

**BEFORE
THE OHIO POWER SITING BOARD**

In the Matter of the Application of The Ohio)	
State University for a Certificate of Environmental)	
Compatibility and Public Need for a Combined)	Case No. 19-1641-EL-BGN
Heat and Power Generating Facility in Franklin)	
County, Ohio)	

**APPLICANT THE OHIO STATE UNIVERSITY'S
POST-HEARING REPLY BRIEF**

August 19, 2020

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I. INTRODUCTION

Sierra Club claims that nothing new can ever be built in Ohio unless the applicant can show through extensive studies that the facility represents the minimum possible environmental impact as compared to every other alternative—feasible or not. Sierra Club has not identified a single feasible alternative. Sierra Club claims that this showing must ignore common sense and industry expertise, and instead each and every conceivable alternative must be included in “studies” or an integrated resource plan of some type. Sierra Club cites no Ohio authority in support of its position. Sierra Club can cite no authority because this is not Ohio law. As was recognized by Staff’s testimony at hearing, this has never been the standard in Ohio. Accordingly, Sierra Club’s arguments all fail as a matter of law.

Even assuming, *arguendo*, The Ohio State University (“Ohio State”) was obligated to consider the generation alternatives identified by Sierra Club, Sierra Club still loses. Not only did Ohio State consider Sierra Club’s preferred solutions of heating hot water and geothermal heat, **Ohio State has already installed both types of systems on campus and would like to expand those systems.** This is expressly stated in the same record evidence Sierra Club relies on to establish the benefits of those technologies. Ohio State also expressly testified why those

technologies were not technically or economically feasible to meet Ohio State's needs. It is therefore difficult to understand how Sierra Club can argue that Ohio State failed to consider technologies that Ohio State is installing on campus and which Ohio State plans to continue to expand even after the CHP is approved.

Sierra Club has failed to present any evidence of the cost of any of its proposals. While perhaps theoretically Ohio State could purchase 700 acres of additional land in an urban environment to install solar panels to generate the equivalent amount of energy as the CHP, or spend \$500 million or more to replace the entire steam network, neither is financially feasible. Even if Ohio State could replace the entire steam network, doing so would not eliminate Ohio State's need for significant volumes of steam for several on campus hospital and medical research facilities. To install local steam generators at each location would add significant capital requirements on top of the \$500 million necessary to replace the steam network. Ohio has a long history of considering cost in the construction of generation facilities. As Ohio State is the entity responsible for bearing all costs associated with meeting its energy goals, its opinion as to what technology is financially the most feasible for the university should be given deference.

Finally, Sierra Club takes issue with the environmental impacts of the CHP. The undisputed record evidence shows that the CHP will have, at most, a *de minimis* environmental impact on the surrounding area. In fact, modeling shows that the highest concentration for any pollutant, using the most conservative possible assumption, at the nearest sensitive location is less than 2% of the relevant air quality standard. Sierra Club presents no evidence of any kind to rebut this study, and instead simply states that any increase in particulate matter emissions must be avoided because "there is no safe level" of those pollutants. Once again, this is not the law. All relevant standards have been well established by the EPA, and the facility is well within acceptable

levels. This is shown by the fact the Ohio EPA has already granted all applicable permits to this facility. Once again, while Sierra Club may wish the law to change, that is an issue to raise with the state or federal legislatures.

Sierra Club's true objection to the CHP is revealed in its final objection. Sierra Club claims that Staff and Ohio State erred by failing to take into account the environmental impacts associated with natural gas extraction when it decided to build this facility. Once again, this is a standard created out of whole cloth by Sierra Club. Ohio law does not require a generation source to take into account the impacts of each of its components in construction or operation. Even if such an analysis was possible, no Ohio applicant has ever been asked to somehow calculate those far reaching impacts. For example, solar facilities are not required to calculate the impacts of the lead used in their batteries, the cadmium used to construct the panels, or the environmental impacts associated with disposal of the panels. Ohio State should be treated the same way as every other Ohio applicant, and its Application determined based on the facility proposed.

Ohio State has proposed a technology that is extremely efficient. A CHP meets Ohio State's thermal needs in a way that actually works from a technical perspective. CHP also provides electrical energy that will allow the campus to manage its costs and exposure to the PJM market while reducing Ohio State's carbon footprint. CHP provides increased reliability for the campus and the hospitals that need consistent heat and power.

In fact, Sierra Club's own prior public statements specifically support CHP technology akin to the technology at issue in this case. Sierra Club has previously identified CHP as a "preferred energy resource" which can be located in urban environments.¹ Sierra Club also

¹ Public Comment of Jordan Clark filed August 5, 2020, Sierra Club Energy Resources Policy, pp. 9, 14.

correctly states that CHP “can share many attributes (minimal impacts, elimination of need for transmission, etc.) with building or process efficiency measures and may often be done as part of a combined project” like Ohio State is pursuing here.² Sierra Club also admits that distributed generation like CHP “can reduce the distance needed for transmission and distribution of power to decrease transmission losses and improve grid stability and reliability.”³ Further, Sierra Club acknowledges that “[e]fficient CHP systems produce both electricity and steam or other useful heating or cooling services, **providing the most value and least pollution from a fuel source.**”⁴ Ohio State agrees with Sierra Club’s past public statements. The CHP meets Ohio State’s needs by efficiently creating electricity, thermal, and reliability benefits while reducing Ohio State’s carbon footprint.

In light of Sierra Club’s past public statements, Sierra Club’s current opposition appears caused by a general opposition to fracking more than an objection to CHP generally. There is only one intervenor in this case, and Sierra Club’s objections are targeted at national policy goals adverse to natural gas instead of issues with this facility specifically. As those general objections to natural gas extraction are not valid grounds to oppose an Ohio Power Siting Board Application, Sierra Club’s arguments should be rejected, and Ohio State’s Application should be approved.

II. ARGUMENT

A. Sierra Club misstates the relevant Ohio legal standard.

Sierra Club misunderstands Ohio’s legal standard when claiming Ohio State must present, and the Board must consider, what is essentially an integrated resource plan as part of this

² *Id.* p. 9.

³ *Id.* p. 12.

⁴ *Id.* p. 14 (emphasis added).

Application proceeding.⁵ Rather, under Ohio law Ohio State is only required to show statutory compliance with its chosen generation option. Ohio State is not required to show that its chosen option is the least environmental impact of any possible option, as Sierra Club incorrectly contends. Nor can Sierra Club point to any legal requirement mandating either the Ohio EPA or the Board to conduct an independent analysis of the possible pollution resulting from the chosen fuel source.⁶

1. **Environmental impact is not the sole consideration for the Board.**

R.C. § 4906.10(A)(3) states the Board should not grant a certificate unless the facility represents the “minimum adverse environmental impact, considering the state of available technology and the nature and economics of the various alternatives.” Sierra Club’s argument is focused on environmental impact and fails to adequately consider whether its proposed alternatives are feasible or economically viable.

In support of its overly restrictive interpretation, Sierra Club relies heavily on a procedural decision from *In Re Am. Mun. Power-Ohio, Inc.* (“AMP-Ohio”).⁷ Sierra Club largely ignores the analysis of the Commission in its Opinion and Order, and entirely ignores the AMP-Ohio April 28, 2008 Entry on Rehearing⁸ that outright rejected Sierra Club’s position. To avoid any possible ambiguity, Ohio State will discuss all three decisions and show that AMP-Ohio actually supports Ohio State’s position in this case.

⁵ Sierra Club Initial Brief (“SC Br.”) p. 2.

⁶ Tr. 329–30.

⁷ *In Re Am. Mun. Power-Ohio, Inc.*, Case No. 06-1358-EL-BGN, Opinion, Order and Certificate (Mar. 3, 2008) (“AMP-Ohio”) (“Order”).

⁸ *In Re Am. Mun. Power-Ohio, Inc.*, Case No. 06-1358-EL-BGN, Entry on Rehearing (Apr. 28, 2008) (“Entry on Rehearing”).

AMP-Ohio involved an application for a certificate of environmental compatibility and public need to construct a 960 MW coal-fired electric generation facility. Sierra Club intervened and argued, just like this case, that there was insufficient evidence of the environmental impact of issues beyond the plant itself by the applicant. In *AMP-Ohio*, the additional issue was the climate change impacts of coal. In the instant case, the additional issue in dispute is the climate change impact associated with the extraction of natural gas. In *AMP-Ohio*, Sierra Club also argued, just like this case, that AMP-Ohio had the burden of evaluating additional alternatives such as renewable generation and had failed to meet that burden.

In the entry relied on by Sierra Club, the Attorney Examiner rejected a motion *in limine* filed by AMP-Ohio which sought to limit discussion of carbon impacts or generation alternatives.⁹ Just like in this case, Sierra Club was allowed to present all of its evidence.

In the merits decision, the Board rejected Sierra Club's arguments in its Opinion and Order dated March 3, 2008. Just like in this case, AMP-Ohio presented evidence that its preferred generation source fit its needs better than the renewable alternatives proposed by Sierra Club. Sierra Club responded by arguing, just like this case, that anything other than the lowest possible environmental impact must be rejected.¹⁰ Also just like in this case, Sierra Club argued that the applicant had a "burden" to present studies showing its consideration of proposed alternatives.¹¹ Again just like this case, Staff and the applicant pointed out that R.C. § 4906.10 specifically allows

⁹ *In Re Am. Mun. Power-Ohio, Inc.*, Case No. 06-1358-EL-BGN, Entry (Dec. 4, 2007), p. 5 ("Limine Entry").

¹⁰ Order p. 8 ("The Citizen Groups claim that AMP-Ohio also failed to factor environmental impacts into its consideration of alternatives. The Citizen Groups argue that Section 4906.10(A), Revised Code does not allow an applicant to reject an alternative simply because it might cost a little more. Instead, the statute requires the Board to determine whether there are alternatives with less environmental impact and to consider those alternatives.").

¹¹ Order p. 11 ("the Citizen Groups claim that AMP-Ohio has improperly rejected less environmentally damaging alternatives. . . . The Citizen Groups argue that it is AMP-Ohio's burden to evaluate such alternatives and to justify any rejection of them.).

the Board to consider additional factors beyond environmental impact.¹² Staff acknowledged the applicant's evidence of a diversified energy portfolio and that renewable resources were not a satisfactory substitute for the reliable generation needed by the applicant.¹³ After weighing all of the reasons the applicant selected this fuel source, the Board approved the coal plant's certificate.¹⁴

On rehearing, Sierra Club argued the Board failed to consider carbon dioxide emissions, failed to consider alternatives, and specifically failed to consider renewable alternatives not presented by AMP-Ohio.¹⁵ The Board rejected each of these arguments, pointing out that it could approve the project after taking environmental impacts into account even though there might theoretically be a lower carbon option that was not commercially viable.¹⁶ Sierra Club's position was rejected because, just like this case, it failed to show that its preferred option was actually feasible.¹⁷

It is also noteworthy that in *AMP-Ohio*, the Board specifically rejected Sierra Club's arguments that the Board was obligated to consider energy efficiency and renewable energy alternatives to the coal plant, or that it was obligated to consider a hypothetical gas plant. In pertinent part, the Rehearing Entry held "[t]he Citizen Groups have cited no legal precedent to support their contention that the Board should limit any certification for the proposed [coal plant]

¹² Order p. 11 ("Staff states that, under the plain language of Section 4906.10(A)(3), Revised Code, the determination that the proposed facility represents the minimum adverse environmental impact is required to be made "considering the state of available technology and the nature and economics of the various alternatives." The Staff argues that AMP-Ohio presented extensive evidence regarding its already diversified energy portfolio and that alternative energy sources and energy efficiency measures, either individually or in the aggregate, cannot serve as adequate substitutes for the approximately 1000 MW of base load capacity represented by the proposed AMPGS.").

¹³ *Id.*

¹⁴ Order p. 12.

¹⁵ *Id.* pp. 1–3.

¹⁶ Entry on Rehearing, p. 2–4.

¹⁷ *Id.*

to the amount of needed generation that cannot be satisfied through alternatives based on the record of this case.”¹⁸

The Board also specifically found it noteworthy that the renewable generation proposed by Sierra Club had a lower capacity factor than the generation at issue in that case and was not dispatchable like baseload coal or gas.¹⁹ Again just like this case, Sierra Club failed to identify any practical renewable alternative to the proposal at issue in the case:

The Citizen Groups do not dispute or otherwise address the lower capacity factors for wind and hydroelectric generation. Likewise, the Citizen Groups do not explain how wind and hydroelectric generation are comparable alternatives to the proposed AMPGS given the fact that these resources are not dispatchable. Therefore, the Board finds that the record in this proceeding supports our conclusion that there is no feasible combination of energy efficiency measures and generation resources based upon renewable resources which could serve as an alternative to the proposed AMPGS facility.²⁰

This is precisely the same situation as this case. Just like in *AMP-Ohio*, Sierra Club attempts to impose a burden on Ohio State to show that Ohio State has selected the least environmental impact without regard to other considerations. However, “the state of available technology and the nature and economics of the various alternatives” are important and are specifically mentioned as statutory considerations that must be balanced with environmental impact. Ohio State needs the thermal output of this facility in order to heat its campus. Ohio State needs the electrical output from this facility to improve reliability and provide reliable power to campus. Those considerations are simply not possible to meet using Sierra Club’s stated preferred alternatives. As such, Sierra Club’s reliance on *AMP-Ohio* is misplaced.

¹⁸ Entry on Rehearing, p. 6.

¹⁹ Entry on Rehearing, p. 5–6.

²⁰ Entry on Rehearing, p. 6.

2. Ohio State is not required to provide a formal “study” for every possible generation alternative.

Sierra Club repeatedly claims that Ohio State should have conducted at least nine additional “studies” to address topics of interest to Sierra Club.²¹ Most importantly, Sierra Club is factually incorrect that Ohio State did not consider those items. As discussed in great detail below, Ohio State has specifically considered each of these issues and rejected Sierra Club’s proposals as unworkable. It simply does not take a formal study to determine that Ohio State does not have 700 nearby acres that can be devoted to a solar farm which, even if installed, would not provide the same thermal and reliability benefits of the CHP due to its cost and intermittent nature.²²

What is relevant in this section of Sierra Club’s brief is the complete lack of authority supporting Sierra Club’s position that Ohio State had a legal burden to present these studies.²³ Sierra Club identifies nothing in Ohio law which requires Ohio State to present these “studies” in its Application. There is a good reason for Sierra Club’s silence on this point, because the Application process is arduous and imposes extensive requirements on applicants. None of the “studies” requested by Sierra Club are obligated to be produced, and thus Sierra Club is incorrect as a matter of law when it argues Ohio State had the obligation to provide that information.

It is also worthwhile to note that, despite the opportunity for discovery, Sierra Club failed to present any viable alternatives of its own for the Board’s consideration. For example, while Sierra Club repeatedly claims that thermal needs can be met in part through geothermal energy,

²¹ See, e.g., SC Br. p. 8 (Ohio State should have conducted a “formal study” of renewable generation); 9–10 (“geothermal energy as a campus-wide solution to [Ohio State’s] heating needs”); 10 (heat recovery chillers); 10 (steam-to-heated hot water conversion projects at other universities); 10 (the cost of complexly replacing Ohio State’s steam system); 10 (hour by hour analysis of heat and cooling); 15 (the reliability of the PJM grid); 15 (alternative means of providing islanding capacity); and 24 (bids for offsite renewable generation).

²² Tr. 104.

²³ See SC Br. p. 8–10, 15, 24.

Sierra Club presented no evidence that Ohio State has enough available and technically suitable land on its campus to install such facilities. Similarly, Sierra Club did not even understand that Ohio State already uses heating hot water on campus, let alone the massive costs of replacing the steam network immediately. Ohio law simply does not require Ohio State to provide a formal “study” for each hypothetical proposed by an intervenor.

Ohio State has made clear its firm commitment to reducing its carbon footprint. The CHP will reduce Ohio State’s carbon footprint by 35% during the first year of operation.²⁴ As part of that commitment, Ohio State is currently a party to the Blue Creek Wind Farm 50 MW wind contract, which is one of the largest renewable projects in Ohio.²⁵ The unrefuted testimony at hearing was that Ohio State is interested in expanding its renewable portfolio even if the CHP is approved. Ohio State witness Mr. Scott Potter testified: “We constantly consider renewable energy and will continue to do so as evidenced by our 50 megawatt wind purchase which was at the time the largest public university direct renewable wind purchase in the country.”²⁶

Sierra Club repeatedly claims that Ohio State should have considered alternatives like off-site renewables or on-campus geothermal. In addition to being factually inaccurate, this is inconsistent with Board precedent. Once again, this is shown by the very case relied on by Sierra Club, *AMP-Ohio*. There, the evidence showed that just like Ohio State, AMP-Ohio was responsible for managing power for a large system. Just like Ohio State, AMP-Ohio had a diversified portfolio of generation assets, including a commercial wind farm like Blue Creek.²⁷ Also like Ohio State here, AMP-Ohio indicated an interest in additional renewable projects in the

²⁴ Tr. 11.

²⁵ Tr. 89.

²⁶ Tr. 192.

²⁷ Order p. 13.

future, but explained those potential future renewable projects would not replace the facility at issue before the Board.²⁸ Once again, as shown by the case relied on by Sierra Club, Sierra Club's myopic view of Ohio law is simply not accurate.

3. Ohio State is not required to comply with hazardous waste standards.

As there is no Board precedent supporting Sierra Club's unique interpretation of R.C. § 4906.10(A)(3), on brief Sierra Club relies on precedent applicable to hazardous waste facilities. Sierra Club mischaracterizes the Ohio Supreme Court's findings in *State of W. Va. v. Ohio Hazardous Waste Facility Approval Bd.*,²⁹ concerning hazardous waste facility permits for facilities issued under a completely different statutory framework, to support its claim that an applicant must "produce evidence of alternative technologies in order to prove that its facility represents the minimum adverse environmental impact."³⁰ Sierra Club's argument fails for several reasons.

First, *Ohio Hazardous* concerned an application for a hazardous waste facility permit issued under R.C. Chapter 3734—not an application to construct a CHP under R.C. Chapter 4906. Sierra Club has failed to identify any circumstance where this completely different statutory scheme was applied in the power siting context. Indeed, in light of the obvious differences between hazardous waste facilities governed by R.C. § 3734.05 and electrical generation facilities, there is a good reason the Board has never applied this standard in the power siting context. Hazardous facility applications must consider the nature of the volume to be treated, the type of waste to be stored, compliance with EPA hazardous waste standards, and the risk of fire and explosion from

²⁸ Order p. 13.

²⁹ *State of W. Va. v. Ohio Hazardous Waste Facility Approval Bd.*, 28 Ohio St.3d 83, 502 N.E.2d 625 (1986).

³⁰ SC Br. p. 1.

waste transportation/storage.³¹ Obviously none of that information is relevant here, and so Sierra Club’s inapplicable standard should be discarded on that basis alone.

Further, the portion cited by Sierra Club³² was an *argument* advanced by appellant in *Ohio Hazardous*, it was not a *finding* by the Ohio Supreme Court.³³ In fact, the Court found that the proposition had no application to the case before it.³⁴ In *Ohio Hazardous*, appellant contended that the Hazardous Waste Facility Approval Board had illegally relieved the applicant of its burden to prove minimal impact and to adduce evidence of alternative technology.³⁵ The Court acknowledged the statute at issue—R.C. 3734.05(C)(6)(c)—normally would require the Hazardous Waste Facility Approval Board to “evaluate the nature and economics of alternative technologies to determine whether a more advanced, more environmentally protective technology can and should be utilized,” but that “where an applicant demonstrates that the technology it proposes is the most advanced, most environmentally protective technology available, no further examination of other technologies is necessary.”³⁶ The Court held that “[t]he board’s determination that the proposed technology was the most advanced is itself a finding that alternative technologies were inferior, thereby fulfilling the requirement for such a finding” under the statute.³⁷ In so holding, the Court noted that “**the board should not be required to waste its time evaluating systems demonstrated to be inferior.**”³⁸

³¹ R.C. § 3734.05(D).

³² SC Br. pp. 1–2.

³³ See *Ohio Hazardous*, 28 Ohio St.3d at 84.

³⁴ *Id.*

³⁵ *Id.*

³⁶ *Id.*

³⁷ *Id.* at 84–85.

³⁸ *Id.* at 85 (emphasis added).

The Court also rejected appellant’s contention that the board improperly failed to consider alternative sites for the proposed facility, noting that “R.C. 3734.05 contains no requirement that the board consider alternative sites in every case.”³⁹ Rather, the “board must consider alternative sites only if it deems such evidence to be a ‘pertinent consideration’ under R.C. 3734.05(C)(6)(c), but is under no statutory obligation to do so.”⁴⁰ Accordingly, Sierra Club’s reliance on *Ohio Hazardous* to claim that Ohio State must produce evidence of alternative technologies in order to prove that its facility represents the minimum adverse environmental impact is without merit, is simply not supported by any relevant Ohio case law, and is not the standard that is applied to an application case under R.C. Chapter 4906.

Sierra Club’s argument is also factually incorrect. As discussed extensively at the hearing and addressed in much more detail below, Ohio State presented a Feasibility Study that contains extensive analysis of various sites and configurations which ultimately led to the selection of the equipment considered within the Application.⁴¹ Similarly, the testimony at hearing included extensive discussion of the considerations of alternatives by Ohio State, and why those alternatives were rejected in favor of the more efficient CHP plant proposed by Ohio State.

4. Gas extraction impacts are not considered in the Board process.

Sierra Club objects because Ohio State did not include the environmental impacts associated with extraction of natural gas.⁴² Ohio law simply does not require the environmental impacts of fuel sources to be addressed by applicants as requested by Sierra Club. This is further evidenced by the fact that Staff also does not include any environmental impacts of gas extraction

³⁹ *Id.*

⁴⁰ *Id.*

⁴¹ Ohio State Ex. A (Tufekci Direct), Ex. 4.

⁴² SC Br. p. 22–23.

as part of its analysis.⁴³ Sierra Club has identified no Ohio case where this standard was applied. There is simply no authority suggesting that the Board must take fuel extraction impacts into account, and it would prejudice Ohio State for such a standard to be created now.

B. The record evidence supports approving the application.

As stated above, the four principal considerations used to determine that the proposed CHP is the best solution to address Ohio State’s energy needs were the cost considerations, Ohio State’s thermal needs, the electricity needs and benefits, and the reliability benefits.⁴⁴ As evidenced by Sierra Club’s arguments, Sierra Club has a misunderstanding of the facts concerning each of these principals. The record evidence shows that the CHP complies with all aspects of Ohio law and is the best possible solution to meet Ohio State’s needs.

Standard certificate applications for electric generation facilities must adhere to the requirements set forth in Ohio Administrative Code (“OAC”) 4906-3 and 4906-4, addressing specific procedural requirements for filing standard certificate applications and the rules governing such applications, respectively. Throughout these rules, there are only two references to “alternatives,” neither of which imposes a duty on an applicant to consider alternatives such as solar and wind when seeking certification.

The first reference to alternatives is found in OAC 4906-3-05 (“Alternatives in standard certificate applications”), which states that standard certificate applications “may include information on additional alternatives, which may include site, route, major equipment, or other alternatives.”⁴⁵ Because use of the word “may” is permissive, this rule makes clear that including

⁴³ Tr. 372 (“Q. Did you or anyone on the Staff review the ecological impacts of the extraction of natural gas for the proposed facility? A. No.”); Tr. 391 (“Q. Did you inquire into the environmental impacts associated with the extraction and transportation of that gas? A. No.”).

⁴⁴ Tr. 109–110, 190–192.

⁴⁵ OAC 4906-3-05 (emphasis added).

alternatives in an application is not required.⁴⁶ Nor does it impose a duty upon an applicant to consider alternative sources when seeking certification. This concept has previously been addressed in the context of a standard certificate application for a generation facility.

In *In re Air Products and Chemicals, Inc.*, (“*Air Products*”),⁴⁷ the applicant, Air Products, requested a waiver of OAC 4906-5-04(A), which at the time stated that an applicant for electric power generating facilities *may* choose to include fully developed information on two or more sites in its application. Staff stated that it did not believe that the waiver request was necessary, and the Administrative Law Judge (“ALJ”) agreed. The ALJ noted that OAC 4906-5-04(A) “is permissive, providing that an applicant *may* choose to provide information on two or more sites; however, the rule does not require an applicant to provide information on multiple sites,” and therefore waiver was not necessary.⁴⁸ The same concept applies here.

Indeed, if generation source alternatives were required to be included in standard certification applications, such as the Application at issue here, then Staff would have found the application to be deficient at the outset, and would have required Ohio State to either include this additional information in its application or seek waiver of the alleged requirement. This did not happen, however, because just like the alternative sites in *Air Products*, alternatives sources are not required to be included in standard certification applications under OAC 4906-3-05—as evidenced by use of the permissive word “may”—and therefore no waiver would be necessary.

⁴⁶ See *In re Application of Ormet Primary Aluminum Corp.*, 129 Ohio St.3d 9, 2011-Ohio-2377, 949 N.E.2d 991, ¶¶ 16–17 (noting that a statute “speaks only in permissive terms” because it used the permissive term “may” and “does not use any mandatory terms, such as ‘must’ or ‘shall’”); see also *State ex rel. Niles v. Bernard*, 53 Ohio St.2d 31, 34, 372 N.E.2d 339 (1978) (“usage of the term ‘may’ is generally construed to render optional, permissive, or discretionary the provision in which it is embodied”).

⁴⁷ *In the Matter of the Application of Air Products and Chemicals, Inc. for a Certificate of Environmental Compatibility and Public Need to Construct a Waste Energy Recovery/Combined Cycle Electric and Steam Generation Facility in Middletown, Ohio*, Case No. 10-847-EL-BGN, Entry (Oct. 28, 2010).

⁴⁸ *Id.*

The second reference to alternatives is found in OAC 4906-4-03(B), which requires an applicant to provide a detailed description of the proposed generation facility.⁴⁹ Again, this rule does not appear to impose any duty or specific requirement on an applicant to consider alternatives such as wind and solar in its application.

1. Cost Considerations.

a. Ohio State considered a variety of alternatives

There is no authority requiring the Board to conduct an integrated resource planning process before approving the facility. As the applicant, Ohio State's decision as to which facility will most cost-effectively meet its thermal and energy needs is entitled to substantial deference.⁵⁰ Ohio State's current electric need can range from 40–110 MW.⁵¹ Ohio State's current thermal demand is 153 MW thermal.⁵² While the technologies identified by Sierra Club each have their place, the technologies are not technically or economically feasible to address Ohio State's needs. Ohio State has carefully and thoroughly determined that the proposed CHP facility most feasibly addresses its needs.

Sierra Club's repeated claim that "OSU Failed to Investigate Alternatives to the Outdated Proposed CHP Technology for Either Its Heating or Electrical Needs" is simply not true.⁵³ Sierra Club has failed to show that any of these technologies, or a combination of them, would replace

⁴⁹ See OAC 4906-4-03(B).

⁵⁰ The Board routinely takes applicant cost preferences into account when making these decisions. See, e.g., *In the Matter of the Application of American Transmission Systems, Inc. for a Certificate of Environmental Compatibility and Public Need for the Construction of the Lake Avenue Substation Project*, Case No. 14-2162-EL-BSB, Opinion, Order, and Certificate (Jan. 1, 2015) (addressing cost preference of applicant); *In the Matter of the Application Of AEP Ohio Transmission Company, Inc. for a Certificate of Environmental Compatibility and Public Need for the Ginger Switch-Vigo 138 kV Transmission Line Project*, Case No. 17-638-EL-BTX, Opinion, Order, and Certificate (Nov. 15, 2018) (same).

⁵¹ Tr. 100.

⁵² Tr. 167.

⁵³ SC Br. p. 8.

the CHP. At most, Sierra Club has claimed that Ohio State's needs "can likely be met through conversion to a heated hot water system, with thermal generation provided through heat exchangers and supplemented by geothermal wells."⁵⁴ Rather than supporting its claim with evidence and testimony showing those technologies would meet Ohio State's needs, Sierra Club tries to reverse responsibility for proving its claims by alleging that Ohio State should have presented evidence anticipating, and then rebutting, Sierra Club's claims.⁵⁵ As discussed above, Sierra Club is incorrect as to the relevant legal standard. Ohio State is not required to anticipate and rebut every potential option Sierra Club deems "likely." Sierra Club is also factually incorrect because Ohio State knew that these options were not technically and/or economically feasible to meet Ohio State's needs as well as the CHP can.

As discussed extensively in the Feasibility Study and in the testimony at hearing, Ohio State squarely addressed each of the options proposed by Sierra Club. Each option is not as advantageous as the CHP.

(i) Heating Hot Water

Ohio State's steam network is extensive. It is simply not feasible to replace it with a heating hot water system immediately. As a preliminary matter, despite Sierra Club's claims to the contrary,⁵⁶ Ohio State does have hourly (and in some cases minute by minute) data on the heating and cooling needs of its system, as "an hourly analysis of thermal load on campus" was

⁵⁴ SC Br. p. 12 (emphasis added).

⁵⁵ SC Br. p. 12.

⁵⁶ SC Br. p. 10.

conducted.⁵⁷ This was repeatedly addressed at hearing.⁵⁸ While the detail of that analysis (which is quite extensive) was not included in the Feasibility Study, it exists and was considered.

Sierra Club also fails to acknowledge Ohio State's current use of heat recovery chillers. Ohio State Exhibit C provides a list of 27 campus buildings (including Ohio Stadium and the Schottenstein Center) where Ohio State either has installed, or is in the process of installing, such heat recovery chillers.⁵⁹ Ohio State explained that while it would like to pursue all those projects immediately, that is simply not feasible. Before heat recovery chillers are installed in a building, a complete audit is performed, often consisting of over 200 pages of analysis of each and every technology Ohio State could utilize to save energy.⁶⁰ Based on that analysis, Ohio State determines what would be the most beneficial and cost-effective technology for that specific building.⁶¹ While that includes heat recovery chillers, there are circumstances where they are not appropriate or cost effective on a building by building basis.

As Ohio State explained at hearing, while heat recovery chillers can be helpful, they only offset a certain amount of energy usage. Ohio State is constantly constructing new buildings, including new hospitals which will be served by this CHP.⁶² Heat recovery chillers can serve some of that load, but not the volume needed by Ohio State.

⁵⁷ Tr. 83.

⁵⁸ Tr. 83 ("Q. So OSEP did conduct an hourly analysis of thermal load on campus. A. Yes."); Tr. 83 ("A. I think I already answered in my previous answer that on a building-by-building basis, we do look at hourly consumption data, cooling and heating demands at the same time because that's the way heat recovery chillers can be considered and, if feasible, can be designed and implemented. Q. And those studies have been conducted at the building level, correct? A. That is correct."); Tr. 166 ("We track thermal load on an hour-by-hour basis and to a certain degree on a building-by-building basis as well. I'm saying to a certain degree because part of the concession agreement also includes implementing a smart meter program, over a thousand smart meters in a four-year -- four-year window that includes electricity, chilled water, steam, hot water. We had about 60 -- 75 percent complete in this implementation so those were things that where the smart meters are installed we do get an hourly data, in fact, minute level data.").

⁵⁹ Tr. 177.

⁶⁰ Tr. 178.

⁶¹ Tr. 178.

⁶² Tr. 178.

(ii) Geothermal

Ohio State has already installed geothermal generation on campus and uses it to serve some of the heating and cooling load of several campus buildings.⁶³ Since 2013, Ohio State has been using geothermal generation to heat portions of 5 residence halls.⁶⁴ However, geothermal at a scale comparable to the thermal output of the CHP would require extensive real estate which Ohio State's urban environment does not provide. Contrary to Sierra Club's claim that Ohio State did not consider geothermal, Mr. Tufekci testified at hearing that Ohio State did consider all possible technologies, but did not find geothermal to be a viable option due to the lack of available land, the scale of heating required on campus, and the non-heating related steam required on campus.⁶⁵ Staff also testified that geothermal was not a viable option for Ohio State, noting the previous issues Ohio State encountered when installing a prior geothermal project on campus.⁶⁶

(iii) On-site renewable generation

On-site renewable generation is similarly not feasible. On-campus solar would require approximately 700 acres to install in a nameplate size comparable to the CHP.⁶⁷ Nameplate size

⁶³ Tr. 70–71.

⁶⁴ Sierra Club Ex. C, p. 11; Tr. 72.

⁶⁵ Tr. 70 (“As part of the concession agreement, we did consider any technology that’s commercially available to be implemented on campus at any given time, not specific to this project. For the record, as we speak, we have over 40 projects that are either completed or in the process of being designed or implemented. The CHP is one of them; therefore, we do consider all technologies that are available. Neither OSEP nor Axium or ENGIE are technology manufacturers. We are not tied to any one technology.

But based on University available land on the University, or lack thereof, and based on the scale of heating required on campus and based on the scale of non-heating-related steam re-quired on campus, we’ve considered that geothermal is not an alternative to a CHP facility.”).

⁶⁶ Tr. 388–89 (“I did research geothermal to an extent. I found that the University did install geothermal a few years ago and it seemed to be overbudget. And then also on page 17 of the application from – page 16, “These cavernous zones” -- at the bottom line “These cavernous zones created many problems during well development for this geothermal project including guisers spouting out previously drilled holes while drilling new wells.” So there were some issues with the geothermal project that was – that was begun or initiated a few years ago at the University. The proposal in front of us is a combined heat and power project, so we looked at that project and we looked at the technology that they would install and we -- we did not look at – we didn’t propose another alternative for the Applicant. We -- they proposed a CHP project. We looked at it. We looked at what was proposed in front of us.”).

⁶⁷ Tr. 104.

is not comparable because solar performance degrades through the day and in high or low temperatures.⁶⁸ Even if solar were installed, to be reliable such a system would also require installation of batteries at a scale never before seen in Ohio, and still would not address Ohio State's thermal needs. In light of these deficiencies it is obvious this is not a reasonable or cost effective alternative to the CHP.

(iv) Off-site renewable generation

As is expressly addressed in the Feasibility Study, off-site renewable generation is expected to cost roughly \$64/MWh to have delivered to Ohio State's campus, even assuming a \$35/MWh PPA price. This is more costly than the CHP, would still be intermittent, and would not address Ohio State's thermal needs. Once again, this is not a viable alternative to the CHP.

(v) Sierra Club ignores the record evidence showing Ohio State considered these alternatives.

As shown by the extensive record evidence cited above, it is simply inaccurate to say Ohio State failed to consider these items. As one representative example, Sierra Club makes the broad claim that "Ohio State also did not consider constructing its own *on-site* renewable generation resources to meet the electricity needs the proposed facility is intended to fulfill."⁶⁹ This is not consistent with the record evidence. In the answer quoted, Sierra Club asked Mr. Tufekci if on-site renewable generation resources could be constructed "as an alternative to the proposed

⁶⁸ Tr. 104.

⁶⁹ SC Br. p. 14.

facility.”⁷⁰ Mr. Tufekci correctly answered it could not because “it’s physically unfeasible to get to the scale needed on campus.”⁷¹

This is further addressed in Ohio State’s Climate Action Plan.⁷² Ohio State’s Climate Action Plan expressly considers on-campus renewable generation and finds it to be infeasible due to a shortage of available real estate.⁷³ It further found that an on-campus solar farm with the same capacity as the average campus load would require a footprint of 700 acres of land.⁷⁴

Even if Ohio State were to somehow find 700 acres of urban land to install such a facility, the energy generation still would not equal the energy generated by the CHP because such a solar facility would have a nameplate capacity of between 100–120 MW. Mr. Tufekci explained the solar nameplate capacity will not produce electricity as reliably as the CHP. “Again, this is rated capacity meaning on a sunny day around noon, it would produce that power. In the morning it won’t. In the afternoon it won’t. When it’s cloudy, it is going to be less, and when it’s nighttime, it will be zero.”⁷⁵ He quantified this difference by explaining that solar in Columbus, Ohio would have a capacity factor of between 14–15%.⁷⁶

Mr. Potter provided a concise answer explaining why no formal study evaluating on-site renewable generation in lieu of the CHP was provided:

⁷⁰ Tr. 88.

⁷¹ Tr. 88.

⁷² Sierra Club Ex. C.

⁷³ Tr. 102–03 (“there could be two types of ground mount systems. One is called -- generally speaking one is called canopy type, canopy mount. Typically in a parking lot, you can implement it so that the land can still be used to a certain degree while the panels would be producing energy. The other type is you literally take the land and mount the panels on the ground. So I expect that the sentence means both, that the University is in an urban setting. It’s literally in the middle of the urban part of the City of Columbus and so there are not acres and acres of open land to build on Columbus Campus as other facility.”).

⁷⁴ Tr. 104.

⁷⁵ Tr. 105.

⁷⁶ Tr. 166 (“My answer will be based on a project we have been developing on campus. It’s a rooftop project for a large relatively flat roof. If I extrapolate my numbers, it’s about 14 percent, in that range. So another utility scale may be 15 percent but that’s the sort of order of magnitude.”).

Q. But OSU did not perform a formal investigation into whether on-site renewables could provide those needs, correct?

A. A second investigation was not necessary. It's known, it's generally known after years of experience or market awareness that on-site renewable electricity can't provide thermal benefits and the reliability benefits and the economic benefits that the University was seeking.⁷⁷

As shown through this one representative example, it is simply inaccurate to state that Ohio State failed to consider these other generation sources. As Mr. Potter explained, Ohio State “considered many alternatives,” including alternative thermal generation facilities.⁷⁸ “As was discussed by the previous witness, . . . we have geothermal on campus, but no other alternative presented itself as a reasonable solution for the situation that exists on the Columbus Campus considering both the thermal needs, the power benefits, the reliability benefits, and the economic availability of capital.”⁷⁹

While Sierra Club may have preferred a formal “study” be conducted for each of the options it identified, Ohio State is not required to create studies to establish what any rational person examining this situation can see.

b. Sierra Club failed to consider any costs whatsoever for any of its proposals.

With one exception discussed below, Sierra Club has failed to include any projected costs whatsoever for any of its proposed options.⁸⁰ Instead of providing any cost estimates, Sierra Club's frequent expert (Dr. Sahu has testified 55 times on behalf of Sierra Club according to his CV) testified that, in his unsupported opinion, Sierra Club's proposed options and the costs associated

⁷⁷ Tr. 190.

⁷⁸ Tr. 190–91.

⁷⁹ Tr. 191.

⁸⁰ Sierra Club Ex. F- Direct Testimony of R. Sahu p. 22–23; Tr. 221 (“Sahu Direct”).

with those options, would be the lowest-cost options.⁸¹ He asserts this opinion, however, without ever actually doing any cost projections.⁸² Indeed, Sierra Club has failed to take cost into account at all or conduct any calculations, despite acknowledging that costs—including costs that would be part of the construction and operation of a facility—should be taken into account by the Board.⁸³

Ohio law clearly permits cost to be included as part of the approval process. In fact, R.C. § 4906.10(A)(3), the very subsection relied on by Sierra Club, specifically states the Board should consider “the nature and economics of the various alternatives.” This is shown by the sole Board decision relied on by Sierra Club, *AMP-Ohio*. In *AMP-Ohio*, the Board specifically took the costs of various alternatives into account when approving AMP-Ohio’s Application.⁸⁴ The Board described AMP-Ohio’s decision to choose that type of generation as “reasonable considering the nature and the economics of the alternatives.”⁸⁵

The only exception to Sierra Club’s failure to provide any cost analysis is Sierra Club’s position regarding solar but, due to severe calculation errors, Sierra Club’s calculations are clearly mistaken. Sierra Club claims that Ohio State’s calculation that delivered costs of \$64 per megawatt hour for off-site solar generation is overstated and argues that solar generation should cost somewhere in the \$32 to \$43 range.⁸⁶

The clear flaw in Sierra Club’s analysis is that Ohio State’s \$64 per megawatt hour calculation represents the “all-in delivered costs,” which includes PJM fees, local distribution utilities’ charges, and transmission charges.⁸⁷ On cross-examination, Dr. Sahu admitted that those

⁸¹ Tr. 221.

⁸² Tr. 221.

⁸³ Tr. 225–26.

⁸⁴ Order pp. 12–14.

⁸⁵ *Id.* p. 14.

⁸⁶ Sahu Direct, p. 22–23; Tr. 241.

⁸⁷ Tr. 241–43.

transmission and distribution charges would be charged to bring off-site solar to campus.⁸⁸ He also admitted that Ohio State's estimate of the solar PPA price of \$35 was below the Lazard and NREL national estimates he used.⁸⁹ Finally, Dr. Sahu testified that he had not determined whether the national averages which he used in his testimony included projects in states which have more sunny days than Ohio.⁹⁰

Somewhat incredibly, even after this was addressed on cross-examination that Ohio State actually used a lower price than Dr. Sahu proposed, Sierra Club repeats this argument in its brief.⁹¹ Sierra Club's brief goes so far as to blame Ohio State's witness for being unable to provide a detailed justification for the AEP tariff charges which would be imposed on off-site solar, even after the witness explained all the information Sierra Club sought could be found publicly in AEP's tariff.⁹²

Sierra Club ignores all transmission and distribution charges and simply claims Ohio State's estimate is "nearly double" its estimate.⁹³ Unfortunately, Ohio State does not have the luxury of ignoring these practical realities. Sierra Club's own witness admitted there are costs associated with transporting power to Ohio State's campus and Ohio State must take those into account in its budgeting. Sierra Club did not address those costs in any way whatsoever. That is particularly obvious here, when Ohio State used an estimated off-site solar PPA price which is below what even Sierra Club claims is appropriate and still clearly determined that the CHP was the most economical way to meet its needs.

⁸⁸ Tr. 242–43.

⁸⁹ Tr. 243.

⁹⁰ Tr. 244.

⁹¹ SC Br. pp. 13–14.

⁹² SC Br. p. 13; Tr. 99.

⁹³ SC Br. p. 13.

Similarly, Sierra Club failed to present any cost estimates for its recommendation to convert the existing steam network to a heating hot water network. The un rebutted testimony of Mr. Tufekci explains why. Even assuming such a transition was physically possible without major disruptions to hospital and campus operations, it would cost a “few hundred million” dollars to complete.⁹⁴ This is in line with the approximate \$400–\$500 million cost of the Stanford conversion relied on by Sierra Club.⁹⁵ As the conversion to a heating hot water network would still not solve all the problems addressed by the CHP (remaining campus steam need at hospitals, electrical energy, electrical reliability), this investment clearly would not be a wise choice for university dollars.

c. Ohio State’s budget limitations.

Sierra Club also failed to consider Ohio State’s budget constraints in any of its proposals. As Mr. Potter—whose office is in charge of comprehensive energy management—testified that historically Ohio State has an annual budget of approximately \$110 to \$135 million allocated for comprehensive energy management.⁹⁶ This figure includes “all costs of energy, operating costs, capital costs, the earnings on capital costs, and the commodity,” and because this is a significant portion of Ohio State’s operating costs in total, adherence to a budget is a must.⁹⁷

Despite claiming that “[a]ll of the goals of the CHP facility, including affordability, . . . can be met by alternate means,” Dr. Sahu testified that he does not know what the current Ohio State capital budget for energy is, what the current Ohio State budget for additional energy infrastructure is, or what the current Ohio State budget for carbon reduction activities is.⁹⁸ Without

⁹⁴ Tr. 76.

⁹⁵ Tr. 77 (the exact cost is not in the record from Sierra Club, but Mr. Tufekci testified it was more than 400 million).

⁹⁶ Tr. 199.

⁹⁷ Tr. 199.

⁹⁸ Sahu Direct 5; Tr. 207–08.

knowledge of any current Ohio State budget limitations, Sierra Club cannot claim with any accuracy or reliability that alternate means can achieve the affordability goals of the CHP.

d. Whether the CHP was the “lowest cost” option.

Sierra Club could not testify as to whether the CHP was the “lowest cost” option, despite Dr. Sahu’s initial claim that “the lowest cost,⁹⁹ least-environmental impact option” for meeting heating and cooling loads “might not be, and in fact likely will not be, the traditional CHP design.”¹⁰⁰ Indeed, when directly questioned what the lowest cost option is in his opinion, Dr. Sahu failed to provide a definitive answer, and could only generally claim that the lowest cost option “would appear to be a combination of technologies to meet its heating and power generation needs,” as discussed in his report—the report that he admits does not include any projected costs for those options.¹⁰¹ It is not persuasive for Sierra Club to not produce any cost estimates, and then claim its preferred options might be cheaper than the CHP.

As shown by the extensive analysis provided by Ohio State, the CHP is the lowest cost way for Ohio State to meet its carbon, thermal, electricity, and reliability goals.

2. Thermal Needs.

a. The CHP is needed to meet Ohio State’s thermal needs.

The CHP would also serve as the primary source of heat for Ohio State’s Columbus campus, which has a very high demand 365 days a year.¹⁰² Specifically, the volume of steam Ohio State needs to operate is “over 100,000 pounds an hour in the summer,” and “500,000 pounds in

⁹⁹ As explained by Dr. Sahu, he defines “lowest cost” here as “[l]evelized costs over a period of time looking at whatever initial capital but also the operating costs and levelizing that over a reasonable period of time.” Tr. 208–09.

¹⁰⁰ Sahu Direct, p. 7; Tr. 208–09.

¹⁰¹ Tr. 221.

¹⁰² Tr. 194.

the winter.”¹⁰³ Ohio State’s thermal demand is 153 MW thermal.¹⁰⁴ Ohio State is building two new hospitals, which will also be served by the CHP.¹⁰⁵

The CHP would allow Ohio State to begin to retire McCracken boilers, with McCracken Boiler No. 5 being retired upon completion of construction of the CHP.¹⁰⁶ And while the remaining five McCracken boilers are not scheduled to be retired until 2035, Ohio State expects those to operate only if and when they are required, such as in winter months when the demand goes up and when there is scheduled maintenance on the CHP.¹⁰⁷

This is a critical distinction that Sierra Club fails to acknowledge. Ohio State will be able to utilize the more efficient CHP to provide its thermal needs the majority of the time and will not need to operate the less efficient McCracken system on those dates. Once the CHP is operational, Ohio State expects McCracken on an annual average to provide only 15% of the annual steam capacity on campus, with the possibility of the CHP providing all of the steam needed on campus in the future.¹⁰⁸

b. Ways to meet thermal needs at this volume are limited, but Ohio State considered them all.

Another important consideration that Sierra Club entirely dismisses is the fact that while the ways to meet thermal needs at such a high volume are limited, Ohio State does indeed consider the options available that effectively meet its needs with the limited resources it has available.

¹⁰³ Tr. 194.

¹⁰⁴ Tr. 167.

¹⁰⁵ Tr. 194.

¹⁰⁶ Tr. 124–26.

¹⁰⁷ Tr. 38, 125.

¹⁰⁸ Tr. 38–41.

This is evidenced by the fact that Ohio State has implemented them into its system where it was feasible given the demands and constraints of the campus.

(i) Geothermal

There is simply not sufficient land nearby to construct sufficient geothermal generation to fill the thermal need.¹⁰⁹ Sierra Club failed to show that its proposed geothermal option is physically or economically feasible for Ohio State to meet its thermal needs. Ohio State witness Mr. Potter explained that Ohio State had considered many alternatives, specifically including geothermal:

Q. Did OSU consider construction of alternative thermal generation facilities other than the CHP as an alternative to the proposed CHP facility?

A. We -- OSU considered this -- has considered many alternatives. As was discussed by the previous witness, we've had -- we have geothermal on campus, but no other alternative presented itself as a reasonable solution for the situation that exists on the Columbus Campus considering both the thermal needs, the power benefits, the reliability benefits, and the economic availability of capital.¹¹⁰

As Dr. Sahu testified, he does not know whether there is suitable land on Ohio State's Columbus campus where geothermal system equivalent thermal output to the CHP could be located, nor has he personally studied that issue.¹¹¹ Dr. Sahu also has not calculated how much geothermal would need to be installed to create a viable alternative to the proposed CHP in this case.¹¹²

¹⁰⁹ Tr. 70 ("But based on University available land on the University, or lack thereof, and based on the scale of heating required on campus and based on the scale of non-heating-related steam required on campus, we've considered that geothermal is not an alternative to a CHP facility.").

¹¹⁰ Tr. 190-91.

¹¹¹ Tr. 236.

¹¹² Tr. 238.

(ii) Heating Hot Water

Sierra Club leads its brief with an extensive discussion of the benefits of heating hot water as compared to steam systems.¹¹³ This is somewhat curious because Ohio State has freely admitted the benefits of these systems.¹¹⁴ The issue is not whether such systems are theoretically more efficient. The issue is identifying a heat source to heat the water, whether it is feasible to actually install the required water lines, and the costs of those upgrades.

It appears the cause of Sierra Club's confusion arises from its lack of understanding about Ohio State's system. In his direct testimony, Dr. Sahu believed that Ohio State was currently using steam to meet all of its heating needs.¹¹⁵ It was not until the hearing itself that Dr. Sahu learned that understanding was incorrect, and Ohio State was currently using heating hot water and heat recovery chillers in many different buildings on campus.¹¹⁶ On the other hand, Ohio State's testimony was very clear that heat recovery chillers are an essential part of Ohio State's future, but that these chillers do not replace the need for additional thermal generation from the CHP.

Sierra Club has failed to show there is a feasible source to heat the water and produce the necessary steam. As discussed above, there is no available location where additional geothermal can be installed to serve this load. Similarly, Sierra Club failed to rebut Ohio State's testimony regarding its extensive analysis showing the feasibility to install additional heat recovery chillers in its buildings. Instead, the un rebutted evidence showed that the CHP will be used to create the very type of heating hot water system suggested by Sierra Club.

¹¹³ SC Br. pp. 3–8

¹¹⁴ SC Br. pp. 5–7.

¹¹⁵ Tr. 204 (“Yes. When I wrote that, that was my understanding, correct.”).

¹¹⁶ Tr. 204.

(iii) Replacing Ohio State's entire steam network

Sierra Club failed to conduct any analysis of whether any of its proposed alternatives are physically or economically feasible with respect to incorporation into the current system being utilized on Ohio State's Columbus campus. As Dr. Sahu again testified, he has not analyzed whether the existing steam piping network on Ohio State's campus would even be suitable for heating hot water.¹¹⁷ He is also unfamiliar with any specifics concerning Ohio State's ability to shut off heating to any of the buildings currently connected to the steam system.¹¹⁸ Without conducting any of the above analyses, combined with the lack of familiarity with any specifics of Ohio State's current network capabilities, Sierra Club cannot reasonably claim that other viable options exist that are the functional equivalent to the proposed CHP.

And, in any event, as new buildings are connected to the steam network, Ohio State has started to convert to heating hot water.¹¹⁹ One example is the new Department of Theater and School of Music buildings. Rather than extending the steam network, Ohio State is installing a heat exchanger in the nearby east regional chiller plant and will provide the heating needs of these two buildings via heating hot water.¹²⁰ The proposed CHP allows Ohio State to further expand its heating hot water deployment.

c. Projects by other universities with different needs and geographic restrictions establish nothing.

The multiple references to other universities and the purported programs that they pursued or will pursue do not bolster any support for Sierra Club's position in this proceeding for several reasons. First, Dr. Sahu has no personal knowledge regarding the specifics of the thermal loads

¹¹⁷ Tr. 315.

¹¹⁸ Tr. 315–16.

¹¹⁹ Tr. 50.

¹²⁰ Tr. 50.

required at each university, and therefore cannot make any sound comparison to Ohio State and its thermal needs.¹²¹ Nor does Dr. Sahu know the total capital expenditures required for the conversions referenced for any of these universities.¹²² And, perhaps most importantly, Dr. Sahu does not know specifics regarding whether the other universities have hospitals on their campuses, and if so, how many.¹²³ In fact, the only university with which he could definitively state has a hospital on campus is Brown, because he has been there.¹²⁴ This is critically important for comparison purposes to Ohio State because, as noted above, the CHP will serve two new hospitals that Ohio State is building.¹²⁵ Finally, Dr. Sahu could not testify as to how many buildings are located on the respective universities' campuses.¹²⁶

Dr. Sahu is even *less* informed about Ohio State's campus. Specifically, Dr. Sahu testified that he does not know: (1) how many hospitals are on Ohio State's campus;¹²⁷ (2) which hospitals on Ohio State's campus have a critical steam load;¹²⁸ and (3) how many buildings are on Ohio State's campus or their sizes.¹²⁹ Simply put, without this critical information, any claimed comparison Sierra Club purports to present is nothing more than speculative at best and certainly fails to provide any relevant support for Sierra Club's position in this proceeding.

¹²¹ Tr. 302–05.

¹²² Tr. 306.

¹²³ Tr. 306, 308–310.

¹²⁴ Tr. 310.

¹²⁵ Tr. 194.

¹²⁶ Tr. 307–310.

¹²⁷ When asked to confirm that Ohio State has six hospitals on campus, Dr. Sahu could not confirm this and instead testified that he “didn’t count all the hospitals.” Tr. 306.

¹²⁸ When asked whether Ohio State's hospitals have a critical steam load, Dr. Sahu testified, “I don’t know which hospitals have what steam loads[.]” Tr. 306.

¹²⁹ Tr. 306–07. When asked whether Ohio State has over 300 buildings, Dr. Sahu testified, “I don’t know the exact building count, what was included in the size of the buildings, and what counts for a building which is something that is not a building.” Tr. 307.

d. Off-site renewables.

Finally, Sierra Club initially cited off-site renewables (i.e., solar or additional wind) as an alternative system to meet Ohio State's electrical energy and heating needs.¹³⁰ But, as Dr. Sahu agrees, off-site renewable resources would not provide any of the steam that Ohio State needs to meet its thermal load, and therefore his testimony does not include any analysis showing how feasible off-site renewables would be for Ohio State's purposes.¹³¹ Accordingly, it is undisputed that "because off-site renewable energy cannot provide the steam demand and the heating demand of campus," the proposed CHP is the best solution to address Ohio State's thermal needs.¹³²

3. Electricity Benefits.

The electricity benefits of the proposed CHP are also clear. Given Ohio State's huge energy and thermal demands and associated costs, it makes sense to utilize gas most efficiently to produce both electricity and heat. This efficiency through cogeneration also results in a reduction in campus carbon emissions due to switching from the more carbon intensive grid to natural gas generation.¹³³

The proposed CHP would not affect Ohio State's current off-site wind contract and will also allow Ohio State to continue its practice of procuring renewable energy from various sources. As Mr. Potter testified at hearing, Ohio State intends to continue procuring renewable energy when it makes financial sense to do so.¹³⁴

¹³⁰ Sahu Direct p. 3.

¹³¹ Tr. 227–28, 238–39.

¹³² Tr. 92–93.

¹³³ Tr. 120.

¹³⁴ Tr. 192.

4. **Reliability Benefits.**

- a. **Ohio State's hospitals and students need reliable heat and electricity, and the proposed CHP will provide that reliability to the campus system as an additional source of on-site generation capability.**

There can be no dispute that Ohio State hospitals and students need reliable heat and electricity. The proposed CHP will provide that reliability to the campus system as an additional source of on-site generation capability. Indeed, combined heat and power facilities have been shown to be beneficial for reliability because they add an additional point of generation beyond and significantly increase the reliability and resiliency of the load that they are serving.¹³⁵

Ohio State Exhibit B is a report by ICF International in a study sponsored by the US Department of Energy.¹³⁶ This study examined how CHP facilities increased reliability during Hurricane Sandy.¹³⁷ Facilities that had a CHP installed were able to continue to provide energy needs for the location they were in during this natural disaster by providing an alternative generation source in adverse conditions.¹³⁸ The same is true of the proposed CHP, as there are several demonstrable reliability benefits of the proposed CHP.

Notably, one benefit of the proposed CHP is its islanding capacity. In the event that the regional or AEP grid fails and the proposed CHP is operating at that time, the CHP will continue to operate because it will go into an "island mode."¹³⁹ In other words, "the Ohio State 13.2kV network would separate from the grid, so it would be an island and fed from the CHP until the grid

¹³⁵ Tr. 174–75.

¹³⁶ Tr. 174.

¹³⁷ Tr. 174.

¹³⁸ Tr. 174.

¹³⁹ Tr. 168.

is restored and can be resynchronized.”¹⁴⁰ Similarly, Ohio State would still be able to access the grid if the CHP is down.

Another benefit of a CHP that is operating continuously (like the proposed CHP in this case) is that it is more reliable than any diesel backup generator, and the proposed CHP will enable less use of any diesel backup.¹⁴¹ While Ohio State needs to maintain the backup diesel generators for critical facilities, such as the medical facilities, as is required by code, such backup diesel generators are not as reliable as a CHP because they only operate approximately one time a month, average one hour a month, and for testing purposes.¹⁴² Further, when operating diesel backups, there is a much larger carbon footprint per megawatt-hour versus a CHP that is operating continuously.¹⁴³

Sierra Club does not meaningfully contest that reliability will be improved by the CHP. The best argument Sierra Club can assert is that Ohio State’s hospitals will still require additional backup generators.¹⁴⁴ However, this argument fails because the backup generators are not as large as the CHP, would not operate as reliably, and would have a greater environmental impact than the CHP. Additionally, the backup generators would also be required, perhaps even more so, with any alternatives proposed by the Sierra Club. Moreover, the standard is not whether the CHP solves Ohio State’s reliability needs by itself. As shown through the studies cited herein, the CHP would improve reliability and as such provide a significant benefit for Ohio State.

¹⁴⁰ Tr. 168.

¹⁴¹ Tr. 169.

¹⁴² Tr. 30, 169.

¹⁴³ Tr. 169.

¹⁴⁴ SC Br. p. 14.

b. Sierra Club's proposals would not offer the same reliability benefits.

Because “it is physically unfeasible to get to the scale needed on campus with on-site renewable generation resources,” renewables simply cannot provide reliable generation in the volumes needed by Ohio State, and are thus not a viable alternative to the proposed CHP.¹⁴⁵ For example, a solar farm with the same capacity as the average campus load would require a footprint of 700 acres of land and is thus not physically possible.¹⁴⁶

Because renewable resources like solar and wind are intermittent, the reliability of such renewables is inconsistent with the reliability requirements necessary to meet Ohio State's demand needs.¹⁴⁷ For example, at hearing Sierra Club claimed that Blue Creek provides 50 MW to campus. Ohio State witness Mr. Tufekci explained why that was incorrect since the 50 MW facility on average provides only 12 MW. “The rated capacity of the contract is 50 megawatts. But the – it's a wind facility, so it produces when the wind blows, so it could be as low as 0, and it could be as high as 50. On average, I checked the data on the last couple of years average, annual average was around 12 megawatts.”¹⁴⁸

Nor does Sierra Club present any evidence to refute this. In fact, Dr. Sahu agrees that an off-site renewable resource that is delivering power through the grid through Ohio State's campus would not provide any extra reliability.¹⁴⁹ It is also important to differentiate between the reliable power to be provided by the CHP and the intermittent power provided by renewable generation. A 50 MW gas facility may be reliably relied upon to produce close to its nameplate capacity after

¹⁴⁵ Tr. 88.

¹⁴⁶ Tr. 104–05, 108.

¹⁴⁷ Tr. 170, 172.

¹⁴⁸ Tr. 101.

¹⁴⁹ Tr. 239–40.

adjustments for maintenance and downtime. The CHP should have a forced outage rate of less than 1%.¹⁵⁰

Ohio State must balance its desire for renewables with certain practical realities in the context of an overall energy mix. Ohio State must also ensure that it has safe and reliable heat and power to properly operate its hospitals, research facilities (e.g. ice core), and classrooms. The CHP is an essential part of that planning process as it will provide on-site generation which will help Ohio State limit its reliance on the delivery of energy via the PJM and local distribution utility company grid for its electrical energy needs.

C. There are no environmental concerns associated with the facility.

There is extensive record evidence establishing that there are no environmental concerns associated with the facility. TRC Environmental Corporation (“TRC”), a well-respected environmental expert, did extensive work to evaluate the environmental impact of the facility.¹⁵¹ TRC was retained to specifically address the concerns raised by Sierra Club and ensure there were no unexpected environmental issues. Though not required as part of the Board or the Ohio EPA process, TRC was retained to affirmatively respond to the environmental issues raised by Sierra Club. TRC’s “[m]odel predicted impacts were made at over 3,000 regularly spaced (70 meter) generic receptor locations surrounding the project site. Thirty (30) possible sensitive receptor

¹⁵⁰ Tr. 19.

¹⁵¹ Sierra Club Ex. E (July 6, 2020 TRC Report).

locations were also considered . . . and the eleven closest ones to the project (within 1.3 miles) were evaluated for impacts.”¹⁵²

TRC found that Franklin County is currently in compliance with all National Ambient Air Quality Standards (“NAAQS”).¹⁵³ TRC found that the “CHP project will have negligible impact on the existing air quality in Franklin County and will not affect its attainment status for any pollutant.”¹⁵⁴ The quantities of pollutants which will be emitted are extremely small.

“For PM2.5, the project impact is less than 0.44 percent above the 24-hour background concentration and less than 0.13 percent above the annual background concentration. For NO2, the project impact is less than 0.66 percent above the 1-hour background concentration and less than 0.05 percent above the annual background concentration. For ozone, the project impact is less than 0.13 percent above the monitored background concentration on an 8-hour basis.”¹⁵⁵

As these impacts were less than 1 percent above the background concentration, and well below the NAAQS Primary standards limits, there is no concern for public safety.

TRC also studied nearby sensitive receptor sites to ensure there were no issues at those specific locations, including the nearby Wexner Medical Center. Once again, the environmental impacts at those locations were negligible. “The highest predicted impacts at these locations are only minimally above the background concentrations and by themselves generally represent less than one percent of the corresponding Primary NAAQS established to protect human health and particularly vulnerable populations.”¹⁵⁶

¹⁵² Sierra Club Ex. E (July 6, 2020 TRC Report), p. 4.

¹⁵³ Sierra Club Ex. E (July 6, 2020 TRC Report), p. 2.

¹⁵⁴ Sierra Club Ex. E (July 6, 2020 TRC Report), p. 2.

¹⁵⁵ Sierra Club Ex. E (July 6, 2020 TRC Report), p. 2.

¹⁵⁶ Sierra Club Ex. E (July 6, 2020 TRC Report), p. 2.

The incredibly low impact of this facility is perhaps best shown by the numbers themselves. TRC modeled 3,000 different locations using USEPA AERMOD dispersion modeling for each of 12 different operating conditions of the CHP units.¹⁵⁷ “Each of the 12 conditions was tested in the model with 43,824 hours (5 years) of meteorological observations from the Columbus National Weather Service site.”¹⁵⁸ The chart below shows the “highest” predicted values from that analysis. In this context, “highest” means: (1) the highest predicted impact in the 3,000 different locations; (2) the highest predicted impact within the group of sensitive receptors; (3) the highest annual predicted concentrations; based on 5 separate years of meteorological data; (4) the highest 24-hr calendar day concentrations based on 1,826 days of meteorological data; (5) the highest 1-hr concentrations based on 43,824 hours of meteorological observations; and (6) the CHP plant operating scenario (out of a group 12 CHP plant operating scenarios modeled) that produced the highest predicted impact(s).¹⁵⁹

Needless to say, these are extremely conservative assumptions. Despite that, the projected impacts are minimal.

Pollutant	CHP Project Impact	Background	Total Impact	NAAQS (PRIMARY)	Project Impact above Background
PM_{2.5} 24-hr	1.51	26	27.51	35	5.8%
PM_{2.5} Annual	0.17	9.9	10.07	12	1.7%
NO₂ 1-hr	5.0	86.2	91.2	188	5.8%
NO₂ Annual	0.13	21.7	21.83	100	0.60%
Ozone 8-hr	0.000084	0.065	0.065084	0.07	0.13%

¹⁵⁷ Sierra Club Ex. E (July 6, 2020 TRC Report), p. 2.

¹⁵⁸ Sierra Club Ex. E (July 6, 2020 TRC Report), p. 2.

¹⁵⁹ Sierra Club Ex. E (July 6, 2020 TRC Report), p. 3.

As shown through TRC's calculations, even under the most conservative possible assumptions the CHP project would never cause a Total Impact above the NAAQS Primary standards. In fact, even at the highest possible receptors under the most conservative assumptions the CHP project impact is barely above the background concentrations. As such, there are no environmental concerns associated with the facility. In fact, the highest concentration for any pollutant, using the most conservative possible assumption, at the nearest sensitive location (an outpatient facility) is less than 2% of the relevant air quality standard.¹⁶⁰ There is simply no reason for concern regarding the facility.

1. Reduced carbon emissions.

Sierra Club first objects to the proposed facility's carbon emissions.¹⁶¹ As shown in Ohio State's Application, the facility will reduce the Columbus Campus carbon emissions by 35% in the first year of operation.¹⁶² Indeed, reducing carbon emissions is one of the major benefits associated with the CHP. Sierra Club quibbles with the use of 2016 Ohio EIA data for this calculation, but as this was the most recent data available at the time the Feasibility Study was conducted, it would have been impossible to use more recent information.¹⁶³

Regardless of what the proper starting value is, Mr. Tufekci testified that Ohio State took that value and modified it to reflect the changing grid. "The 15 -- the number used I believe is 1510 pounds per -- 1,510 pounds per megawatt-hour was a 2016 figure. And at the time of the feasibility study, that was the most up-to-date figure. But for future projections, we used Ohio EPA [requirements] of I think the number is 11 -- 10 or 1130, and we did a linear interpolation

¹⁶⁰ Sierra Club Ex. E (July 6, 2020 TRC Report), p. 4.

¹⁶¹ SC Br. pp. 17–19.

¹⁶² Tr. 11.

¹⁶³ Tr. 127.

and extrapolation.”¹⁶⁴ As such, Ohio State took the “greening” of the PJM grid into account when it performed its calculations of the carbon reduction impact of the CHP.

Leaving aside the impossibility of using more recent information and the fact Ohio State updated its numbers for future periods, Sierra Club puts forth an argument which misunderstands how carbon impact is calculated. Sierra Club argues that because coal, nuclear, and gas units provide the vast majority of PJM’s total generation load (Sierra Club is correct that renewables do not meet a major portion of the PJM load), and coal is decreasing in importance, that the benefit may be less than 35%.¹⁶⁵ Sierra Club does not put forth its own estimate, but rather claims that Ohio State “does not explain how the substitution of generation that is less carbon-intensive than 18% of the current PJM generation mix but *more* carbon-intensive than 34.5% of that mix (and roughly equivalent to natural gas generation on the grid, which makes up the largest portion of PJM generation) can reduce the carbon emissions associated with electricity generation for its campus.”¹⁶⁶ While the AEP Ohio generation mix is more carbon intensive than PJM as a whole, and using statistics for part of a year are misleading because the fleet operates differently in different periods of the year,¹⁶⁷ Ohio State does not need to “explain” this concept because it is simply arithmetic. Natural gas has a lower carbon output than coal. The PJM system is 18% coal. By using less coal generation, Ohio State will reduce its carbon footprint. More importantly, the CHP produces electricity and heating in a combined process which is inherently more efficient.

¹⁶⁴ Tr. 127.

¹⁶⁵ SC Br. p. 19.

¹⁶⁶ SC Br. p. 19.

¹⁶⁷ For example, solar resources would be less productive in the winter when there is less daylight, wind will operate more in the spring and fall, and more assets will operate in periods of high demand than operate in periods of low demand.

Sierra Club then argues that because the PJM generation mix is gradually becoming less reliant on coal, the carbon benefits of the facility will fall over time. Even if Sierra Club's predictions for the PJM generation fleet are correct, this does not mean that the CHP will not reduce Ohio State's carbon footprint today. While this case is not the place for a discussion of national climate policy, Sierra Club should agree that real tangible reductions in carbon output today, like those proposed by Ohio State in this case, provide immediate environmental benefits. Those benefits will compound each year they are in place, having a major impact on the climate. While it may be possible to provide even more benefits in the future, such as Ohio State's potential conversion of the CHP from natural gas to green hydrogen, the certain immediate benefits of the CHP should not be thrown away for speculative potential further future reductions.

2. Sierra Club does not apply the correct standard for PM2.5.

Sierra Club did not provide its own modeling in this proceeding or put forth any of its own estimates of the environmental impact of the facility. Instead, Sierra Club argues that any increase in PM2.5 should be absolutely prohibited because "no study has found a level below which PM2.5 does not have adverse effects on human health."¹⁶⁸ On cross-examination, Dr. Sahu testified that, in his opinion, even half of the NAAQS primary standard would still be too high.¹⁶⁹

Sierra Club's opinions regarding PM2.5 are simply not relevant to the issue before this Board. The studies Sierra Club relies on in its brief were also cited by Dr. Sahu in his testimony.¹⁷⁰ On cross-examination, Dr. Sahu admitted that the information he relied on was all available to the Obama administration when it adopted the current PM 2.5 Primary standard in 2013.¹⁷¹ Dr. Sahu

¹⁶⁸ SC Br. p. 20.

¹⁶⁹ Tr. 262.

¹⁷⁰ SC Br. p. 20, FN 81. Sahu Direct p. 10.

¹⁷¹ Tr. 263.

also admitted that the Trump administration has issued a notice of proposed rulemaking for PM2.5 in April of 2020, and to his knowledge did not propose any change to the PM2.5 standard despite again having access to this data.¹⁷² In short, administrations of both parties have examined the very data relied on by Sierra Club and have established the appropriate primary standard for PM2.5. While Sierra Club may not agree with that primary standard, that is simply not the legal standard which Ohio State is required to meet in this case. The CHP shows a negligible increase in PM 2.5 and Franklin County would still be well below all relevant NAAQS standards. As such Sierra Club's arguments should be rejected.

Sierra Club's argument here is also incorrect as a matter of policy. All generation sources have environmental impacts. For example, wind turbines have killed some birds and bats and have extensive concrete foundations which cause carbon emissions. Solar panels have lead batteries, are hazardous to dispose of, and cadmium is toxic and carcinogenic. As a matter of policy, society has agreed that the benefits of those technologies can outweigh those dangers, and that is why we have wind and solar generation. As a matter of policy, safe generation like combined heat and power facilities should be permitted to be constructed when, like in this case, they are shown to be safe for the surrounding community.

Sierra Club specifically has acknowledged the benefits of combined heat and power technology.

Efficient CHP systems produce both electricity and steam or other useful heating or cooling services, **providing the most value and least pollution from a fuel source.** Use of the waste heat from industrial processes decreases on-site energy requirements for grid power and may provide off-site supply. In conjunction with smart development of city and town centers, district energy systems can provide both electricity and usable heat. Note: Sierra Club support

¹⁷² Tr. 263–64.

for CHP does not change our opposition to coal-fired power plants.¹⁷³

Ohio State agrees with Sierra Club's prior public statements. Combined heat and power is efficient and provides the most value and least pollution from a fuel source.

3. **The modeling was conducted correctly.**

TRC used AERMOD dispersion modeling in its analysis. As noted by TRC, "[t]his model has been developed by the USEPA and is utilized by the Ohio EPA and environmental review agencies in every other State."¹⁷⁴ Therefore, there can be no debate that the model used by Ohio State was appropriate.

Sierra Club's first objection is the distance from a monitor to the proposed facility site. According to Dr. Sahu, the closest monitor (Korbel Rd.) being approximately two miles away from the CHP is non-representative because it is not next to a river. However, Sierra Club never provides any evidence or opinion that the river would increase impacts, or that climate somehow changes in those two miles. As Sierra Club has failed to provide any evidence that the Olentangy River causes Ohio State's modeling to materially understate impact this argument fails.

Sierra Club next claims that the location is non-representative because the proposed facility will be located next to St. Rt. 315.¹⁷⁵ This argument is curious because the Korbel Rd. location is also located close to a highway, Interstate 71. Dr. Sahu acknowledged this at hearing but argued that Korbel Rd. is slightly further from Interstate 71 than the facility is from St. Rd. 315.¹⁷⁶ However, Dr. Sahu had not taken into account the increased traffic on Interstate 71, or the

¹⁷³ Public Comment of Jordan Clark filed August 5, 2020, Sierra Club Energy Resources Policy, p. 14 (emphasis added).

¹⁷⁴ Sierra Club Ex. E (July 6, 2020 TRC Report), p. 2.

¹⁷⁵ SC Br. p. 22.

¹⁷⁶ Tr. 286.

increased amount of interstate trucking traffic on Interstate 71.¹⁷⁷ Once again, Sierra Club's analysis is never developed and so it provides no clarity to this proceeding. Sierra Club has not conducted its own modeling or explained how these extremely minor differences would cause TRC's analysis to be substantively inaccurate. The TRC results for the highest impacted of the 3,000 sites, using the most conservative assumptions and specifically focusing on sensitive receptor sites, showed the PM2.5 impact to be negligible.

Finally, Sierra Club objects because "[a]lthough the consultant OSU contracted to perform analysis of projected ambient concentrations claims it modeled 12 different scenarios, including one in which the facility operates at less than 75% load, nothing in the report identifies the twelve scenarios under which this consultant produced a model."¹⁷⁸ Once again, this is not a substantive objection. Sierra Club could have requested this information in discovery or conducted its own analysis. TRC modeled 12 different scenarios and explained them in its report. Sierra Club's failure to understand those scenarios does not mean the modeling was inaccurate.

4. The Ohio EPA has already granted the permit.

The Ohio EPA has already examined the air emissions environmental impacts of the facility. The Ohio EPA granted Ohio State the requisite permit, which did not include any limit on the capacity factor at which the CHP must operate.¹⁷⁹ Sierra Club did not appeal that EPA permit.¹⁸⁰ Sierra Club has not substantiated its environmental concerns in any meaningful way,

¹⁷⁷ Tr. 287.

¹⁷⁸ SC Br. p. 22.

¹⁷⁹ Tr. 294.

¹⁸⁰ Tr. 294.

and as such there is no reason to vary from the considered decision of the Ohio EPA to issue this permit.

III. CONCLUSION

For the foregoing reasons, and as more fully described in Ohio State's Initial Post-Hearing Brief, the Board should (1) reject Sierra Club's arguments opposing the proposed CHP; and (2) approve Ohio State's Application.

Respectfully submitted,

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CERTIFICATE OF SERVICE

I certify that the foregoing was filed electronically through the Docketing Information System of the Public Utilities Commission of Ohio on this 19th day of August 2020. The PUCO's e-filing system will electronically serve notice of the filing of this document on counsel for all parties.

/s/ N. Trevor Alexander

One of the Attorneys for The Ohio State
University

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Summary: Reply The Ohio State University's Post-Hearing Reply Brief electronically filed by Ms. Kari D Hehmeyer on behalf of THE OHIO STATE UNIVERSITY