § 7.02(5)(c)(6) (requiring applicants to furnish air-dispersion modeling "upon request by" DEP).

such, she recommended reducing the allowable startup time from thirty minutes to eighteen minutes, and the Commissioner adopted this recommendation. As to the fact that even the eighteen-minute model showed a concentration above the AAL, the Presiding Officer stated that "[t]he slight exceedance shown in the revised modeling beyond the fence line . . . does not, in my opinion, justify denying the permit."

Petitioners' main argument before us is straightforward: the Weymouth station will, even under the revised air permit, create an exceedance of the AAL for formaldehyde, and so the permit should have been denied, and we should vacate DEP's contrary decision as arbitrary and capricious. As its name suggests, AAL is meant to be a "limit," petitioners argue, so an exceedance should not be allowed, no matter how "slight."

DEP counters that under the applicable policy, there was no exceedance here. EPA's guidance explains that "the intermittent nature of the actual emissions associated with . . . startup/shutdown [operations] in many cases, when coupled with the probabilistic form of the standard, could result in modeled impacts being significantly higher than actual impacts would realistically be expected to be for these emission scenarios." Memorandum from Tyler Fox, Leader, Air Quality Modeling Grp., EPA, to Reg'l Air Div. Dirs., Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-Hour NO₂ National Ambient

Air Quality Standard 8 (Mar. 1, 2011), https://www.epa.gov/sites/production/files/2015-07/documents/appwno2_2.pdf. EPA thus advises against using startup modeling. See id. at 9-10; see also DEP, Modeling Guidance for Significant Stationary Sources of Air Pollution 1 (2011) (noting that DEP generally follows EPA's guidance on air modeling); cf. 40 C.F.R. § 60.8(c) ("Operations during periods of startup, shutdown, and malfunction shall not constitute representative conditions for the purpose of a performance test"). DEP relied on this guidance in not requiring Algonquin to account for startups in its application, and petitioners have not pointed to anything in DEP policy requiring a contrary rule. Although Algonquin provided additional (non-mandatory) modeling to explore the effects of startup events, such models have not been adopted into official department policy or regulations. Thus, DEP acted within its discretion when it relied on a model excluding startup emissions to find, without further evaluation, that there was no exceedance of AAL or TEL.

3. Environmental Justice Policy

Petitioners claim that DEP failed to comply with the Massachusetts Environmental Justice (EJ) Policy.

The EJ Policy, first implemented in 2002 by the Massachusetts Executive Office of Energy and Environmental Affairs, states that "all people have a right to be protected from environmental pollution and to live in and enjoy a clean and

healthful environment," regardless of "race, ethnicity, class, gender, or handicap." Environmental Justice Policy of the Executive Office of Environmental Affairs 2-3 (2002), <https://www.mass.gov/files/documents/2017/11/29/ej%20policy%202002.pdf>; see City of Brockton v. Energy Facilities Siting Bd., 14 N.E.3d 167, 171 n.9 (Mass. 2014) (describing the various iterations of the EJ Policy prior to 2014). The EJ Policy requires that agencies subject to it, including DEP, engage in "enhanced public participation" for projects that meet two criteria: (1) the project site is located within five miles (for air pollutants) of an "EJ population,"²⁰ and (2) emissions will exceed the Environmental Notification Form (ENF) threshold under the Massachusetts Environmental Protection Act (MEPA), Mass. Gen. Laws ch. 30, §§ 61-62I. City of Brockton, 14 N.E.3d at 172. The policy requires "enhanced analysis and review of 'impacts and mitigation'" for projects that meet the first of these criteria and where emissions will exceed the Environmental Impact Report (EIR) threshold under MEPA. Id.

DEP and Algonquin acknowledge that the Weymouth station is located within five miles of EJ populations. However, they

²⁰ An EJ population is "a neighborhood where 25 percent of the households have an annual median household income that is equal to or less than 65 percent of the statewide median or 25% of its population is Minority or identifies as a household that has English Isolation." Environmental Justice Policy of the Executive Office of Energy and Environmental Affairs 3 (2017).

argue, the Weymouth station's emissions exceed neither the ENF nor the EIR thresholds, so the EJ Policy is not implicated. Seeing no rejoinder from petitioners on this point, we agree.

Petitioners nevertheless argue that DEP was required to do something more. They cite City of Brockton, which stated in dicta that "[t]he EJ policy does impose a general, but affirmative, requirement on all agencies covered by it . . . to develop strategies designed 'to proactively promote environmental justice in all neighborhoods' in a manner tailored to and consistent with that agency's 'specific mission.'" Id. at 174 n.17. The City of Brockton court said there "may be an argument that under this general requirement," agencies must incorporate EJ principles into certain agency decisions for projects not implicating the enhanced public participation or enhanced analysis criteria, but the court ultimately left the question unresolved. Id. (emphasis added). Since DEP has not, in petitioners' view, developed any special "strategies," petitioners say we should invalidate the air permit for noncompliance with the EJ Policy.

We decline to do so. City of Brockton does not mandate that agencies go beyond the two requirements set out in the EJ Policy, only that there "may" be such a requirement. In this case, there is no real need to resolve this issue of Massachusetts law. Even assuming DEP is required to go beyond the two stated requirements, here DEP allowed for enhanced public participation

even though there was no exceedance of the ENF threshold. City of Brockton also recognized that agencies would need time to implement any special strategies, id., and the 2017 updated EJ Policy (issued after City of Brockton) says that all agency strategies "will be consolidated into one Secretariat EJ Strategy and will be finalized by a date established by the Secretary [for Energy and Environmental Affairs]," Environmental Justice Policy of the Executive Office of Energy and Environmental Affairs 9 (2017). So we can hardly blame DEP for the fact that this future date has not arrived yet. Petitioners also do not explain what special procedures they have in mind, only that DEP should have implemented something more than it did. We are unwilling to disturb DEP's decision in this case with only the vague admonition that it needed to do more, without saying what more is needed.²¹

Petitioners point us to Brockton Power Co., Nos. 2011-025, 2011-026, 2016 WL 8542559 (Mass. DEP July 29, 2016), in which DEP "performed an enhanced substantive review" of a power plant even though the relevant MEPA thresholds were not

²¹ Petitioners also argue, in one sentence, that the Presiding Officer's decision to dismiss the EJ Policy claim prior to the hearing was "arbitrary, capricious, an abuse of discretion, otherwise not in accordance with law, contrary to constitutional right or short of statutory right." To the extent petitioners attempt to raise a separate challenge -- constitutional or otherwise -- to the Presiding Officer's procedure, we deem this argument waived for lack of development. See United States v. Zannino, 895 F.2d 1, 17 (1st Cir. 1990).

triggered. Id. at *57. So, petitioners say, the EJ Policy does not prevent DEP from voluntarily doing more, and the unexplained departure from what DEP did in Brockton Power was arbitrary and capricious. We disagree. As Brockton Power recognizes, DEP can, in its discretion, engage in further review "on a case-by-case basis," id., and in this case it chose not to do so (except for the enhanced public participation).

Finally, petitioners draw our attention to Friends of Buckingham, in which the Fourth Circuit vacated Virginia's approval of a compressor station because the agency failed to comply with Virginia's EJ requirements. 947 F.3d at 87-92. Friends of Buckingham is easily distinguishable, though, because Virginia's EJ requirements are not Massachusetts's EJ requirements. A violation of the former, even on similar facts, would not necessarily be a violation of the latter, and as we have determined, there was no violation of Massachusetts's EJ policy here.

4. Noise

Petitioners argue that noise from the Weymouth station will cause a nuisance, and hence an impermissible "condition of air pollution," in violation of 310 Mass. Code Regs. §§ 7.00, 7.01(1) (quoted supra section II(B)(2)(a)).²²

²² Petitioners also mention "unpleasant odors" from the Weymouth station, but do not explain how such odors would create

According to the HIA, the Weymouth station will produce, under normal nighttime operating conditions, up to 47 dB(A) (A-weighted decibels) of noise as measured at King's Cove recreation area. When combined with background noise, the nighttime noise at one nearby residence will be 46 dB(A). While the station is under construction, noise is estimated to be up to 113 dB(A). The HIA also noted that "EPA recommends an average 24-hr exposure limit of 45 dB(A) indoors and 55 dB(A) outdoors," and that the World Health Organization (WHO) recommends nighttime exposure of "45 dB(A) or less." Petitioners argue in effect that, because the estimated noise levels will exceed EPA's and WHO's recommendations, the station will create a nuisance. They present no other argument for how the noise would be considered a nuisance, nor do they cite to any case or statute pertaining to Massachusetts nuisance law.

DEP regulations specifically address noise. See Morales v. Trans World Airlines, Inc., 504 U.S. 374, 384 (1992) ("[I]t is a commonplace of statutory construction that the specific governs the general"). 310 Mass. Code Regs. § 7.10(1) states: "No person owning, leasing, or controlling a source of sound shall willfully, negligently, or through failure to provide necessary

a nuisance. We consider this argument waived for lack of development. See Zannino, 895 F.2d at 17. To the extent petitioners claim that the Weymouth station will in any other way cause a nuisance, those arguments are likewise waived.

equipment, service, or maintenance or to take necessary precautions cause, suffer, allow, or permit unnecessary emissions from said source of sound that may cause noise." Id. (emphasis added).²³ DEP has established a "Noise Policy" interpreting when emissions of sound are unnecessary. See Mass. Exec. Office of Env'tl. Affairs, Dep't of Env'tl. Quality Eng'g, Division of Air Quality Control Policy 90-001 (1990), <https://www.mass.gov/doc/massdep-noise-policy/download>. Under that policy, a source of sound will violate the noise regulation if the source "[i]ncreases the broadband sound level by more than 10 dB(A) above ambient" or "[p]roduces a 'pure tone' condition." Id.

Petitioners do not argue that DEP's Noise Policy is an unreasonable interpretation of 310 Mass. Code Regs. § 7.10(1), so we give deference to that policy. See Kisor, 139 S. Ct. at 2414-18; Brookline II, 497 N.E.2d at 15. Petitioners also do not argue that the Weymouth station will create a "pure tone" condition or, except for the construction period and "emergency blowdowns,"²⁴ increase broadband sound by more than 10 dB(A) above ambient. Thus, there is no violation of the Noise Policy. The fact that

²³ "Noise" is defined as "sound of sufficient intensity and/or duration as to cause or contribute to a condition of air pollution." 310 Mass. Code Regs. § 7.00.

²⁴ A "blowdown" is a venting of gas. Emergency blowdowns "will be extremely rare after initial commissioning" of the Weymouth station and would last no more than five minutes.

EPA or WHO might recommend a lower level of noise would presumably be of interest to DEP. But that fact provides no basis for saying that DEP has violated any relevant law.

As to the construction period, the HIA estimated that sound from construction equipment will increase ambient sound levels by 12 dB(A), which is over the Noise Policy's 10-dB(A) limit.²⁵ However, DEP says that it has a "longstanding practice" -- to which its witnesses testified at the hearing -- "not to apply the Noise Policy to temporary construction sound" for purposes of air permitting, and "instead to require appropriate noise mitigation measures." And DEP required just such mitigating measures for construction of the Weymouth station, including limited construction hours, mufflers for heavy equipment, quieter backup alarms, portable noise barriers, and a noise complaint hotline. Similarly, DEP says that it does not apply the Noise Policy to "unplanned emergency events" like blowdowns, which could increase ambient sound by up to 17 dB(A), and it instead required a "blowdown silencer" to muffle the noise from such an event. Petitioners do not argue that DEP's "longstanding practice[s]" regarding construction and emergency events are unreasonable, nonexistent, or in any other way invalid, so we will again defer to those practices. See Doe v. Leavitt,

²⁵ DEP contends that the actual increase will be closer to 8 dB(A), below the limit.

552 F.3d 75, 80-81 (1st Cir. 2009) (describing deference based on Skidmore v. Swift & Co., 323 U.S. 134 (1944)).

5. Manufacturer Guarantee

Petitioners fault the Presiding Officer's finding that "[t]he Solar turbine specified for the proposed Project has a guaranteed emission rate for NOx of 9 ppm," given that the technical proposal from Solar Turbines contains no guarantee of emissions rate. Therefore, petitioners reason, the Presiding Officer's finding was not supported by substantial evidence, or DEP's decision based on that finding was otherwise arbitrary and capricious.

Algonquin contends that the record does otherwise contain evidence of a guaranteed emissions rate from Solar. But even assuming it does not, we see no merit in petitioners' argument. Petitioners point us to nothing in Massachusetts law suggesting that a guarantee from the equipment manufacturer is required for approval of Algonquin's air permit. And, more importantly, if the SoLoNOx turbine does not work as claimed in the permit, that will be Algonquin's problem, not petitioners' or even DEP's. Simply put, Algonquin could be fined and ordered to reduce operations to eliminate any violation of its permitted limits. See Mass. Gen. Laws ch. 111, § 142B. Whether or not Solar could be liable to Algonquin for such a violation affects only the allocation of costs as between those parties. See Catlin v. Bd.

of Registration of Architects, 604 N.E.2d 1301, 1305 (Mass. 1992) ("The appealing party has the burden of showing that his 'substantial rights . . . may have been prejudiced' by the agency's error." (quoting Mass. Gen. Laws ch. 30A, § 14(7))); see also Sasen v. Spencer, 879 F.3d 354, 366 (1st Cir. 2018).

6. Insurance Requirement

Petitioners claim that DEP violated Mass. Gen. Laws ch. 21C, § 4 by granting Algonquin's air permit without requiring Algonquin to obtain liability insurance or a surety bond. That statute states:

The department shall require that a licensee obtain and maintain in effect a contract of liability insurance, a surety bond or other evidence of financial responsibility in favor of the commonwealth sufficient to assure financial responsibility in the event of damages resulting from accidents, negligence, misconduct, or malfunctioning in the construction, maintenance and operation of a facility, or from any other circumstances reasonably foreseeable occurring during or after construction or in the course of the maintenance and operation of hazardous waste facilities.

Mass. Gen. Laws ch. 21C, § 4.

Petitioners' argument lacks merit because Mass. Gen. Laws ch. 21C, the Massachusetts Hazardous Waste Management Act, has nothing to do with air permitting. Indeed, petitioners do not even attempt to argue that the Weymouth station is a "hazardous waste facilit[y]" subject to the insurance requirement. See id.

§ 2 (defining "facility" and "hazardous waste"); see also 310 Mass. Code Regs. §§ 30.131-30.136 (listing hazardous wastes). We thus reject petitioners' argument.

C. Remedy

Having determined that DEP erred in one regard, see supra section II(B)(1)(a), we finally must determine the appropriate remedy. Algonquin urges us to remand to DEP to address the defects in the permitting process without vacating the permit approval. Petitioners say we should vacate and remand.

Whether to vacate an agency's flawed decision or remand without vacatur is within our discretion as the reviewing court, and "depends inter alia on the severity of the errors, the likelihood that they can be mended without altering the order, and on the balance of equities and public interest considerations." Cent. Me. Power, 252 F.3d at 48. Algonquin argues that these factors favor remand without vacatur. It says that DEP's failure to fully explain the BACT result could be easily remedied by DEP providing the missing explanation. And Congress has already expressed a preference for the speedy resolution of matters concerning natural-gas facilities, see 15 U.S.C. § 717r(d)(5), particularly where FERC has already declared the facility to be required by considerations of "public convenience and necessity." So, Algonquin argues, the balance of equities favor a narrow remedy.

Petitioners say that, under the federal APA, vacatur is the default remedy, see 5 U.S.C. § 706(2) (requiring reviewing courts to "hold unlawful and set aside" defective agency actions), and that remand without vacatur is a limited exception that should apply mainly to agency rulemaking, see generally Note, Kristina Daugirdas, Evaluating Remand Without Vacatur: A New Judicial Remedy for Defective Agency Rulemakings, 80 N.Y.U. L. Rev. 278 (2005). And they argue that the Central Maine Power factors favor vacatur because the BACT error was severe, correcting the error may potentially alter DEP's final decision (i.e., DEP might decide that the electric motor is the BACT), and the interests of the public in being protected against harmful air pollution tip the balance of equities.

Both sides' arguments are persuasive, but we decide to vacate based on three additional considerations. First, we believe the administrative record as it exists now is insufficient for DEP to complete the BACT analysis. As shown by our attempts to perform the missing calculations, see supra section II(B)(1)(a), it is impossible even to calculate the magnitude of the cost effectiveness of an electric motor without more information about either SoLoNOx's costs or the base-case emissions rate. By vacating, we allow DEP to reopen the administrative record for the purpose of filling these evidentiary gaps. DEP may also wish to elicit more evidence on the actual costs of the electric motor.

Second, Algonquin has expressed a desire to pursue its redesign argument, see supra note 6, and vacating will allow DEP to fully consider that issue as well. Third, we expect and anticipate that any further proceeding before the DEP will be limited to these purposes and will be expedited.

III.

For the foregoing reasons, we vacate the air permit and remand to DEP for it to conduct further proceedings, limited to the purposes we have identified. We further order that if and when DEP determines that it cannot reasonably conclude those proceedings and issue a decision within seventy-five days of the date of this opinion, then DEP will consult with the other parties and make a filing with this court in this action showing cause why such additional time is reasonably required. Any opposition to the show-cause filing must be filed within seven calendar days of DEP's filing. We retain jurisdiction for the limited purpose of receiving and responding to such a filing.