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EXECUTIVE OFFICE OF ENERGY & ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
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THE OFFICE OF APPEALS AND DISPUTE RESOLUTION

January 11, 2021

In the Matter of	OADR Docket Nos. 2019-008, 2019-009, 2019-010, 2019-011, 2019-012 and 2019-013
Algonquin Gas Transmission LLC	Air Quality Plan Approval Weymouth, MA

RECOMMENDED FINAL DECISION AFTER REMAND

INTRODUCTION

This remand proceeding concerns six consolidated administrative appeals filed in February, 2019 challenging an Air Quality Plan Approval ("the Air Permit") that the Southeast Regional Office of the Massachusetts Department of Environmental Protection ("MassDEP" or "the Department") issued to Algonquin Gas Transmission, LLC ("the Applicant") pursuant to the Department's Air Pollution Control Regulations at 310 CMR 7.02 for the construction and operation of a natural gas compressor station in the Town of Weymouth ("the Project"). The Project is one component of the Applicant's Atlantic Bridge Project ("AB" or "AB Project"), an interstate natural gas transmission project that the Federal Energy Regulatory Commission ("FERC") authorized pursuant to the Natural Gas Act 15 U.S.C. §§ 717 et seq. The appeals were filed by a Ten Persons Group (with residents of Weymouth, Braintree, Newton, and Quincy,

Massachusetts); a Ten Persons Group (from Hingham, Massachusetts); the Town of Hingham; the City of Quincy; the Town of Braintree; and the Town of Weymouth with a Ten Citizens Group, (collectively "the Petitioners").

To resolve the Petitioners' claims against the Air Permit, I conducted an evidentiary Adjudicatory Hearing ("Hearing") and issued a Recommended Final Decision ("RFD") on June 27, 2019 recommending that MassDEP's Commissioner issue a Final Decision affirming the Air Permit with certain changes because a preponderance of the evidence presented by the parties at the Hearing demonstrated that the Air Permit sufficiently regulated air contaminants in accordance with 310 CMR 7.02. On July 12, 2019, the Commissioner issued a Final Decision in the case adopting my RFD and affirming the Air Permit. Pursuant to the federal Natural Gas Act, 15 U.S.C. § 717r(d)(1)[1] and M.G.L. c. 30A, §14(1), the Petitioners appealed the Final Decision to the United States Court of Appeals for the First Circuit ("the federal First Circuit Court of Appeals" or "the First Circuit"). See Town of Weymouth et al. v. Massachusetts Department of Environmental Protection, No. 19-1794; Elizabeth Moulds, et al. v. Massachusetts Department of Environmental Protection, No. 19-1797; and Dorothy Anderson, et al. v. Massachusetts Department of Environmental Protection, No. 19-1803 (collectively "the Petitioners' First Circuit Appeal"). After reviewing the record on appeal, a three-judge panel of

[1] 15 U.S.C. § 717r(d)(1) provides in relevant part that:

> The United States Court of Appeals for the circuit in which a facility subject to . . . [15 USCS § 717b or 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 . . . . State administrative agency acting pursuant to Federal law to issue, condition, or deny any permit, license, concurrence, or approval (hereinafter collectively referred to as "permit") required under Federal law, other than the Coastal Zone Management Act of 1972 (16 U.S.C. 1451 et seq.).

See also Matter of Tennessee Gas Pipeline, LLC, OADR Docket No. 2016-020, Recommended Final Decision (March 22, 2017), 2017 MA ENV LEXIS 34, 134-39, adopted as Final Decision (March 27, 2017), 2017 MA ENV LEXIS 38.

the First Circuit ("the Court") issued a decision on June 3, 2020 "resolv[ing] . . . in favor of [Mass]DEP" all of issues raised by the Petitioners on appeal regarding the propriety of the Air Permit, except for the question of whether the emissions limit of the natural gas fired turbine ("turbine"), as proposed by the Applicant, rather than an electric motor drive ("EMD") connected to the existing electrical power grid, was the Best Available Control Technology ("BACT") to limit Nitrogen Oxide ("NOx") emissions from the proposed compressor station. On the BACT issue, the three-judge panel ruled that MassDEP did not follow its own BACT procedures because it did not conduct a cost-effectiveness analysis before eliminating an EMD from consideration in Step 4 of the BACT analysis. Town of Weymouth v. Mass. Dept. of Envtl Prot., 961F. 3d 34, 47 (1st Cir. 2020). As a result, the Court vacated the Air Permit and remanded the matter to MassDEP for further review of the BACT issue. Id. at 58.[2]

The Court ruled that a remand to MassDEP was necessary because "the administrative record as it exists now is insufficient for [Mass]DEP to complete the BACT analysis [because] . . . it is impossible . . . to calculate the magnitude of the cost effectiveness of an electric motor without more information about either SoLoNOx [turbine's] costs or the base-case emissions rate." Id. In remanding the matter to MassDEP, the court allowed MassDEP to reopen the administrative record for the limited purpose of filling the evidentiary gaps in the record relating to BACT. Id. As well, the Court ruled that on remand MassDEP could fully consider the Applicant's argument that an EMD would be a project redesign and thus could be excluded from consideration at Step 1 of the BACT analysis. Id.

In response to the Court's ruling, on June 12, 2020, the Department's Commissioner issued a Remand Order remanding this matter to me for resolution of the BACT issue in

[2] In an Order issued on August 31, 2020, the Court amended its Opinion and remanded the proceeding without vacating the permit. Town of Weymouth v. Mass. Dept. of Envtl Prot., 973 F. 3d 143, 146 (1st Cir. 2020).

accordance with the Court's ruling. Pursuant to the Commissioner's Remand Order, on June 22, 2020, I issued a Proposed Remand Adjudication Schedule ("Adjudication Schedule") to resolve the BACT issue in accordance with the Court's ruling. On June 24, 2020, the Commissioner issued an Order approving the Adjudication Schedule. In accordance with the Adjudication Schedule:

(1) the Applicant submitted to the Department supplemental BACT data and analysis supported by the sworn pre-filed testimony ("PFT") and documentary evidence of the individuals who compiled the supplemental BACT data and performed the BACT analysis on behalf of the Applicant ("the Applicant's expert witnesses");

(2) the Department reviewed the Applicant's supplemental BACT data and analysis and issued a revised BACT determination supported by the PFT and documentary evidence of the Department staff who performed the review and made the determination on behalf of the Department ("the Department's expert witnesses");

(3) the Applicant reviewed and accepted the Department's revised BACT determination;

(4) the Petitioners also reviewed the Department's revised BACT determination but rejected it based on the PFT and documentary evidence of witnesses who opined the determination was erroneous and in violation of 310 CMR 7 ("the Petitioners' expert witnesses"); and

(5) I conducted a two-day evidentiary Remand Adjudicatory Hearing to

determine the validity of the Department's revised BACT determination at which the parties' respective expert witnesses were cross-examined by opposing counsel on the PFT and documentary evidence they had submitted supporting or opposing the Department's revised BACT determination.

After reviewing the entire administrative record, I find by a preponderance of the evidence that MassDEP's revised BACT analysis was properly conducted pursuant to 310 CMR 7.02(8)(a)2 and informed by relevant state and federal BACT guidance, and that MassDEP correctly determined that an EMD does not represent BACT for NOx emissions because it is not cost-effective. Accordingly, I recommend that the Department's Commissioner issue a Final Decision After Remand Decision affirming the Air Permit.

In addition, although it does not alter my finding above that the Department's revised BACT determination is proper, I nevertheless reiterate my previous recommendation in my June 2019 RFD that the Commissioner direct the Department's Bureau of Air and Waste, Air Permitting Division ("BAW"), to update the dollar amounts used for cost-effectiveness determinations in the BACT Guidance to reflect a cost range that accounts for inflation since the range was last revised in 1990. Although there was testimony at the Remand Adjudicatory Hearing that MassDEP affirmed this cost-effectiveness range when it re-issued its BACT Guidance in 2011, there was no evidence that the Department engaged in a deliberative process in 2011 to examine that cost effectiveness range. The administrative record shows that MassDEP should engage in a deliberative process on the subject and determine, after deliberating, whether the dollar amounts that were valid in 1990 remain valid today. I recommend that the

Commissioner direct BAW to recalculate the cost effectiveness range in its BACT Guidance to reflect inflation since 1990 and update the Guidance to reflect the change.

PROCEDURAL BACKGROUND

As previously noted above, the Department's revised BACT determination was based on its review of the Applicant's supplemental BACT data and analysis that was supported by the PFT and documentary evidence of the Applicant's expert witnesses. Specifically, the Applicant's supplemental BACT data and analysis consisted of an Addendum to its air permit application, including appendices and exhibits, that provided a BACT analysis for the EMD alternative to the natural gas fired turbine to power the compressor. The Addendum was accompanied by the PFT of five expert witnesses and included exhibits to the PFT.

In response to the Applicant's submittal, the Town of Weymouth submitted comments to the Department on the Applicant's BACT analysis on August 4 and 6, 2020. In response to MassDEP's requests for additional and clarifying information on certain aspects of the BACT analysis, the Applicant submitted numerous responses in early August 2020 and on August 7, 2020, the Applicant submitted an amended Addendum ("Amended Addendum") and supplemental testimony from one of its expert witnesses.

On August 7, 2020 MassDEP published notice of its proposed revised BACT determination on the agency's website and a 30-day public comment period began. MassDEP received 234 timely comments on its proposed revised BACT determination. On September 29, 2020, MassDEP issued its revised BACT determination, a Response to Comments ("RTC") document, and the PFT of two MassDEP staff members supporting the Determination. In its revised BACT determination, MassDEP determined that EMD did not represent BACT because: (1) an EMD is properly excluded in Step 1 of a Top-Down BACT analysis because it would

redefine the source and (2) even if an EMD were not excluded at Step 1, it is not a cost-effective control under Step 4 of the BACT analysis. MassDEP therefore reaffirmed its BACT determination in the air permit issued on August 26, 2019. BACT Determination at p. 1.

On October 9, 2020, the Petitioners in five of the six consolidated appeals notified OADR of their rejection of the Department's revised BACT determination and their intent to challenge the determination in the Remand Adjudicatory Hearing.[3] On October 30, 2020, only four of the five remaining Petitioners filed PFT from two expert witnesses with exhibits in support of their position.[4],[5] In response, on November 20, 2020, the Applicant and MassDEP filed rebuttal PFT of their respective expert witnesses. The Applicant also filed rebuttal PFT from one additional expert witness, who had not previously submitted PFT in support of the Applicant. Although the original Remand Adjudication Schedule did not authorize the Petitioners to file sur-rebuttal PFT to the rebuttal PFT of the Applicant's and the Department's respective expert witnesses, I afforded them that opportunity and they filed additional PFT from one of their expert witnesses on November 27, 2020. In total, written PFT with exhibits was submitted by ten expert witnesses for the Remand Adjudicatory Hearing.

[3] Petitioner Hingham Ten Persons Group, Docket No. 2019-009 did not file an appeal notice. I recommend that Docket No. 2019-009 be dismissed.

[4] Petitioner Town of Weymouth and the associated Weymouth Ten Citizens Group did not file testimony. On November 6, 2020, the Town of Weymouth notified OADR that it was withdrawing its objection to the BACT determination and the issuance of the Air Permit. Nine members of the Weymouth Ten Citizens Group joined the Petitioner Ten Residents Group with my approval on November 12, 2020. I recommend that Docket No. 2019-013 be dismissed.

[5] Petitioners Town of Hingham, City of Quincy and City of Braintree adopted the pre-filed testimony filed by the Ten Persons Group. Each had previously joined in and adopted the appeal notice filed by the Town of Weymouth and Weymouth Ten Citizens Group.

I conducted the Remand Adjudicatory Hearing on December 1 and 2, 2020, at which nine of the expert witnesses who had filed PFT were cross-examined by opposing counsel.[6] The parties stipulated that the PFT of Petitioners' witness Ruth Jones would be admitted at the Remand Adjudicatory Hearing without objection and she would not be cross-examined. Due to the ongoing COVID-19 Pandemic that had commenced in Massachusetts nine months earlier in March 2020, the Remand Adjudicatory Hearing was conducted remotely on the Zoom internet platform and livestreamed on MassDEP's YouTube channel so that interested members of the public could observe the proceedings. The Remand Adjudicatory Hearing was also stenographically recorded by a certified court-report at the Applicant's expense, transcripts of the Hearing were provided to the parties, and the parties submitted post-hearing briefs and proposed findings of fact and law on December 14, 2020. To the extent the proposed findings are consistent with my evaluation of the witnesses and analysis of the evidence presented, I have incorporated them into this Recommended Final Decision After Remand.

BURDEN OF PROOF

As the party challenging MassDEP's BACT Determination, the Petitioners have the burden of going forward by producing credible evidence in support of their position. Matter of Town of Freetown, Docket No. 91-103, Recommended Final Decision (February 14, 2001), adopted by Final Decision (February 26, 2001) ("the Department has consistently placed the burden of going forward in permit appeals on the parties opposing the Department's position."). So long as the initial burden of production or going forward is met, the ultimate resolution of factual disputes depends on where the preponderance of the evidence lies. Matter of Town of

[6] The Remand Adjudicatory Hearing date had been shifted by one day so that all parties had additional time to review all of the later-filed PFT and prepare for the Hearing.

Hamilton, Docket Nos. 2003-065 and 068, Recommended Final Decision (January 19, 2006), adopted by Final Decision (March 27, 2006).

"A party in a civil case having the burden of proving a particular fact [by a preponderance of the evidence] does not have to establish the existence of that fact as an absolute certainty. . . . [I]t is sufficient if the party having the burden of proving a particular fact establishes the existence of that fact as the greater likelihood, the greater probability." Massachusetts Jury Instructions, Civil, 1.14(d).

STANDARD OF REVIEW

My review of the evidence presented at the Remand Adjudicatory Hearing is de novo, meaning that my review is anew, irrespective of any prior determination of the Department in making its revised BACT determination. See e.g. Matter of Woods Hole, Martha's Vineyard & Nantucket Steamship Authority, OADR Docket No. 2016-025, Recommended Final Decision (March 27, 2017), 2017 MA ENV LEXIS 29, at 31, adopted as Final Decision (April 13, 2017), 2017 MA ENV LEXIS 31; Matter of Onset Bay II Corp., OADR Docket No. 2012-034, Recommended Final Decision (August 28, 2020), 2020 MA ENV LEXIS 79, at 39-40, adopted as Final Decision (September 23, 2020), 2020 MA ENV LEXIS 82. Put another way, as the Presiding Officer responsible for adjudicating the appeal, "[I am] not bound by MassDEP's prior orders or statements [in the case], [but] instead [am] responsible . . . for independently adjudicating [the] appea[l] and [issuing a Recommended Final Decision] to MassDEP's Commissioner that is consistent with [the governing statutory and regulatory requirements] . . . ." Id.

As for the relevancy, admissibility, and weight of evidence that was presented at the Remand Adjudicatory Hearing this is governed by G.L. c. 30A, § 11(2) and 310 CMR 1.01(13)(h)(1). Under G.L. c. 30A, § 11(2):

> [u]nless otherwise provided by any law, agencies need not observe the rules of evidence observed by courts, but shall observe the rules of privilege recognized by law. Evidence may be admitted and given probative effect only if it is the kind of evidence on which reasonable persons are accustomed to rely in the conduct of serious affairs. Agencies may exclude unduly repetitious evidence, whether offered on direct examination or cross-examination of witnesses.

Under 310 CMR 1.01(13)(h), "[t]he weight to be attached to any evidence in the record will rest within the sound discretion of the Presiding Officer. . . ."

WITNESSES

The following witnesses testified at the Hearing:

For Petitioners:[7]

1. Ruth Jones. Ms. Jones is a Commissioner of Health for the City of Quincy Health Department. She holds a Master of Science in Public Health degree and a Bachelor of Science in Nursing. She is also a Registered Nurse and holds other health-related certifications and licenses.

2. Ranajit Sahu, PhD. Dr. Sahu is a consultant on environmental and energy issues. He has over thirty years of experience in the fields of environmental, mechanical, and chemical engineering, including regulatory permitting and BACT determinations under the federal Clean Air Act and various state statutes and regulations. He has provided expert testimony on BACT issues for USEPA and the Department of Justice. He holds degrees in Mechanical Engineering, including a Bachelor of Technology, a Master's degree, and a PhD.

[7] Petitioners Town of Braintree, Town of Hingham and City of Quincy adopted the testimony filed by the Ten Persons Group.

For Algonquin:

1. L. Barry Goodrich. Mr. Goodrich is a Senior Engineer in the Air Permitting group at Enbridge, Inc. He is responsible for overseeing air permitting for the northern portion of Enbridge's gas transmission system, spanning 17 states and including the Algonquin system. He holds Bachelor of Science and Master of Science degrees in Biological and Agricultural Engineering.

2. Christopher Harvey. Mr. Harvey is the Director, Rates & Certificates, Regulatory Affairs of Enbridge, Inc. He oversees the preparation and prosecution of various rate and certificate filings that the Applicant submits to the Federal Energy Regulatory Commission ("FERC"), including those for the Atlantic Bridge project. His work includes calculating a cost-of-service based reservation rate and establishing a fuel reimbursement percentage for projects such as Atlantic Bridge. He holds Bachelor of Business Administration and Master of Business Administration degrees.

3. John Heintz. Mr. Heintz is employed by International Engineering and Development, Corp., a subcontractor to Vanasse Hangen Brustlin, Inc. ("VHB"). He is the Project Manager for the Atlantic Bridge project. He has overseen Enbridge projects for the past six years including infrastructure improvement and new infrastructure construction related to interstate natural gas transmission pipelines, and including work on compressor and meter stations.

4. Nancy Kist. Ms. Kist is a Senior Advisor, Lands & Right of Way for U.S. Projects at Enbridge, Inc. In this role she manages land and right of way acquisition in support of natural gas pipeline infrastructure projects, and estimates costs associated with land and right of way acquisitions for budgeting purposes. She holds a Bachelor of Arts degree in history and English and a Juris Doctor degree.

5. Wendy Merz. Ms. Merz is a Principal Consultant at Trinity Consultants, the company that assisted the Applicant in preparing the air permit application and subsequent submittals for the construction and operation of the compressor station. Her consulting work has been focused on air permitting and federal Clean Air Act compliance and her responsibilities at Trinity have included managing air permitting projects for clients in a wide variety of industries, including all sectors of the natural gas industry. She holds a Bachelor of Science degree in Chemical Engineering a Master of Science degree in Environmental Engineering.

6. Laurence Smith. Mr. Smith is a Senior Electrical Engineer, Facilities Project Engineering, in Engineering & Construction for Enbridge.

For MassDEP:

1. Glenn Keith. Mr. Keith is the Director of the Division of Air and Climate Programs for MassDEP's Bureau of Air and Waste. He oversees statewide air pollution control programs and aspects of climate mitigation programs, including the statewide ambient air monitoring network, air quality regulation and policy development, and development and implementation of air pollution source programs. From 2000 until 2018, he was a Deputy Director in the Division of Air and Climate. Mr. Keith holds a Bachelor of Arts degree in Communications.

2. Thomas A. Cushing. Mr. Cushing has been employed by MassDEP since 1987. Since 2012 he has served as the Air Quality Section Chief in MassDEP's Southeast Regional Office. Mr. Cushing holds a Bachelor of Science degree in Chemical Engineering and has taken graduate level courses in Public Administration. Additionally, he has taken technical and regulatory training courses sponsored by NESCAUM[8] and the USEPA.

[8] NESCAUM is the acronym for the Northeast States for Coordinated Air Use Management, a nonprofit association of air quality agencies in the northeast United States. Its members include the six New England states plus New Jersey and New York. See https://www.nescaum.org/

DISCUSSION

The First Circuit identified two issues to be resolved in this Remand Proceeding. First, whether an EMD would "redefine the source" as that phrase has been interpreted and applied to air pollution control technologies, and second, whether an EMD would be eliminated in Step 4 of a Top-Down BACT analysis as not cost-effective.[9] As noted above, the First Circuit and the Commissioner's Remand Order expressly limited this Remand Proceeding to these issues.

After reviewing the Applicant's "Addendum to the Non-Major Comprehensive Plan Approval Application ("Addendum")(as revised to August 7, 2020) and PFT filed simultaneously with the Addendum; comment letters from the Town of Weymouth dated August 4 and 6, 2020; the Applicant's responses to MassDEP's requests for additional information; and the 234 timely public comments received in response to MassDEP's Preliminary BACT Determination issued on August 7, 2020, MassDEP determined that EMD does not represent BACT because (1) an EMD is properly excluded in Step 1 of a Top-Down BACT analysis because it would redefine the source and (2) even if an EMD were not excluded at Step 1, it is not a cost-effective control under Step 4 of the BACT analysis. These issues are addressed in this order in the discussion below.

I. EMD WOULD REDEFINE THE SOURCE

The emissions unit proposed by the Applicant for the Weymouth Compressor Station at issue in this Remand Proceeding and originally determined to be BACT is a natural gas-fired

[9]. A Top-Down BACT analysis is a four step process as follows:
Step 1: Rank 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

The USEPA's New Source Review Workshop Manual, Chapter B at p. B.6. Only Steps 1, 4 and 5 are at issue in this proceeding.

combustion turbine which employs a lean premix or dry low NOx combustion technology called SoLoNox[10] to achieve NOx emissions of no greater than 9 ppmvd @ 15% O_2 during normal operating conditions and the use of an oxidation catalyst to achieve emissions of no greater than 1.25 ppmvd CO at 15% O_2 and 5 ppmvd VOC (as propane) at 15% O_2 during normal operating conditions. The gas-fired turbine will burn a small amount of the natural gas in the pipeline to generate pressure sufficient to allow the bulk of the natural gas to flow through pipeline. The Petitioners contend that this pressure requirement can be achieved with a compressor driven by an electric motor, thereby eliminating the emissions produced by the gas-fired turbine.

The Petitioners contend that an EMD does not redefine the source and is not a project redesign because it does not disrupt the Applicant's basic business purpose of transporting natural gas through the pipeline. Algonquin contends that the question goes beyond whether an EMD can compress the gas and includes consideration of Algonquin's objective of achieving that compression using a turbine that uses the fuel that is co-located at the facility. MassDEP contends that Petitioners' position is inconsistent with the New Source Review ("NSR") Manual and construes redefining the source too narrowly to encompass only the compressor station's purpose of compressing gas without considering the purpose and design elements as proposed by the applicant that MassDEP analyzes pursuant to its BACT regulations. As discussed below, applying applicable guidance and legal decisions addressing the issue, the evidence demonstrates that an EMD would redefine the source.

Step 1 of the BACT analysis requires identification for the emission unit in question "all 'available' control options." NSR Manual at p. B.5. "Available control options are those air pollution control technologies or techniques with a practical potential for application to the

[10] SoLoNox is a trademark of Solar Turbines, the manufacturer of the Applicant's proposed turbine. Addendum at p. 1-1.

emissions unit and the regulated pollutant under evaluation." Id. At Step 1 MassDEP can consider whether an alternative to the Applicant's proposed designed emission unit would "redefine the design of the source." Id. at B.13. The NSR Manual states that

> Historically, EPA has not considered the BACT requirement as a means to redefine the design of the source when considering available control alternatives. For example, applicants proposing to construct a coal-fired electric generator, have not been required by EPA as part of a BACT analysis to consider building a natural gas-fired electric turbine although the turbine may be inherently less polluting per unit product (in this case electricity).

Id. If it is determined the alternative would "redefine the source," then the alternative is no longer considered as part of the BACT analysis. "If a permitting authority [such as MassDEP] decides that a proposed alternative would constitute a redefinition of the source, it will not list the alternative as a potential control option in Step 1 of its BACT analysis, and it will not consider that option further." In re: Arizona Public Service Company Ocotillo Power Plant, 17 E.A.D. 323; 2016 EPA App. LEXIS 42 The "redefine the source" principle addresses the "crucial question of where control technology ends and a redesign of the 'proposed facility' begins." Sierra Club, et al. v. USEPA and Prairie State Generating Company, LLC, 499 F.3d 653, 655 (7th Cir. 2007),

A determination of whether a pollution control alternative redefines the source is case specific and involves a two-step process of first defining the end, object, aim or purpose of the project and then determining which design elements are inherent to the applicant's purpose. As noted in Sierra Club, the line between where a control technology ends and a redesign begins is not obvious. See also Helping Hand Tools v. USEPA, 848 F.3d. 1185 (9th. Cir. 2016) ("In essence, a control alternative redefines the source if it required a complete redesign of the facility.") As the court in Helping Hands noted, the second step in the two-step process requires a "hard look" by the reviewing authority "at the proposed definition to determine which design

elements are inherent to the applicant's purpose and which elements can be changed to reduce pollutant emissions without disrupting the applicant's basic business purpose." Id. at 1194. When a fuel source is co-located with a facility, MassDEP does not need to consider in its BACT analysis fuel sources that are not readily available because that would redefine the source. Helping Hand Tools at 1195. For this reason, the EAB and courts have taken the general approach to disallow substitution of one fuel source for another or one source of energy for another. City of Palmdale, 2012 WL 4320533, at *22-33 (increasing solar-power component of hybrid, natural-gas and solar-powered plant would redefine source).

The Petitioners assert that an EMD is BACT because it produces no emissions and can power the compressor just as the proposed gas-fired turbine can. Sahu PFT at ¶ 5. Dr. Sahu, the Petitioners' expert witness, opines that replacement of the proposed turbine with an EMD does not redefine the source or purpose of the facility because the purpose of the compressor station is to compress pipeline natural gas in order to boost its pressure so it can travel another 40-50 miles along the pipeline and overcome pipeline friction. Id. at ¶ 6. He testified that the compressor station will compress natural gas regardless of whether the driver is an EMD or a gas turbine. Electricity is "locally available" to power the EMD. Id. In his opinion, EMD does not alter the purpose of the compressor station and use of EMDs at compressor station are quite common. Id. at ¶ 8. Dr. Sahu further testified that MassDEP has discretion to include an EMD in the BACT analysis pursuant to its own guidance, the NSR Manual and NESCAUM's BACT guidance, and therefore EMD should not be eliminated as a redefinition of the source. Sahu PFR at ¶¶ 1-3.

In support of their argument that an EMD would redefine the source, MassDEP and the Applicant presented the following evidence. The application for the compressor station proposed as one emission unit a natural gas-fired combustion turbine. Application, October 2015; Keith

PFT at ¶ 3. The stated purpose of the compressor station project is to compress natural gas that passes through a pipeline located at the Project Site. Application, October 2015, and subsequent updates. This additional compression is necessary to insure delivery of natural gas to its customers. Algonquin chose a combustion turbine fueled by natural gas since the fuel is co-located with the combustion turbine at the Facility and it is a more reliable source of energy than an EMD since an EMD is subject to power failures. Tr. 322:10-12 (gas-fired turbine is the most reliable source of energy to move gas along the system).

The compressor station was designed to use some of the natural gas flowing through the compressor station as fuel for the turbine. Merz PFT at ¶ 29; Keith PFR at ¶ 4. The fuel is readily available, and the turbine is co-located with the natural gas pipeline facilities for which the compressor station will provide the compression necessary to the project's basic purpose of increasing gas pressure at that location. Merz PFT at ¶ 29. The gas turbine will provide power to the compressor even during power outages. Merz PFT at ¶ 32. The Applicant exclusively uses gas turbines to compress pipeline gas on the Atlantic Bridge project, and the fuel type is integral to the contract structure between the Applicant and its customers for the project. Merz PFT at ¶ 32. Recovery of electric power costs are not included in the Atlantic Bridge Project Cost of Service & Rates or the rates the Applicant negotiated with its customers. Harvey PFT at ¶ 11. Using an EMD would involve changing the Applicant's proposed primary fuel from natural gas to electric power, which current infrastructure at the facility cannot support at the level required to drive the station's compressor unit. Heintz PFT at ¶ 9.

MassDEP determined that an EMD required a completely different design compared to a combustion turbine and would not achieve the purpose of using the readily available natural gas flowing through the facility as fuel to power the compressor. This determination is supported by

a preponderance of the evidence presented at the Remand Adjudicatory Hearing. Mr. Keith testified that "the air pollution control regulations do not give MassDEP the role of determining what type of facility or emission unit will be built or the role of dictating the design and scope of a proposed facility or emission unit through the BACT analysis." Keith PFT at ¶ 3. MassDEP relies on the applicant to define a proposed facility's or emission unit's purpose and basic design in the permit application and based on the emissions unit that is proposed, MassDEP determines what is the BACT that can be applied to that emissions unit. Here, Algonquin proposed a natural gas fired combustion turbine designed to combust a portion of the natural gas that it is compressing to achieve the purpose of increasing gas pressure in the pipeline at the facility location. An EMD is not a control technology that can be applied to the proposed emissions unit. Keith PFT at ¶ 8. The BACT process focuses on control technologies "that can be applied to specific emission units, not different emission units or different technologies, but pollution control technologies that can be applied to each emission unit." Tr. at 29:9-14. An EMD "would be a complete replacement of the combustion turbine, and since an EMD does not have any emissions, there would no longer be an emissions unit. Therefore, an EMD would redefine the source since it would be a wholesale replacement of the proposed combustion turbine with a fundamentally different technology." Keith PFT at ¶ 8. In rebuttal to Dr. Sahu, Mr. Keith testified that while the NESCAUM BACT guidance is a resource available to MassDEP, MassDEP does not follow it for BACT reviews because it is not the guidance document of a regulatory agency. Tr. at 16:21-24; 17:9-14.

Based on the evidence presented and my review of the applicable guidance and decisions, I find that an EMD would redefine the source and thus could be excluded at Step 1 of the BACT analysis. The Petitioners' view of the purpose of the compressor station is too narrow in scope.

As they did in the prior 2019 Adjudicatory Hearing in this matter, they limit their analysis to whether an EMD is able power a compressor to compress the pipeline gas, without considering the broader analysis that the guidance and cases require. There is no dispute that an EMD is able to power a compressor; and EMD is offered by the same manufacturer that provided the gas turbine. See Addendum, Appendix D, Solar Turbines Technical Proposal for Electric Motor Drive Compressor Set, June 6, 2020. However, I discount Dr. Sahu's testimony that an EMD does not redefine the source on the basis that electric power is "locally available." "Locally available" is not "readily available." A preponderance of the evidence submitted by Applicant persuasively demonstrates that much infrastructure would be required to support an EMD, including upgrades to the Edgar Power Station, connection via cable to the compressor station, and a substation at the compressor station. See Addendum at p. 4-15, Table 4-6; Goodrich PFT at ¶¶ 26-32; Heintz PFT at ¶¶ 6-19; Kist PFT at ¶¶ 5-11; Smith PFR at ¶¶2-8, Ex. 2, Figure RR10 – Response 2C.

But as the guidance and cases discussed above make clear, the determination of whether a pollution control alternative redefines the source involves a two-step process of first defining the end, object, aim or purpose of the project and then determining which design elements are inherent to the applicant's purpose. The second step in the two-step process requires a "hard look" by the reviewing authority "at the proposed definition [provided by the applicant] to determine which design elements are inherent to the applicant's purpose and which elements can be changed to reduce pollutant emissions without disrupting the applicant's basic business purpose." Helping Hands, supra, at 1194. The applicant defines the facility's or emission unit's basic design and purpose. See In re: Prairie State Generating Company, 13 E.A.D. 1; 2006 EPA App. LEXIS 38. (E.P.A. August 24, 2006).

In this case, Algonquin designed and submitted the Project with a Taurus 60 natural gas-fired combustion turbine in its original application to the Department. Application, October 2015. The project was designed to use the natural gas co-located with the pipeline at the compressor station and the Atlantic Bridge project's contracts were developed with use the gas-fired turbines as an essential element. Use of pipeline natural gas to fuel the turbine to provide a reliable source of natural gas to the Applicant's customers is one of the identified business purposes of the project. While the Petitioners elicited testimony at the Hearing from Mr. Harvey that the Applicant's parent, Enbridge, generally can include electric power costs in the operating and maintenance costs included when Enbridge establishes the rate for a new project where EMDs are used, and can negotiate those rates into customer contracts, this testimony did not establish that this could be done for the Weymouth Compressor station or the Atlantic Bridge project, for which all of the compressor stations are powered by gas-fired turbines. See Tr. at pp. 400-403. For the Weymouth Compressor station, the evidence supports a finding that the use of co-located natural gas is integral to the design of the facility.

An EMD would represent a wholesale replacement of the proposed power source at the compressor station. The BACT regulations, guidance and caselaw do not support such a wholesale replacement. A preponderance of the evidence demonstrates that a combustion turbine is a different design than an EMD. Tr. p. 571, lines 13-16; Keith Rebuttal at ¶ 3. The equipment in a combustion turbine is different than the equipment in an EMD, and an EMD cannot run on natural gas. Tr. p. 570, lines 13-17. An EMD is a technology that cannot be applied to the combustion turbine. Tr. p. 43, lines 3-6; Tr. p. 465, line 24; Tr. p. 466, lines 1-2. Installing an EMD would require additional infrastructure and improvements, including a half-mile of underground high-voltage transmission line. Tr. p. 349, lines 2-11. Based on the foregoing, I find

that MassDEP took a "hard look" at the design elements and properly determined that the use of co-located natural gas is integral to the design of the facility. I find that use of an EMD instead of a natural gas-fired combustion turbine redefines the source because an EMD is not a pollution control technology that can be applied to the proposed source, has a completely different design and relies on electricity rather than co-located natural gas at the facility. Helping Hand Tools v. United States EPA, 848 F.3d 1185, 1194 (9th Cir. 2016). An EMD is technically feasible but would require significant modifications to the facility's design to accommodate required infrastructure. It is not appropriate to change the fuel source during the BACT analysis if the change requires significant modifications. See, e.g. Helping Hand Tools, supra. Therefore, an EMD is properly excluded from the BACT analysis at Step 1.

II. INCLUDING EMD IN THE BACT ANALYSIS IS A PROPER EXERCISE OF AGENCY DISCRETION.

MassDEP properly concluded that EMD could be excluded under Step 1 of the BACT analysis. Nonetheless, MassDEP included a BACT analysis for an EMD beyond Step 1 in accordance with the First Circuit's remand decision. The NSR manual affords MassDEP discretion in its BACT analysis to engage in a broader analysis if it wishes, though MassDEP does not use the BACT requirement "as a means to redefine the source." See NSR Manual at B.13; Keith PFT at ¶ 12. The NSR Manual states:

> However, this is an aspect of the PSD permitting process in which states have the discretion to engage in a broader analysis if they so desire. Thus, a gas turbine normally would not be included in the list of control alternatives for a coal-fired boiler. However, there may be instances where, in the permit authority's judgment, the consideration of alternative production processes is warranted and appropriate for consideration in the BACT analysis.

NSR Manual at p. B. 13.

MassDEP's consistent practice is not to use the BACT analysis as a means to redefine the source. Keith PFT at ¶ 17. Before this appeal, MassDEP never used the BACT analysis to redefine the source. Keith PFT at ¶¶ 10-11. However, at the Remand Adjudicatory Hearing, the Petitioners elicited testimony that in 2020 MassDEP did require an applicant for another project to include an EMD in the BACT analysis, because [e]ven though that's not [MassDEP's] practice, [MassDEP] felt it would be best to cover [its] bases because, you know, the eventual permit that will be issued by [MassDEP's] Central Regional [Office for] the Northeast Energy Center could be appealed, and [MassDEP] didn't want to be in the same situation as now." Tr. at 21:9-15. While acknowledging the discretion afforded, Mr. Keith notes that "…states must follow their own regulations, guidance, and established practice." Id. Mr. Keith reiterated that EMD should not be considered in the BACT analysis because it would redefine the source and "[t]his determination is consistent with MassDEP's interpretation of its regulations and BACT guidance, and practice of not using BACT to redefine the source." Keith PFT at ¶ 17. Nonetheless, I find that MassDEP's inclusion of EMD in the BACT analysis in this case was a proper exercise its discretion in light of the First Circuit's decision.

III. AN EMD IS NOT A COST-EFFECTIVE CONTROL TECHNOLOGY AND WAS PROPERLY ELIMINATED AT STEP 4 OF THE BACT ANALYSIS.

MassDEP determined that an EMD was not cost-effective under Step 4 of the BACT analysis.[11] Cushing PFT at ¶ 69; BACT Determination, September 29, 2020. This Determination was based on Mr. Cushing's review of information identified in ¶ 4 of his PFT, which included

[11] MassDEP conducted a full BACT analysis of an EMD but as noted above, the issues raised in this appeal address the Step 4 analysis. In its full analysis, at Step 2 MassDEP determined that an EMD was technically feasible despite the Applicant's assertion in the Addendum at Section 4.3 that "[t]here is inadequate electricity supply at the Facility to support an EMD." MassDEP determined that the Applicant's asserted infrastructure upgrades were more appropriately evaluated as part of the Step 4 economic analysis. Cushing PFT at ¶ 18. At Step 3, MassDEP determined that an EMD ranked higher than the proposed gas-fired turbine because an EMD has no emissions. Id. at ¶ 19.

the Addendum and the direct and supplemental pre-filed testimony submitted by Algonquin in support of its BACT analysis for an EMD alternative; supporting documentation submitted by Algonquin;[12] correspondence from the Town of Weymouth dated August 4 and 6, 2020; and Algonquin's August 4, 5 and 7, 2020 responses to MassDEP's requests for information dated July 29, August 3 and 5, 2020. Cushing PFT at ¶ 4.

MassDEP determined, based on its evaluation of Algonquin's submittals, that the cost of using an EMD exceeded the cost effectiveness range in MassDEP's BACT Guidance of $11,000 to $13,000 per ton of NOx and VOC controlled and $4,000 to $6,000 per ton of CO and SO_2 controlled. Cushing PFT at ¶¶ 46, 68. After considering the Town of Weymouth's comments relative to the capital costs associated with the additional infrastructure Algonquin said was required for the EMD, MassDEP conducted additional analysis and determined that cost effectiveness was driven by the higher operating costs associated with the EMD. Cushing PFT at ¶ 68. Even with the capital costs removed, MassDEP determined that the EMD was not cost effective. Id. MassDEP's BACT Determination was issued on September 29, 2020, and its RTC and pre-filed testimony was filed simultaneously.[13]

[12] This supporting documentation included: (1) MassDEP *Best Available Control Technology Guidance*, dated June 2011; (2) EPA's draft *New Source Review Workshop Manual* dated October 1990; (3) EPA's *Emission & Generation Resource Integrated Database* (eGRID); (4) 2018 *ISO New England Electric Generator Air Emissions Report*; (5) EPA Air Pollution Control Cost Manual, Chapter 2 *Cost Estimation: Concepts and Methodology*; (6) U.S. Energy Information Administration *Average retail price of electricity, annual*; (7) AP-42: Compilation of Air Emissions Factors, Chapter 3 *Stationary Gas Turbines*; (8) 40 CFR 60 Subpart KKKK—Standards of Performance for Stationary Combustion Turbines; (9) FERC *Cost-of-Service Rate Filings*; (10) Town of Weymouth Property Viewer; (11) Massachusetts Department of Environmental Protection (MassDEP) *Top Case Best Available Control Technology (BACT) Guidelines*.

[13] Ordinarily in OADR appeals the parties challenging a MassDEP permit determination file their testimony first. In this case, pursuant to the authority of 310 CMR 1.01(5)(a)13 and 310 CMR 1.01(13), the normal order was altered in light of the First Circuit's decision to expedite this proceeding. See Proposed Remand Adjudication Schedule, June 22, 2020 at pp. 4-5.

The Petitioners challenged the Step 4 BACT analysis on several grounds.[14] First, they alleged that MassDEP used an incorrect baseline emission rate in its calculations and should have used the uncontrolled startup emissions as baseline. TPG Notice of Claim at pp. 9-10; Town of Weymouth Notice of Claim at p. 8.[15] Second, they alleged that the infrastructure requirements/costs and operational costs for an EMD proposed by Algonquin and accepted by MassDEP were inappropriate and erroneous. TPG Notice of Claim at pp. 12; Town of Weymouth Notice of Claim at p. 8-10. Third, they allege that MassDEP annualized the capital costs associated with an EMD using an improper interest rate. Specifically, they alleged that using a proper (lower) rate "reduces the annualized cost input for calculation of an EMD's average cost effectiveness. Among its deficiencies, Algonquin's methodology improperly focused on its own debt/equity ratio—skewed toward equity with a higher capital cost recovery interest rate as compared to debt—as compared to Enbridge, its corporate parent, thus substantially increasing its annualized costs." Town of Weymouth Notice of Claim at p. 9.[16] Finally, they allege that the cost-effectiveness range used by MassDEP has not been adjusted for inflation and is not valid for current dollars. In support of their claims, they presented the testimony of Dr. Sahu and Ms. Jones. The Petitioners rely on the testimony of Dr. Sahu to prove their specific claims regarding the Step 4 analysis. As noted above, the Petitioners had the

[14] The TPG also alleged that the presence of nearby Environmental Justice ("EJ") communities and the Covid-19 Pandemic require the Department to complete enhanced analysis of EJ concerns during the BACT analysis. The First Circuit determined that there was no violation of the Massachusetts EJ Policy and the scope of its remand excludes reconsideration of EJ issues..

[15] Braintree, Hingham and Quincy adopted the Notice of Claim filed by the Town of Weymouth.

[16] The Town of Braintree disputes the assumptions that Algonquin relied on to calculate the capital costs of each alternative and, hence, the conclusion that Algonquin reached as to the difference in capital costs that would be associated with the selection of the EMD as BACT. For purposes of this appeal only, Braintree relies on the capital cost calculation presented in the Addendum, in order to demonstrate the error in the method used to calculate the annualized capital costs. Town of Braintree Notice of Claim at p. 4; Braintree Closing Brief at p. 8, note 5.

burden of proving their claims by a preponderance of the evidence. As discussed below, I find they have failed to meet this burden.

The BACT Step 4 Framework

Step 4 of the BACT analysis is a case-by-case consideration of energy, environmental, and economic impacts and "the top alternative is either confirmed as appropriate or is determined to be inappropriate." In re: Prairie State Generating Company, supra; See also NSR Guidance B. 26. The purpose of Step 4 of the analysis is to validate the suitability of the top control option identified, or provide a clear justification as to why the top control option should not be selected as BACT. Id. The permitting agency considers "…relevant total cost information (such as project capital costs or annualized costs), the impact of such costs on the economic achievability of the project, and analyses of other factors such as energy and environmental impacts that are a part of a typical BACT analysis at step 4." In the Matter of Exxon Mobil 16 E.A.D. 383 (2014); 2014 EPA App. LEXIS 20. If the permitting authority "…determines that the total cost of a control technology provides a basis for eliminating a particular technology such as CCS at step 4, it should explain in detail why those costs make the technology "clearly cost prohibitive." Id. While there is no "bright line" as to the limit of the scope of information that needs to be considered in this analysis, the agency may make a reasonable determination, even if some information is lacking. Id. at 402 (consideration of cost-effectiveness appropriate even where lack of comparables required agency to consider "total costs" alone). If the agency takes a rational approach in light of all the information available to it, then that decision will be upheld. Id. p 401-403. Speculative arguments on costs are not given weight in Step 4. In re Three Mountain Power, LLC, 10 E.A.D. 39, 58 (EAB 2001). This rational approach does not always require a detailed cost-effectiveness analysis. See In re Masonite Corporation 25 ELR 40303

(citing to NSR Manual B. 35 "Normally the submittal [by the applicant] of very detailed and comprehensive project cost data is not necessary."). If an agency goes beyond the designated range of consideration in determining BACT, then it will be overturned for lack of a reasoned analysis. See EPA. v. Alaska DEP, 124 S. Ct. 983, 34 ELR 20012 (2004) (switch from finding SCR economically feasible to finding SCR economically infeasible is reversable since it had no relevant factual basis in the record as it was based upon consideration of the mine's contribution to the local economy).

The First Circuit recognized there must be a reasonable limit to the appropriate scope of a BACT analysis where it stated: "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." Town of Weymouth v. Mass. Dep't of Envtl. Prot., 961 F.3d 34, 50 (2020) (on the exclusion of SCR as BACT for this project).

The resolution of the BACT issue in this Remand Proceeding hinges on the economic analysis in Step 4. According to the NSR 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. Cost is measured in terms of annualized control costs. The cost effectiveness calculations can be conducted on an average, or incremental basis." NSR Workshop Manual at B.36. "Average cost effectiveness (total annualized costs of control divided by annual emission reductions, or the difference between the baseline emission rate and the controlled emission rate) is a way to present the costs of control." Id. MassDEP applied an average cost-effectiveness analysis in making its determination.

Average cost effectiveness is calculated using the following formula from the NSR Manual:

$$\text{Average Cost Effectiveness (dollars per ton removed)} = \frac{\text{Control option annualized cost}}{\text{Baseline emissions rate - Control option emissions rate}}$$

Costs are calculated in (annualized) dollars per year ($/yr) and emissions rates are calculated in tons per year (tons/yr). The result is a cost effectiveness number in (annualized) dollars per ton ($/ton) of pollutant removed. Id. Cushing PFT at ¶¶ 31-32.

The Cost Effectiveness Range

The Petitioners' expert witness, Dr. Sahu, testified that the cost-effectiveness range in the MassDEP BACT Guidance of $11,000 to $13,000 per ton of NOx removed was established "roughly 30 years ago" in 1990 and is not valid for current dollars. Sahu PFT at ¶ 11. Using the Bureau of Labor Statistics price index available for the northeast, he calculated conservatively that adjusted for inflation, the range should be $20,350-$24,050. Id. He used this adjusted range to compare his cost values for an EMD to those submitted by the Applicant and accepted by MassDEP. Id. In response, Mr. Cushing testified that "[a]pplying a cost escalation factor is not a regulatory requirement but rather a matter of policy and cost escalation of the BACT cost effectiveness thresholds is simply not required by MassDEP's BACT Guidance." Cushing PFR at ¶ 2. At the Hearing, Mr. Cushing affirmed that the range is a matter of policy and changing it would require revisiting that policy. But he acknowledged that a 30-year old range that did not account for inflation had the potential to make it easier for an applicant to prove cost infeasibility. at pp. 167-169. I agree that changing the cost effectiveness range in MassDEP's BACT guidance requires a policy change, and as stated above, I recommend that MassDEP

engage in a deliberative process to reassess the cost effectiveness range. However, in this proceeding, I cannot make that change. Therefore, I find that the cost effectiveness range applied by MassDEP is correct.

Baseline Emissions

The first step in evaluating the economic feasibility of a control option involves determining the source's baseline emissions rate, calculated in tons per year. NSR Workshop Manual at B.31. The emissions rate of the control option is subtracted from the baseline to determine the emissions removed (for the denominator of the average cost effectiveness calculation). In the Commissioner's 2019 Final Decision in this matter, the baseline emission rate for the proposed gas-fired turbine was found to be 9 ppmvd. The First Circuit stated that "the baseline emissions rate is not the emissions rate of the SoLoNox turbine" Town of Weymouth, 961 F.3d. 34, 45, note 8, and is probably as high as the emissions rate for "good combustion practices" used as the Base Case in Algonquin's air permit application. Id. MassDEP and Algonquin disagree with these statements, but in consideration of the Court's position calculated cost effectiveness using a higher, more conservative baseline emissions factor of 25 ppmvd. The Petitioners disagree with MassDEP and Algonquin and further assert that even the 25 ppmvd does not reflect the baseline emissions "calculated using realistic upper boundary operating assumptions" as the NSR Workshop Manual advises. See NSR Workshop Manual at B.10 and B.37.

Dr. Sahu testified that he disagreed with MassDEP's use of either 9 ppmvd or 25 ppmvd in the BACT analysis because he disagreed that the turbine with SoLoNox is an inherently lower polluting process. Sahu PFT at ¶ 13 (pp. 8-13). As the basis for his opinions he relies on his 30 years of experience with BACT determinations and his twenty years of expert work for EPA and

the US Department of Justice on BACT, and literature from the turbine manufacturer (Solar) included with his testimony that "confirms that even with SoLoNOx installed, a wide range of NOx performance is to be expected, depending on operating and ambient conditions." Id. These include low load and low ambient temperatures. As shown in Table 1 and Table 2 from the Solar literature, emissions under these conditions are much higher, and can be as high as 120 ppmvd. Id. In his opinion, this information from the manufacturer confirms that the turbine can and does operate without SoLoNox active, therefore it is not an inherently lower polluting process, and even with SoLoNox on the turbine, the turbine can and does operate with much higher emissions of NOx than those determined to be baseline. Id. In his opinion, the uncontrolled baseline for the proposed turbine should be 120 ppmvd. Sahu PFT at ¶ 13 at p. 13. See also Tr. at pp. 505-508.

Mr. Cushing responded to Dr. Sahu's testimony by pointing out that Solar's information, available on its website, contradicted Dr. Sahu's testimony that the SoLoNox is not inherent to the design of the turbine. He further testified that although Solar sells a Taurus 60 turbine with an emission rate of 38 ppm outside of the United States, within the United States the highest available rate is 25 ppm. Cushing PFR at ¶¶ 4-5. Mr. Cushing effectively rebutted Dr. Sahu's proposed 120 ppmvd emission rate by noting that it would only occur if the proposed turbine is operating at the extreme temperature range of zero degrees to twenty degrees below Fahrenheit, and the location of compressor station only experiences an average of 12 hours per year of subzero temperatures, so using the rate proposed by Dr. Sahu to establish a year-round emission baseline is inappropriate. Cushing PFR at ¶ 7.

Algonquin conducted an alternative cost effectiveness calculation assuming that Solar's advancements of SoLoNOx were not considered, and the generic and "uncontrolled" capability of lean premix units is applied at approximately 25 ppm NOx. Goodrich PFT ¶¶ 44-45, Ex. 3.

Solar offers the Taurus 60 7802S with three different emissions levels for natural gas pipeline applications in the U.S.: 25, 15 and 9 ppm NOx @15% O2. Goodrich PFT ¶ 42, Ex. 2. Algonquin calculated the baseline emissions under realistic operating conditions by including estimated emissions associated with the maximum expected startup conditions (62 hours), shutdown conditions (59 hours) and extreme cold temperatures (12 hours) and maximum operation at 100% Load under normal conditions for the remaining hours of the year (8,627) at 9 ppmvd (even though the turbine would have to be shut off at times, making zero emissions, before it can be started up). Goodrich PFT ¶¶ 13-14; Goodrich PFR at ¶¶ 9-17.

Based on the testimony presented by MassDEP's and Algonquin's respective expert witnesses, I find that for purposes of this Remand Proceeding, the correct baseline emission rate for the cost effectiveness calculation is 25 ppmvd. I do not find Dr. Sahu's testimony persuasive because he bases his opinion on temperature conditions that rarely occur in Weymouth and on equipment options from Solar that are not available in the United States and therefore could not represent a realistic baseline for the Weymouth compressor station's turbine. The 120 ppmvd rate assumed by Dr. Sahu does not represent turbine emissions when SoLoNOx is not effective; it only represents turbine performance in sub-zero temperature conditions. Cushing Rebuttal, Ex. 1, Solar Turbines PIL 167 at p. 4; Algonquin's Closing Brief at 17. Dr. Sahu's proposed baseline improperly overestimates potential emissions because it reflects emissions which would only result from operation at constant subzero temperatures; this is an unrealistic operating assumption because, on average, Weymouth experiences below zero temperatures for just 12 hours per year (not 8,760). Goodrich PFR at ¶ 12.

Capital and Operating Costs

The numerator of the equation for cost effectiveness is the sum of the annualized capital costs (the capital costs spread over the life of the equipment at an assumed interest rate) plus the annual operating and maintenance costs. Algonquin identified the infrastructure it would require to install an EMD, consistent with how the project was originally described to Federal Energy Regulatory Commission ("FERC"). See Amended Addendum, Table 4-6; Goodrich PFT ¶¶ 26-32; Heintz PFT ¶¶ 6-19; Kist PFT at ¶¶ 5-11; Smith PFR at ¶¶ 2-8, Ex. 2, Figure RR10 - Response 2C. Algonquin obtained third-party vendor estimates to determine the costs associated with the infrastructure it determined necessary to support the EMD. Goodrich PFT at ¶¶ 26-27; Heintz PFT at ¶¶ 10-19; Smith PFR at ¶¶ 2-8; Cushing PFT at ¶60. In certain instances, Algonquin obtained multiple estimates and determined which should reasonably be included in its analysis. Heintz PFT at ¶¶ 9-11, 13-14, 16-19; Amended Addendum, Table 4-6, Appendix C – Table 2. Goodrich PFT at ¶¶ 26-27; Kist PFT at ¶¶ 5-11; Smith PFR at ¶¶ 2-8.

To support an EMD at the compressor station Algonquin proposed to MassDEP that the following capital investments were required: (1) Upgrades to the Edgar Power Station ($1,300,000); (2) High voltage transmission ($8,500,000); (3) Real Estate Right of Way ($619,460); (4) Medium voltage substation at the compressor station ($3,950,000); (5) Raise elevation of Medium voltage substation ($768,000); and (6) Medium voltage line install ($693,764). Algonquin calculated the capital investment increase for an EMD instead of the proposed gas turbine as $12,242,077. Addendum at 4-15, Table 4-6.

Since the compressor driver is sized to meet the horsepower ("HP") requirements for the compressor, this is the basis for deriving the electricity demand for an EMD of equivalent size. At the average annual ambient conditions at the compressor station, the proposed Taurus 60 gas-

fired turbine is capable of delivering an annual average of 7,758 HP to the compressor. Therefore, to determine the electricity demand for an equivalent EMD, Algonquin started with the 7,758 HP compressor provided by the proposed Taurus 60 and, using the known efficiencies of the system, calculated the electricity consumption required for an EMD to provide this same annual average HP output. Addendum at p. 4-9. Algonquin based the costs for electricity on data from the same time period as it used for the gas-fired turbine. Addendum at p. 4-13. To estimate the cost of electricity for the EMD, Algonquin multiplied the maximum annual electricity requirements by the average industrial rate in Massachusetts for 2019 based on EIA data ($0.1437/kW-hr). The maximum annual electricity usage for the EMD option was derived directly from the basis for maximum annual natural gas usage by the proposed Taurus 60 turbine, to ensure that costs are compared on a comparable basis. This resulted in a total annual utility cost of $7,943,500/year for an EMD. Addendum at p. 4-16; See also Table 4-1 (derivation of EMD electricity requirements). Accounting for the higher maintenance costs associated with the gas-fired turbine, the increased operating and maintenance costs for the EMD were calculated as $5,836,737. Addendum at p. 4-17, Table 4-7 ("Direct Annual Cost Comparison of EMD Driver vs. SoLoNox Taurus 60 Turbine Driver").

MassDEP's BACT Guidance provides that the EPA's Cost Control Manual is an appropriate source for cost assumptions. MassDEP's BACT Guidance at 4. The Cost Control Manual "focuses on private cost, which refers to the costs borne by a private entity for an action the private entity decides." EPA Air Pollution Control Cost Manual, § 1, Chapter 2, at p. 5. "[T]he costs of purchasing and installing pollution control equipment, and then operating and maintaining this equipment … are private costs" and "reflect the private choices and decision of the owners and operators of the facilities." Id. at 5. MassDEP's BACT Guidance does not require

an applicant to use bare "minimum" requirements. Tr. at 186:11-23 ("A: Could you tell me where in the BACT analysis -- BACT guidance it says minimum? It doesn't exist."); Tr. at 185:3-11 ("[Algonquin] ha[s] determined it is -- based on their operating experience it's more reliable to use transmission-level power based on their own documentation, and they're being consistent and not being arbitrary in their -- in how they apply the design."). The EPA's Cost Control Manual instructs that study level estimates are sufficient. "Study level estimates," including "[r]ough estimates of utility requirements," are "… used to estimate the economic feasibility of a project before expending significant funds for piloting, marketing, land surveys, and acquisition … [They] can be prepared at relatively low cost with minimum data." EPA Air Pollution Control Cost Manual, § 1, Chapter 2: Cost Estimation: Concepts and Methodology at p. 6.

Dr. Sahu challenged each of the elements in the numerator used by MassDEP in its calculations. Sahu PFT at ¶ 15. Dr. Sahu opined that a proper BACT economic cost-effectiveness analysis for the EMD should be based on what is actually required for infrastructure rather than the Applicant's preferences for infrastructure. Sahu PFT at ¶ 15. He testified that a fundamental problem in MassDEP's analysis which affects all of the infrastructure Algonquin proposed as required to support an EMD is "the complete lack of engineering detail on what would be required, *at a minimum*, to install an EMD at Weymouth." Id. at ¶ 16 (emphasis in original). Dr. Sahu further testified:

> In a BACT analysis only costs that are *required* for a control option to work need to be included, for obvious reasons. If an applicant chooses to go above and beyond the minimum required costs, they are entitled to their preferences but not for the incremental costs of those preferences to be included in a BACT analysis. This is so for the reason that if an applicant could simply "gold-plate" the costs of a control option by including preferential but not required costs, thereby making that option not cost-effective, that would be an unacceptable abuse of the BACT analysis.

Sahu PFT at ¶ 16. (emphasis in original). Dr. Sahu testified that a BACT analysis should consider industry practice, not the Applicant's practice. Sahu PFR at ¶ 23. He also testified that the natural gas costs were underestimated to make the operating costs for the EMD look more expensive on an operating cost basis. Id. at ¶ 17. Dr. Sahu opined that the natural gas cost factored into the operating cost for the gas-turbine should be the retail rate, not the wholesale rate. In his own calculation of cost effectiveness, Dr. Sahu used the retail rate. Id. The Petitioners argue that the Applicant can recover the costs for using electricity through contracts with its customers, and therefore these costs are properly excluded from the Applicant's annual operating costs. TPG Closing Brief at pp. 19-21.

In response to Dr. Sahu's testimony, Mr. Smith explained that it included costs for high voltage transmission lines because its parent company, Enbridge, has exclusively used federally regulated transmission line service to support all new EMD installations since 2008. Smith PFR at ¶¶ 7-8. Mr. Smith further explained that Enbridge uses transmission level service because it considers transmission service more reliable than distribution service with respect to adequacy and operating reliability. Id.; see also Tr. at 349:15-23 (importance of reliability). At the Adjudicatory Hearing, Mr. Heintz testified that a study-level estimate for upgrades to the Edgar power station is sufficient to substantiate the estimate. Tr. at pp. 345-347. In response to Dr. Sahu's testimony regarding operating costs, Algonquin testified that it does not purchase the natural gas that it uses to fuel the turbine from a distributor or take the gas from a distribution network. Harvey PFR at ¶8. It obtains its gas directly from its pipeline. Id. The Algonquin city-gate prices set forth in Algonquin's Annual Fuel Reimbursement Quantity filing, submitted annually to FERC, are representative of the costs that Algonquin will incur for natural gas used for fuel. See Harvey PFR at ¶ 9; Harvey PFT at ¶¶ 6-10. As discussed above, the Petitioners

elicited testimony at the Hearing from Mr. Harvey that the Applicant's parent, Enbridge, generally can include electric power costs in the operating and maintenance costs included when Enbridge establishes the rate for a new project where EMDs are used, and can negotiate those rates into customer contracts, but as I noted above, this testimony did not establish that this recovery could be done for the Weymouth Compressor station or the Atlantic Bridge project, for which all of the compressor stations are powered by gas-fired turbines. See Tr. at pp. 400-403.

Solar Turbines provided an estimate of the additional annual maintenance costs for a gas turbine driver, which are over and above the annual maintenance costs for an EMD driver of $207,403 per year. See Goodrich PFT ¶32, Ex. 1. Table 4-7 of the Amended Addendum shows a comparison of the direct annual costs associated with an EMD compressor driver vs. a Solar Taurus 60 turbine compressor driver. Amended Addendum Table 4-7; Goodrich PFT at ¶ 33.

A preponderance of the evidence supports the following findings. Algonquin provided a detailed cost-effectiveness analysis, including project capital costs and annual costs, even though it may not have been necessary to do so. In re: Masonite Corporation, supra. The costs included in the analysis were based on reliance on subject matter experts within the company, consistent past practices, conversations with the utilities and quotes from third party vendors. Heintz PFT; Tr. at pp. 321-322 (Mr. Heintz testifying that "[t]he scope of the project and the -- I guess the mission of the project is to provide safe and reliable natural gas delivery for our customers, and in order to achieve that, we need to provide the necessary infrastructure, which is the purpose of the Atlantic Bridge project.") These are all concrete, reliable and reasonable methods to determine costs and are not speculative. In re Three Mountain Power, LLC, 10 E.A.D.39, 58 (EAB 2001). I find, therefore, that the costs proposed and included in the BACT cost effectiveness calculation were appropriately proposed by the Applicant and evaluated by

MassDEP in its BACT calculation. The Petitioners did not offer a credible challenge to the costs associated with the construction of a substation at the compressor station, the Medium Voltage line installation at the compressor station, or the right of way costs associated with the infrastructure to power an EMD, and have therefore failed to meet their burden of going forward on these issues.

Interest Rate

The EPA Guidance recognizes that entities finance projects differently:

> Different firms may structure how they finance their purchases differently. Some may choose to finance their purchases through cash holding or other means of equity; some may choose to borrow to finance their investment. … For permit applications, if firm-specific nominal interest rates are not available, then bank prime rate can be an appropriate estimate for interest rates…

EPA Cost Control Manual, § 1, Chapter 2, Cost Estimation: Concepts and Methodology, at p. 15. To annualize capital costs, Algonquin determined an interest rate and project life to determine the capital recovery factor ("CRF"). Algonquin used the CRF to convert capital cost estimates into equivalent annualized costs, and, included it in the assessment of annual costs. Section 4.4.3.2.2 of the Amended Addendum contains Algonquin's CFR calculations. Amended Addendum § 4.4.3.2.2; Goodrich PFT at ¶ 35. Algonquin applied a 10.137% after tax interest rate because the Cost Control Manual recommends applying a nominal interest rate, which is the rate firms actually face. See Harvey PFT ¶¶ 12-14; Goodrich PFT at ¶ 35. Because it is "available" here, MassDEP used Algonquin's "firm specific nominal interest rate." Algonquin's nominal interest rate includes debt and equity, because that is how it financed the Atlantic Bridge Project, which includes the Facility. Harvey PFR at ¶¶ 2-6. The 10.137% "after tax rate of return," or weighted average of the rates Algonquin incurs for debt and equity, is the rate Algonquin actually incurred in financing—through a combination of debt and equity—the

Atlantic Bridge Project, and also would have incurred to finance an EMD at the Facility. Harvey PFR at ¶ 5. The equity component of the 10.137% cost of capital rate was included in the cost of service factors used to develop Algonquin's rates as approved by the FERC under Docket No. RP99-262, *et al.*, and, along with Algonquin's long term debt rate, was disclosed in Algonquin's FERC Financial Report Form No. 2. Harvey PFR at ¶ 6; Harvey PFT ¶ 14, Ex. 5. 10% is the rate that MassDEP's BACT form directs applicants to assume for an annualized cost analysis. See Application, Attachment C, Supplemental Forms, BWPD AQ BACT (Demonstration of Best Available Control Technology) p. 4 of 6. Algonquin calculated total annual costs by summing together the direct annual cost of replacing the proposed gas-fired turbine with an EMD (derived in Table 4-7 of the Amended Addendum), and the annual capital recovery on the total capital investment (derived in Table 4-6 of the Amended Addendum) to determine a single annualized cost estimate as shown in Table 4-8 of the Amended Addendum. Amended Addendum Tables 4-6, 4-7; Goodrich PFT at ¶ 35.

Based on his review of Algonquin's submittals, including its witnesses' testimony, Mr. Cushing testified that the capital costs for the EMD were annualized over a fifty-year period, using an interest rate based on current after-tax real rate of return, as calculated using Algonquin's 2019 FERC Financial Report Form No.2. Cushing PFT at ¶ 43, citing Harvey PFT, Exhibit 5. "It should be noted that the longer the service life and the lower the interest rate, the lower the annualized capital costs and the lower the cost effectiveness in dollars per ton." Id. He further testified that a fifty-year period for the economic life of the project exceeds the 10 to 20 years that EPA considers typical but is based on Algonquin's expected life of an EMD. Id., citing EPA's NSR Workshop Manual, Appendix B, page b.10. The interest rate of 10.137% is consistent with EPA guidance, which states "The value used in most control costs analyses is 10

percent in keeping with current EPA guidelines and Office of Management and Budget recommendations for regulatory analyses." Id., citing EPA's NSR Workshop Manual, Appendix B, page b.11. The interest rate of 10.137% represents Algonquin's true cost of capital, which comports well with EPA guidance, which states "In assessing these private decisions, interest rates that face firms must be used, not social rates." Id., citing EPA Cost Control Manual at p. 17.

Dr. Sahu criticized MassDEP's reliance on the EPA NSR Workshop Manual where EPA used the 10% interest rate in an example calculation because it was the current rate in 1990. He considered this reliance ludicrous. Sahu PFR at ¶ 16. He opined that the cost of borrowing, not the Applicant's desired rate of return, is the issue. He noted that as pointed out in the public comments, the cost of borrowing for Enbridge, the Applicant's parent company, "is far smaller than 10.137%." Id. Dr. Sahu proposed a 3% interest rate and included that in his own calculations.

The Town of Braintree argues that MassDEP's erroneous selection of a nominal interest rate is inconsistent with the EPA Cost Control Manual and interest rates available in 2020 and has the effect of vastly overstating the annualized capital costs. Braintree argues that Section 2.5.2 of the Cost Control Manual "clearly indicates that the interest rate that is selected should reflect its borrowing costs, not its rate of return." Braintree Closing Brief at p. 8. Braintree notes that Exhibit 5 to the PFT of Mr. Harvey (Algonquin's 2019 4th Quarter Financial report submitted to FERC) shows that "Algonquin itself utilized a rate of 3.54% on $350 million in long term debt and a 0.54 percentage rate for other borrowed funds." Braintree Closing Brief at p. 9. Given this, Braintree argues that there is no valid reason to utilize an interest rate of 10% or greater and the use of the higher rate is fatal to Algonquin's analysis. Id.

An interest rate above 10% may seem excessive in 2021, but there are several reasons why I find that it was appropriate for MassDEP to consider it in its analysis. First, the rate is consistent with the EPA Cost Control Manual, which focuses on the costs borne by a private entity for an action the private entity decides. EPA Cost Control Manual at Section 2.2. Here, the undisputed testimony was that the 10.137% rate "is the rate that Algonquin actually incurred in financing – through a combination of debt and equity – the Atlantic Bridge project." Harvey PFR at ¶ 5. As well, the First Circuit noted that a 10% interest rate was "reasonable". Town of Weymouth, supra, 961 F. 3d 34, 45. Dr. Sahu's testimony that a lower interest rate is appropriate and Enbridge, "with its superior credit" could borrow at lower rates, is not persuasive in the face of evidence that it is Algonquin Gas Transmission, LLC and not Enbridge that financed the project and at a rate of 10.137%. Here, the Applicant presented specific, undisputed evidence of how it actually financed the Atlantic Bridge project of which the compressor station is a part. Based on this evidence, I find that MassDEP appropriately applied the interest rate in the BACT analysis.

BACT Determination: Step 5

Based on all of the information presented to it and conducting a Top-Down BACT analysis, MassDEP concluded that an EMD was not BACT because even with the capital costs removed from the numerator, as shown below, the cost per ton of pollutants removed, whether the baseline emissions are 9 ppmvd or 25 ppmvd, far exceeded the cost effectiveness ranges in MassDEP's BACT Guidance. Cushing PFT at ¶ 68. MassDEP's calculations are as follows:

Using the 25 ppmvd turbine as the baseline

$$\text{(dollars per ton NOx removed)} = \frac{\$192{,}505}{\$5{,}836{,}737} = \frac{\$5{,}836{,}737}{30.32 \text{ tons} - 0.0 \text{ tons}}$$

$$\text{(dollars per ton CO removed)} = \frac{\$155{,}979}{\$5{,}836{,}737} = \frac{\$5{,}836{,}737}{37.42 \text{ tons} - 0.0 \text{ tons}}$$

$$\text{(dollars per ton removed aggregated)} = \frac{\$75{,}999}{\$5{,}836{,}737} = \frac{\$5{,}836{,}737}{76.8 \text{ tons} - 0.0 \text{ tons}}$$

Using the 9 ppmvd turbine as the baseline

$$\text{(dollars per ton NOx removed)} = \frac{\$581{,}928}{\$5{,}836{,}737} = \frac{\$5{,}836{,}737}{10.3 \text{ tons} - 0.0 \text{ tons}}$$

$$\text{(dollars per ton CO removed)} = \frac{\$337{,}744}{\$5{,}836{,}737} = \frac{\$5{,}836{,}737}{17.28 \text{ tons} - 0.0 \text{ tons}}$$

$$\text{(dollars per ton removed aggregated)} = \frac{\$161{,}370}{\$5{,}836{,}737} = \frac{\$5{,}836{,}737}{76.8 \text{ tons} - 0.0 \text{ tons}}$$

Cushing PFT at ¶ 68. I find that these calculations demonstrate that an EMD is not BACT because its costs exceed the applicable cost-effectiveness ranges in the MassDEP BACT Guidance.

CONCLUSION

For all of the foregoing reasons, I find that on Remand, MassDEP properly conducted a Top-Down BACT analysis in accordance with the First Circuit's remand decision and after a thorough analysis, properly determined that an EMD is not BACT. I recommend that the Department's Commissioner issue a Final Decision After Remand affirming the Air Permit.

Date: 1/11/2021

Jane A Rothchild
Presiding Officer

NOTICE- RECOMMENDED FINAL DECISION AFTER REMAND

This decision is a Recommended Final Decision After Remand of the Presiding Officer. It has been transmitted to the Commissioner for his consideration. This decision is therefore not a Final Decision After Remand subject to reconsideration under 310 CMR 1.01(14)(d), and may not be appealed to Federal Court pursuant to the federal Natural Gas Act, 15 U.S.C. § 717r(d)(1) and M.G.L. c. 30A, §14(1).

Because this matter has now been transmitted to the Commissioner, no party shall file a motion to renew or reargue this Recommended Final Decision After Remand or any part of it, and no party shall communicate with the Commissioner's office regarding this decision unless the Commissioner, in his sole discretion, directs otherwise.

SERVICE LIST

IN THE MATTER OF:
Docket Nos. 2019-008, 009, 010, 011, 012, 013

ALGONQUIN GAS TRANSMISSION, LLC

Weymouth

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