

**BEFORE THE ENVIRONMENTAL APPEALS BOARD  
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, D.C.**

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	)	
In the Matter of:	)	Appeal No. PSD 16-___
Arizona Public Service Company	)	
Ocotillo Power Plant	)	Maricopa County Air Quality
	)	Department PSD Permit No. PSD16-01
	)	
	)	

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PETITION FOR REVIEW OF PREVENTION OF SIGNIFICANT DETERIORATION  
PERMIT ISSUED BY MARICOPA COUNTY AIR QUALITY DEPARTMENT FOR THE  
OCOTILLO POWER PLANT

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## **I. INTRODUCTION**

Pursuant to 40 C.F.R. § 124.19(a), the Sierra Club, petitions for review of the conditions of the Prevention of Significant Deterioration (“PSD”) Permit Number PSD16-01, issued by the Maricopa County Air Quality Department (the “County”) for a construction project proposed by the applicant Arizona Public Service (“APS”) to add five new 100 megawatt (“MW”) natural gas simple-cycle turbines to the existing Ocotillo Power Plant (“Ocotillo”) in Tempe, Arizona. The final permit from the County is dated March 22, 2016 and the County provided notice of the permit and a response to comments to Sierra Club on March 23, 2016. A copy of the final PSD permit is attached as Sierra Club Exhibit 1. A copy of the County’s notice to Sierra Club and response to comments (“RTC”) is attached as Sierra Club Exhibit 2. In accordance with 40 C.F.R. § 124.19(a), the thirty day period within which to file a petition for review begins with the service of notice. This petition is therefore timely filed within 30 days of March 23, 2016, which is April 22, 2016.

The final PSD permit is appealable to the Environmental Appeal Board (“Board”) pursuant to a delegation agreement entered into by the County and the U.S. Environmental Protection Agency, Region 9 (“Region 9”). A copy of the delegation agreement, date February 8, 2016, is attached as Sierra Club Exhibit 3. Under the delegation agreement, the provisions of 40 CFR part 124 apply to appeals of PSD permits issued by the County.

Specifically, Sierra Club challenges the provisions of condition 18 of the final PSD permit that sets the carbon dioxide equivalent (“CO<sub>2</sub>e”) at 1,460 lbs CO<sub>2</sub>/MWh gross output, based on a 12-month rolling average for each of the simple-cycle gas combustion turbine units. (SC Ex. 1, Table 4 at p.16.)

## II. FACTUAL AND STATUTORY BACKGROUND

### A. Summary of Petition

Sierra Club brings this petition to request that the Environmental Appeals Board (“Board”) review and remand the final permit issued by the County for the Ocotillo project. The final permit allows an incredibly high greenhouse gases (GHG) emission rate limit for the five simple-cycle gas combustion turbines. That GHG limit does not meet the requirements of the PSD program. First, the County’s review process of available control technologies failed to meet the minimum requirements of the top-down methodology to determine the Best Available Control Technology (“BACT”) because the County failed to identify energy storage paired with the combustion turbines as an available technology that would result in real and significant reductions in GHG emissions. Second, the County failed to respond to Sierra Club’s comments addressing energy storage paired with the combustion turbines.

The construction of the Ocotillo gas plant and other similar projects comes at a critical time for federal plans and commitments to combat climate change by reducing greenhouse gas emissions. In June 2013, the President issued the Climate Action Plan, noting that climate change will have “far-reaching consequences and real economic costs.”<sup>1</sup> The federal government has begun to implement the Climate Action Plan by embarking on an effort to reduce greenhouse gas emissions from the electric sector, with a goal to reduce U.S. greenhouse gas emissions, relative to 2005, by at least 17 percent by 2020, 42 percent by 2030, and 83 percent by 2050.<sup>2</sup> In 2014, the Environmental Protection Agency (“EPA”) proposed rules to limit carbon dioxide emissions from new and existing power plants. These rules rely, in part, on switching from coal

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<sup>1</sup> Executive Office of the President, The President’s Climate Action Plan (June 2013) at 4; *available at* <https://www.whitehouse.gov/sites/default/files/image/president27sclimateactionplan.pdf>.

<sup>2</sup> United States Framework Convention on Climate Change, Annex I (June 7, 2011) at 7-8; *available at* <https://unfccc.int/resource/docs/2011/sb/eng/inf01r01.pdf>.

to low-priced natural gas. *See e.g.*, 79 Fed. Reg. 34,830, 34,862 (June 19, 2014).<sup>3</sup> EPA estimates that this rule will reduce emissions by 415 million tons of carbon dioxide equivalent per year.<sup>4</sup>

This progress on climate change will be undermined if permitting agencies do not properly implement the Clean Air Act’s New Source Review requirements for GHGs for facilities like the Ocotillo power plant at issue in this petition. In this case, APS claimed in its application that the Ocotillo plant must be permitted to run in an extremely inefficient manner so that it can essentially wait around idling at low load until it is called upon. As a result, APS proposed and the County accepted a GHG emission limit of 1,460 lbs CO<sub>2</sub>/MWh (gross) on a 12-month rolling average basis, which is among the worst rates for recently permitted facilities with similar or identical turbine models. *See*, Sierra Club Exhibit 4, Sierra Club Comments (“SC Comments”), Table 4, at 39. <sup>5</sup>To put that limit in context, EPA’s recently finalized GHG emissions limit for new **coal plants** is 1,400 lbs CO<sub>2</sub>/MWh (gross), which is lower than the limit imposed by the County in the final permit for Ocotillo. 80 Fed. Reg. 64,512 (Oct. 23, 2015).<sup>6</sup> In other words, if the County’s final PSD permit is upheld, the proposed Ocotillo gas plant would be permitted to emit CO<sub>2</sub> emissions at a rate higher than a newly constructed coal plant.

Such a high GHG permit limit is unreasonable and unnecessary. The Ocotillo plant can operate with a far more stringent GHG limit while still meeting the applicant’s basic purpose. The addition of one or more energy storage units paired with the five proposed simple-cycle gas combustion turbines would significantly lower the GHG emission rate and still allow the Ocotillo facility to provide peaking and load shaping electric capacity. As discussed in more

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<sup>3</sup> The rule has been stayed pending judicial review. *West Virginia, et al. v. EPA, et al.* U.S. Supreme Court, No. 15A773, Order List: 577 U.S.

<sup>4</sup> Regulatory Impact Analysis for the Clean Power Plan Final Rule, ES-6 (Oct. 23, 2015); *available at* <https://www.epa.gov/sites/production/files/2015-08/documents/cpp-final-rule-ria.pdf>.

<sup>5</sup> Note that page numbers refer to the bates stamped numbers in the upper right corner of the exhibit.

<sup>6</sup> Sierra Club is not suggesting that the Ocotillo plant falls under this rule. The comparison is illustrative.



detail below, the County set the GHG limit based on the assumption that all five combustion turbines at the plant will operate at loads as low as 25% for more than half their total operating hours.<sup>7</sup> This assumption dramatically increased the “worst case” GHG emissions because the gas turbines are much less efficient at low loads. (Sierra Club Exhibit 5, Revised App., Appx. B, Figure B7-1, p. 63.) However, the County neglected to even consider efficiency improvements and emissions reductions that could be achieved if Ocotillo added energy storage units such as batteries that would mitigate or eliminate the need for the turbines to operate at such low loads for such long periods of time. This type of technology – a discrete additional component that increases efficiency and reduces emissions – is precisely the kind of technology that permitting authorities must consider as part of the BACT analysis.

Sierra Club submitted detailed comments on April 9, 2016 (SC Ex. 4) addressing several issues in the Draft Permit. For purposes of this petition, Sierra Club is only raising the issue of energy storage paired with the combustion turbines. The County failed to respond to Sierra Club’s comments related to energy storage paired with the combustion turbines and instead rejected any consideration of energy storage on the erroneous argument that such technology would redefine the source. The Board must correct this error and remand the permit to the County to reconsider the use of energy storage as an available technology that would increase the efficiency of the combustion turbines and thereby reduce GHG emissions.

## **B. Procedural History**

The Ocotillo plant currently consists of two 110 MW steam generators and two 55 MW gas turbines for a total output of 330 MW. On April 14, 2014, APS filed an application with the

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<sup>7</sup> See Sierra Club Exhibit 6, Technical Support Document (“TSD”) at 40; (Sierra Club Exhibit 5) Revised App., Appx. B at 65; SC Ex. 2. RTC at 17-18.

County requesting a revision to its Title V permit to install five new 100 MW natural gas simple-cycle turbines, model LMS 100, to replace the two existing 110 MW steam generators.<sup>8</sup> On January 23, 2015, APS updated its permit application to provide a Control Technology Review (“App.”). (Sierra Club Exhibit 7.) On March 4, 2015, the County issued a Draft Permit (Sierra Club Exhibit 8) for public comment through April 10, 2015. Sierra Club submitted written comments on April 9, 2015. (SC Ex.4, SC Comments.)

On September 30, 2015, APS submitted an updated application (“Revised App.”) with revisions and updates to the Applicant’s GHG BACT analysis. (SC Ex. 5.) In December 2015, the County issued a revised draft permit and draft TSD (SC Ex. 6) for public comment through January 16, 2016. No party commented on the revised draft permit. On March 22, 2016, the County issued the final permit (SC Ex. 1) without any substantive changes to the December 2015 revised draft permit. On March 23, 2016, the County provided notice to the Sierra Club announcing the final permit and provided a response to Sierra Club’s and other’s comments (“RTC”). (SC Ex. 2.)

### **C. Background on Establishing BACT Limits.**

The Clean Air Act and U.S. EPA’s implementing regulations require BACT emission limits for all new and modified pollution sources. 42 U.S.C. § 7475(a)(4); 40 C.F.R. § 52.21(j)(2). BACT is a limit based on the maximum degree of reduction achievable through, among other options, add-on controls. 42 U.S.C. § 7479(3) (“best available control technology” means an emission limitation based on the maximum degree of reduction of each pollutant...

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<sup>8</sup> APS pursued siting authority on a parallel path. On July 31, 2014, APS filed an application with the Arizona Power Plant and Transmission Line Siting Committee (“Committee”). SC Ex.4, SC Comments at 203-08 “CEC Application”. After a public process, the Committee issued a Certificate of Environmental Compatibility to APS on November 13, 2014. The permitting process before the Committee is not subject to review by the Board; however, Sierra Club submitted documents from that proceeding with its comments that are informative to the issues on appeal here.

achievable for such facility through application of production processes and available methods, systems, and techniques, including fuel cleaning, clean fuels, or treatment or innovative fuel combustion techniques for control of each such pollutant”); *accord* 40 C.F.R. § 52.21(b)(12) (similar regulatory definition of BACT). The plain meaning of “maximum” is “the greatest quantity, number, or degree possible or permissible; the highest degree or point (of a varying quantity...) reached or recorded; upper limit of variation.” *Websters New World College Dictionary* 837 (3<sup>rd</sup> Ed. 1997). Courts have thus instructed that the words “maximum” and “achievable” constrain the permitting agency’s discretion in setting limits. *See Alaska Dept. of Env’tl. Conservation v. EPA*, 540 U.S. 461, 485-89 (2004).

This Board has repeatedly instructed permitting authorities that “BACT determinations are one of the most critical elements in the PSD permitting process, must reflect the considered judgment on the part of the permit issuer, and must be well documented in the administrative record.” *In re Mississippi Lime Co.*, 15 E.A.D. 349, PSD Appeal No. 11-01, Slip Op. at 17 (EAB, Aug. 9, 2011) (citing *In re Desert Rock Energy Co., LLC.*, PSD Appeal Nos. 08-03 thru 08-06, Slip Op. at 50 (EAB, Sept. 24, 2009); *In re Knauf Fiber Glass, GmbH*, 8 E.A.D. 121, 132 (EAB 1999); *In re Newmont Nev. Energy Inv., LLC*, 12 E.A.D. 429, 442 (EAB 2005); *In re Gen. Motors, Inc.*, 10 E.A.D. 360, 363 (EAB 2002). The result is a limit set based on the maximum achievable emission reduction with the best pollution control option that is “tailor-made” for that facility and that pollutant. *In re CertainTeed Corp.*, 1 E.A.D. 743, 747 (Adm’r 1982); Office of Air Quality Planning and Standards, U.S. EPA, New Source Review Workshop Manual at B.2 (Draft, Oct. 1990) (“NSR Manual”) (“The reviewing authority then specifies an emissions limitation for the source that reflects the maximum degree of reduction achievable for each pollutant regulated under the Act.”).

The list of control option types that must be considered when establishing a BACT limit includes both “add-on” controls that remove pollutants from a facility’s emissions stream, and “inherently lower-polluting process[]” or practices that prevent the pollutants from being formed in the first place. *In re Knauf Fiber Glass*, 8 E.A.D. at 129. The New Source Review Workshop Manual describes the categories as follows:

Potentially applicable control alternatives can be categorized in three ways:

- **Inherently Lower Emitting Processes/Practices**, including the use of materials and production processes and work practices that prevent emissions and result in lower “production specific” emissions; and
- **Add-on Controls**, such as scrubbers, fabric filters, thermal oxidizers and other devices that control and reduce emissions after they are produced.
- **Combination of Inherently Lower Emitting Practices and Add-on Controls**. For example, the application of combustion and post-combustion controls to reduce NOx emissions at a gas-fired turbine.

NSR Manual at B.10; *see, also, PSD and Title V Permitting Guidance for Greenhouse Gas* at 25 (March 2011) (“GHG Guidance”).

BACT is a site-specific determination resulting in the selection of an emission limitation that represents application of control technology or methods appropriate for the particular facility. Any major stationary source or major modification subject to PSD must conduct an analysis to ensure the application of BACT. (NSR Manual at B.1.)

The County, in this case, employed the NSR Manual’s recommended methodology known as that “top-down” method for determining BACT. *See*, NSR Manual at B.2. The first step requires the permitting authority to identify all “potentially” available control options. *Id.* at B.5. The second step is to eliminate “technically infeasible” options from the potentially

available options identified at step 1. *Id.* at B.7. In step 3 of the top-down method, the remaining control technologies are ranked and then listed in order of control effectiveness for the pollutant under review, with the most effective alternative at the top. In the fourth step of the analysis, the energy, environmental and economic impacts are considered and the top alternative is either confirmed as appropriate or is determined to be inappropriate. *Id.* at B.29. Finally, under step 5, the most effective control alternative not eliminated in step 4 is selected and the permit issuer sets as BACT an emissions limit for a specific pollutant that is appropriate for the selected control method. *Id.* at B.53; *see, generally, In re Prairie State Generating Co.*, 13 E.A.D. 1, 11 (EAB 2006).

As the Board has repeatedly noted, “the combined results of the considerations that form the BACT analysis are the selection of an emission limitation and a control technology that are specific to a particular facility.” *Mississippi Lime*, Slip Op. at 10 (quoting *In re Three Mountain Power, LLC*, 10 E.A.D. 39, 47 (EAB 2001)); *see also In re Christian Cnty. Generation, LLC*, 13 E.A.D. 449, 454 (EAB 2008); *Prairie State*, 13 E.A.D. at 12; *Knauf Fiber Glass*, 8 E.A.D. at 128-29. The most effective option must be selected unless the applicant meets the burden of demonstrating that this option is infeasible. *Citizens for Clean Air v. EPA*, 959 F.2d 839, 845 (9th Cir. 1992) (“The top-down approach places the burden of proof on ‘the applicant to justify why the proposed source is unable to apply the best technology available.’”); *see also In re Spokane Regional Waste-to-Energy Applicant*, PSD Appeal No. 88-12 (EPA June 9, 1989)

Regulation of GHG emissions under the PSD and Title V provisions of the Clean Air Act is relatively new. In 2007, the Supreme Court held that GHGs unambiguously qualify as an “air pollutant” under the Clean Air Act and are subject to regulation. *Massachusetts v. EPA*, 549 U.S. 497, 528–32 (2007). In 2010, EPA issued a final rule (75 FR 31514, June 3, 2010) that “tailors”

the applicability provisions of the PSD and Title V programs to enable EPA and states to establish GHG permitting requirements for new stationary sources or major modifications (the “Tailoring Rule”). Effective July 1, 2011, the Tailoring Rule requires all sources that emit or have the potential to emit at least 100,000 tons per year (“tpy”) of carbon-dioxide equivalent (“CO<sub>2e</sub>”) and that undertake a modification that increases net emissions of GHGs by at least 75,000 tpy CO<sub>2e</sub> to obtain a permit under the PSD requirements. 75 FR 31516, June 3, 2010.

In 2011, EPA issued its *PSD and Title V Permitting Guidance for Greenhouse Gas* (“GHG Guidance”) to assist permitting authorities in addressing PSD and Title V permitting requirements for GHGs. Section III of the GHG Guidance addresses the BACT analysis. (GHG Guidance at 17-46.) The GHG Guidance directs permitting authorities to “continue to use the Agency’s five-step ‘top-down’ BACT process to determine BACT for GHGs.” *Id.* at 17. The GHG Guidance specifically identified energy efficiency as a key component of the GHG BACT review. “EPA believes that it is important in BACT reviews for permitting authorities to consider options to improve the overall energy efficiency of the source or modification – through technologies, processes and practices at the emitting unit.” GHG Guidance at 21.

### **III. THRESHOLD PROCEDURAL REQUIREMENTS**

Sierra Club satisfies the threshold requirements for filing a petition for review under Part 124. Sierra Club has standing to petition for review of the permit decision because Sierra Club on behalf of its members participated in the public comment period by timely filing written comments on the draft permit. 40 C.F.R. § 124.19(a). (SC Ex. 4, SC Comments.) The issues raised by Sierra Club below were raised with the County during the public comment period or are directly related to the County's response to other comments (and therefore not reasonably ascertainable during the comment period). Consequently, the Board has jurisdiction to hear Sierra Club's timely request for review.

#### **IV. ISSUES PRESENTED FOR REVIEW**

Sierra Club respectfully requests Board review pursuant to 40 C.F.R. § 124.19 of the following issues:

1. Whether the County clearly erred by failing to identify in Step 1 of the BACT analysis energy storage as an available technology that would reduce GHG emissions from the proposed gas turbines, despite evidence showing that such technology has provided a demonstrated method to reduce GHG emissions without changing the fundamental business purpose of producing electricity through a simple-cycle power plant. And, even if not clear error, whether the Board should review this issue because it has important policy implication for implementing BACT for GHG emissions.
2. Whether the County clearly erred by failing to respond to Sierra Club's comments recommending consideration of energy storage paired with gas combustion turbines as a control technology. The County's response to comments addressed the wholesale replacement of the gas combustions turbines with energy storage, but the County did not adequately respond to Sierra Club's comments to consider energy storage paired with the combustion turbines to improve efficiency and lower GHG emissions as an available and demonstrated control technology.



## V. ARGUMENT

Sierra Club requests that the Board grant review of and remand the County's final PSD permit for Ocotillo because the County failed to consider energy storage paired with the proposed simple-cycle gas combustion turbines as an available control technology. The Ocotillo project's GHG limit is based on APS's asserted need to operate the facility at very low and inefficient loads. (SC Ex. 6, TSD at 40.) Operating a simple-cycle gas facility at low loads increases the rate of CO<sub>2</sub> emissions dramatically. (SC Ex. 5, Revised App., Figure B7-1 at PDF p. 63.) Therefore, eliminating or mitigating the need to operate the combustion turbines at such low loads will result in substantially improved rates of CO<sub>2</sub> emissions. (*Id.* at Table B7-9 at p.63.)

Sierra Club's comments identified two aspects of energy storage that the County was required to respond to: (1) wholesale replacement of some or all of the gas turbines with energy storage, and (2) pairing or integrating energy storage with the gas turbines in order to mitigate excess GHG emissions that occur during operation at low loads. In the RTC, the County addressed only the first of Sierra Club's comments with respect to energy storage and rejected any use of energy storage as a redefinition of the source. However, the County effectively ignored Sierra Club's comment regarding the pairing or integration of energy storage with the combustion turbines to improve efficiency and lower emissions. Instead of explaining why energy storage paired with the combustion turbines would redefine the source, the County simply lumped all uses of energy storage together as redefining the source. (SC Ex. 2, RTC at 8-10.) This failure to specifically respond to the use of energy storage paired with the combustion turbines was clear error. The permit issuer must articulate with reasonable clarity the reasons supporting its conclusion and the significance of the crucial facts it relied upon when reaching its conclusion. *E.g., In re Shell Offshore, Inc.*, 13 E.A.D. 357, 386 (EAB 2007).

Energy storage paired with the five combustion turbines would not change the fundamental project purpose because all five LMS 100 natural gas simple-cycle turbines would remain a part of the project. Therefore, the Ocotillo facility would still be able to provide 25 to 500 MW of capacity with quick-ramping capability. The only difference would be that the addition of energy storage would eliminate the need to idle the combustion turbines for long periods of time at 25% load. Rather than idling the combustion turbines at 25% load (i.e. 25 MW) while waiting for a spike in load, the addition of a 25 to 50 MW<sup>9</sup> energy storage system such as a battery would allow APS to keep the combustion turbines completely shut down. If a rapid change occurred that required Ocotillo to respond, the energy storage system could respond almost instantaneously while the combustion turbines fired-up. The energy storage system would then provide power for the short duration of time it took the combustion turbine to reach 25% or 50% load, during which time the combustion unit could gradually take over for the energy storage system and operate as proposed by APS.<sup>10</sup> The energy storage units could then either recharge during periods of over-generation from renewable sources, which would make them a zero-emission resource if they avoided curtailment of solar or wind resources, or the Ocotillo combustion turbines could recharge the energy storage units when combustion turbines are not needed at full load, which would further increase the efficiency of the units by allowing them to operate closer to 100% load.

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<sup>9</sup> Sierra Club did not suggest that APS should be restricted to a particular size of energy storage system. Sierra Club uses the example of a 25 MW system because this would eliminate the need to have immediate power from 0-25 MW. Increasing the size of the energy storage system to 50 MW would further eliminate the need for the combustion turbines to respond to loads between 0-50 MW, which would further increase their efficiency.

<sup>10</sup> APS could further increase Ocotillo's efficiency and the flexibility by pairing an energy storage unit with each specific combustion turbine. For example, five different 25 MW batteries paired with each of the five combustion turbines would allow each individual turbine to respond the same way, similar to the assumed need to idle each unit at 25%. In practice, such a configuration would likely be an over-design of the project because a single energy storage unit could provide the low-load flexibility for the entire plant.

The County was required to consider energy storage paired with the combustion turbines because operating the Ocotillo plant with energy storage would allow APS to dramatically improve the CO<sub>2</sub> emission rate that the permit is based on. Rather than setting the GHG emission rate based on the assumption that all five combustion turbines will operate at low loads for more than half of their operational hours (SC Ex. 5, Revised App., Table B7-10 at PDF 176), integrating energy storage with the combustion turbines would allow the County could to set a limit based on the assumption that the combustion turbines would operate closer to 100% load for more of the time. This would allow a CO<sub>2</sub> rate limit as low as 1,090 lbs/MWh, which is 25% lower than the final permit rate limit of 1,460 lbs/MWh.<sup>11</sup>

#### **A. Project Description**

The Ocotillo project, as proposed by APS, consists of five new 100 MW simple-cycle gas combustion turbines. APS defined the project purpose as follows:

The purposes for the Project are to provide peaking and load shaping electric capacity in the range of 25 to 500 MW (including quick ramping capability to backup renewable power and other distributed energy sources), to replace the 200MW of peak generation that will be retired at Ocotillo with cleaner units, and to provide an additional 300MW of peak generation to handle future growth.

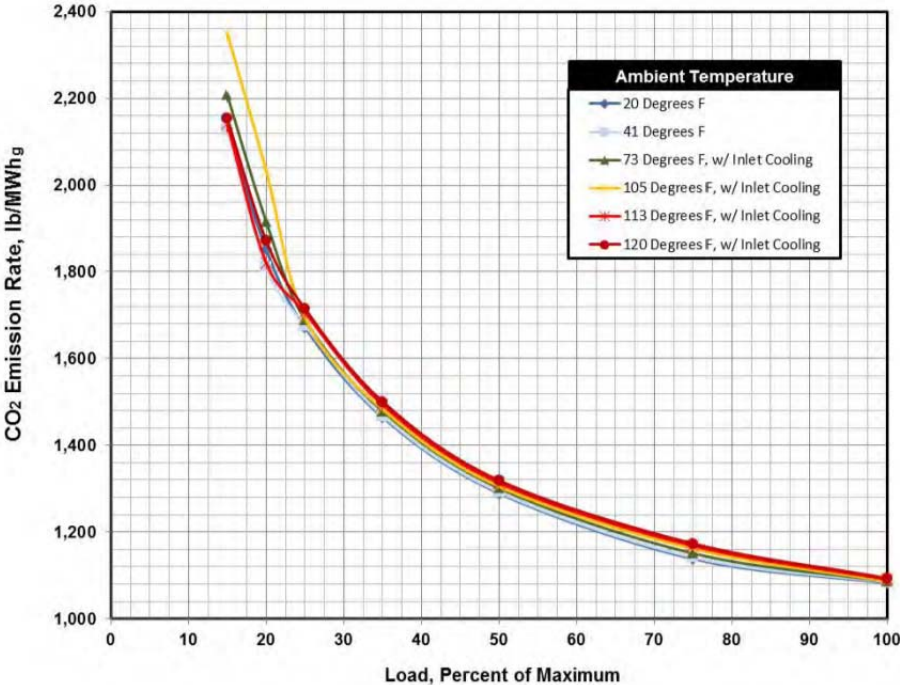
(SC Ex. 5, Revised App. at PDF p.13.) APS further stated that the Ocotillo project is necessary to provide flexible capacity to meet grid needs in response to an increasing amount of renewable energy generation.

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<sup>11</sup> The County's February 26, 2015 Draft Permit, to which Sierra Club responded in its comments, originally included a proposed limit of 1,690 lbs CO<sub>2</sub>/MWh. APS and the County subsequently revised that limit to 1,460 lbs CO<sub>2</sub>/MWh based on revisions to the expected operation provided by APS in its Revised Application. However, the basis for Sierra Club's opposition to the revised GHG limit still stands, and the incorporation of energy efficiency into the project as a control technology would still reduce the facility's emission rate for the same reasons asserted in Sierra Club's comments.

To backup the current and future renewable energy resources, the Project design requires quick start and power escalation capability to meet changing power demands and mitigate grid instability caused by the intermittency of renewable energy generation.

(*Id.*) APS further claimed that “[t]he new units need the ability to start quickly, change load quickly, and **idle at low load.**” (*Id.* at PDF p. 3, 173 (emphasis added).) The asserted requirement to “idle at low load” is responsible for the extremely high GHG emission rate the County set in the permit because the rate of CO<sub>2</sub> emissions from the combustion turbines increases substantially as load decreases. (*Id.*, Fig. B7-1., at PDF p. 174) The average rate of CO<sub>2</sub> emissions at 25% load is 1,690 lbs/MWh; at 100% load, the rate is 1,090 lbs/MWh. (*Id.*) Thus, at low load, emissions per MWh are up to 55% higher than at full load. The following Figure B7-1 from APS’s Revised Application, Appendix B, shows the magnitude of this change:



(SC Ex. 5, Revised App., Fig. B7-1., at PDF p. 174)

Neither APS nor the County explicitly explained what business need or end goal is fulfilled by idling all five Ocotillo combustion turbines at such low load. (Idling at low load is an

operational description, not a project need description.) Though not asserted as a purpose of the project, elsewhere the application stated that when the five turbines are operating at 25% load, the entire project is capable of providing approximately 375 MW of ramping capacity (i.e., from 125 to 500 MW) in less than 2 minutes. (SC Ex. 5, Revised App., at PDF p. 13.) This ramping rate compares to the capability of the LMS 100 combustion turbines to achieve full load (i.e., from 0 to 500 MW) in 10-minutes.<sup>12</sup> It therefore appears that the plan to idle all five combustion turbines at 25% loads would serve only to allow the Ocotillo plant to provide ramping capability 8 minutes sooner than it could from a black start.

Whatever the reason, the County accepted APS's proposed operating plan and originally based the GHG BACT limit on the assumption that all five combustion turbines would operate at 25% load at all times: "Because the BACT emission limit must be achievable across all load ranges for which these turbines are designed to operate, and because the Ocotillo CTGs are designed to operate continuously at loads as low as 25% of the maximum load, APS had originally proposed a CO<sub>2</sub> emission rate of 1,690 lb CO<sub>2</sub>/MWh of gross electric output, based on a 12-month average." (SC Ex. 2, RTC at 17.) After Sierra Club's comments, the County later revised that limit based on APS's calculations in Table B7-10 of the Revised Application (SC Ex. 5), which assumed that the five turbines would need to operate at low load for 52% of the total duration. (SC Ex. 2, RTC at 18; SC Ex. 5, Revised App. at PDF p.176.)

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<sup>12</sup> See, SC Ex. 5, Revised App., at PDF p.179 ("For the LMS100 simple cycle GTs, the length of time for a normal startup, that is, the time from initial fuel firing to the time the unit goes on line and water injection begins, is normally about 10 minutes."; see, also, SC Ex. 7 at PDF p.153 ("As discussed in Step 2, even with fast-start technology, new combined-cycle units may require more than 3 hours to achieve full load, as compared to approximately 10 minutes to achieve the full rated electric output for the proposed GE Model LMS100 simple cycle gas turbines."))

**B. The County Clearly Erred By Failing to Identify Energy Storage as a Control Technology in Step 1.**

The County clearly erred by failing to identify in Step 1 of the BACT analysis energy storage as an available technology that would reduce GHG emissions from the proposed combustion turbines, despite evidence provided by Sierra Club showing that such technology has provided a demonstrated method to reduce GHG emissions at similar facilities. The County's argument that any use of energy storage will always constitute a redefinition of the source is misplaced because the use of energy storage paired with the combustion turbines in this specific circumstance does not change the fundamental business purpose of the Ocotillo plant's goal of providing 25 to 500 MW of capacity with quick-ramping capability.

**1. Energy Storage Paired with the Combustion Turbines Does Not Redefine the Source.**

Review and remand is appropriate here to correct the County's clear error in interpreting and applying the "redefining the source" policy. 40 C.F.R. § 124.19(a)(4)(i)(A). The County rejected all aspects of energy storage as "redefining the source," both for wholesale replacement of the combustion turbines and as an addition to complement the combustion turbines. The County's assertion that pairing energy storage with the combustion turbines would "redefine the source" is unsupported and incorrect. Furthermore, the County's rationale is inconsistent with decisions by EPA, including by this Board. Because the Ocotillo facility would still be a predominantly gas fired simple cycle power plant of the same size and producing the same energy from gas combustion, but with lower overall GHG emissions, energy storage as a means of mitigating or eliminating the need to operate the combustion turbines at inefficient low loads does not redefine the plant's purpose.

BACT is a limit based on the maximum degree of reduction achievable through add-on controls or inherently lower emitting processes or practices. 42 U.S.C. § 7479(3); NSR Manual

at B.10. As a matter of policy, EPA has generally not required a permittee to consider an inherently lower polluting process or practice that would “redefine the design of the source.” NSR Manual at B.13. A technology redefines the source if it requires a completely different process, but the mere fact that a technology would require some changes to the applicant’s preferred design does not mean that a technology redefines the source. NSR Manual at B.13-.14. However, the “redefining” policy does not shield an applicant from having to alter its design to use a cleaner process changes.

Only a change to the facility’s “end, object, aim, or purpose” can constitute an impermissible redefinition of the source, and even then, there must be a “hard look” to “discern which design elements are inherent for the applicant’s purpose and which design elements ‘may be changed to achieve the pollutant emissions reduction without disrupting the applicant’s basic business purpose for the proposed facility’ ...” *In re Desert Rock Energy Co., LLC*, 14 E.A.D. 484, 530 (EAB 2009) (internal quotes omitted); *In re Cash Creek Generation, LLC*, Petition Nos. IV-2008-1 & IV-2008-2, Order Responding to Issues Raised in January 31, 2008 and February 13, 2008 Petitions, and Denying in Part and Granting in Part Requests for Objection to Permit at 9 (EPA Adm’r, Dec. 15, 2009) (finding that permitting authority failed to provide a reasoned explanation for why a cleaner fuel would “redefine the source”).

As the Seventh Circuit held, there must be some adjustment allowed to an applicant’s design to fulfill the BACT definition’s requirement to consider cleaner processes, fuels, and methods to reduce pollution. *Sierra Club v. EPA*, 499 F.3d 653, 656 (7th Cir. 2007); *see also Desert Rock*, 14 E.A.D. at 528 (*quoting Sierra Club*, 499 F.3d at 655); GHG Guidance at 26 (noting that the redefining policy “does not preclude a permitting authority from considering

options that would change aspects (either minor or significant) of an applicant’s proposed facility design in order to achieve pollutant reductions...”).

Here, the use of energy storage paired with the five proposed combustion turbines would decrease the GHG emissions rate without changing the facility’s “end, object, aim or purpose.” The energy storage hybrid option allows the combustion turbines to turn off rather than to idle at 25% load in anticipation of a load spike. However, once the combustion turbines are up and running to respond to a load spike – a process that takes only 10 minutes – the full capacity and flexibility of the combustion turbines would be operated as planned by APS. The only change would be the elimination or reduction of APS’s plan to idle the combustion turbines at low loads.

Eliminating the plan to idle all five combustion turbines at low loads does not redefine the source because it does not alter the Ocotillo facility’s ability to meet APS’s business goals. As Sierra Club noted in its comments, battery storage units are capable of responding to changes in load much faster than the combustion turbines. (Ex. 4, SC Comments at 15.) Even when idling at 25%, the LMS 100 turbines can only ramp up at a rate of 50 MW per minute. (SC Ex. 6, TSD at 7.) In contrast, a 25 MW or 50 MW battery storage unit can ramp to full capacity within seconds. (Ex. 4, SC Comments at 15.) The storage unit would then allow the turbines to ramp up to full capacity (or whatever is needed) within 10 minutes, at which time the storage unit could shut down and/or recharge. In other words, the purpose of the hybrid storage operation is not to replace the capabilities of the combustion turbines; rather, the energy storage unit improves the operation of the combustion turbines by eliminating the need for the combustion turbines to operate at their most inefficient and highest polluting state.

APS even identified energy storage as a potential option as part of its 2014 Integrated Resource Plan. (SC Ex. 4, SC Comments at 63.) Jim Wilde, APS’s Direct of Resource Planning,



identified specific energy storage technologies as available, but rejected them on the basis of high costs. *Id.* Rejecting an available and feasible control technology on the basis of high costs is not a valid use of the “redefining the source” policy. To the contrary, Step 1 and Step 2 of the BACT top-down analysis are designed to identify the available and feasible control technologies. It is only under Step 4 of the BACT analysis that costs are considered, and even then a permitting authority may only reject a feasible and available control technology if it can demonstrate on a case by case basis that the costs borne by the proposed project would not be comparable to costs borne by other facilities using the same technology. *In re ExxonMobil Chemical Company Baytown Olefins Plant*, 16 E.A.D. \_\_, 15 (EAB 2014). In any event, the County never cited to costs as a basis for rejecting energy storage paired with combustion turbines and instead relied only on the erroneous grounds that the control technology would redefine the source.

Furthermore, the record does not support a determination that energy storage paired with combustion turbines would redefine the source. Other than stating that any use of battery or other energy storage options at Ocotillo “are not a technically feasible for the Project and would redefine the project,” (SC Ex. 2, RTC at 16) the County provided no explanation of how or why pairing energy storage with the combustion turbines to reduce the need to operate at 25% load would redefine the applicant’s purpose. A blanket rejection of energy storage in all cases is not sufficient to satisfy the County’s burden to apply a hard look “to determine which design elements were inherent to the applicant’s basic business purpose or objective and which elements could be changed to achieve pollutant emissions reductions without disrupting [that] purpose.” *Desert Rock*, 14 E.A.D. at 530.

The County's reliance on past permitting decisions issued by EPA Regional Offices for facilities in Florida and Texas to support a blanket presumption that energy storage can never be considered in a GHG BACT analysis is wrong. (*See, e.g.*, SC Ex. 2, RTC at 6 ("EPA [Region 6] determined that 'energy storage cannot be required in the Step 1 BACT analysis as a matter of law.'"))(citing EPA's Response to Comments on the Red Gate PSD Permit for GHG Emissions, PSD-TX-1322-GHG, February 2015).) As a preliminary matter, those decisions are not controlling because they are examples of other permitting decisions that were not appealed and therefore were not reviewed by this Board or a court. While decisions from other permitting authorities may provide useful information in guiding the County's own review, a case-specific response to comments issued by Region 6 or Region 4 does not establish "as a matter of law" that energy storage is never appropriate to consider in Step 1 of the BACT analysis. BACT is determined on a case-by-case basis. 40 C.F.R. § 52.21(b)(12).

In the case of the Ocotillo plant, the facts and circumstances related to the use of energy storage are very different than the facts and circumstances at issue with regard to the Red Gate and Shady Hills facilities. In both of those cases, the EPA regional offices were responding to Sierra Club comments that energy storage should replace the engines or turbines at issue. In contrast, the issue before the Board here is whether energy storage can improve the permitted GHG emission rate of the combustion turbines by eliminating or mitigating the need to operate all five of the Ocotillo combustion turbines at low loads. This question of setting a permit limit based on low loads and inefficient operation was not at issue in either the Red Gate or the Shady Hills permits. The Red Gate facility was proposed as a series of 12 smaller internal combustion engines to meet peaking needs in Texas. Each engine had a capacity of approximately 18 MW, and EPA did not base the GHG emission limit on an assumption that each of the 12 engines

would operate at low loads. Sierra Club's comments on the Red Gate draft permit therefore recommended the replacement of one or more of the engines with energy storage; the issue of pairing energy storage with each engine did not come up. Similarly, Sierra Club submitted very brief comments addressing energy storage for the Shady Hills facility that recommended energy storage only as a complete replacement of the proposed simple cycle turbines (i.e. energy storage "in lieu of" the combustion turbines). Again, the issue of energy storage paired with the combustion turbines did not come up and was not addressed by EPA Region 4. Contrary to the County's claim, these case-specific examples of EPA responding to specific comments related to energy storage do not establish "as a matter of law" that energy storage is never available to consider in Step 1 of the BACT analysis.

In this petition, unlike the comments on Red Gate and Shady Hills, Sierra Club is not asking the Board to consider whether the use of energy storage to replace the combustion turbines would redefine the source.<sup>13</sup> Rather, this petition seeks review of the County's failure to identify energy storage paired with the combustion turbines as an available control technology to mitigate or eliminate the need to operate the combustion turbines at low load. That question turns on the circumstances related to Ocotillo, and specifically on the question of whether energy storage could eliminate the need to operate the combustion turbines at such low loads for such long periods of time. The County's blanket rejection of energy storage in all cases without regard to the case specific circumstances raised by Sierra Club's comments on the Ocotillo project is the

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<sup>13</sup> Sierra Club Comment's did recommend that the County consider complete replacement of the combustion turbines with energy storage. Sierra Club does not agree with the County's argument that this option would redefine the source. However, at this time Sierra Club has chosen not to bring this issue before the Board and instead seeks review on the issue of whether the County erred by failing to identify a hybrid energy storage configuration in Step 1 of the BACT analysis.

type of “automatic BACT off-ramp” that this Board has cautioned against. *See In re La Paloma Energy Center LLC*, 16 E.A.D. \_ at 26 (EAB 2014).

The County also cannot successfully argue that energy storage redefines the source because it would not provide a full 375 MW within 2 minutes. First, there is no evidence on the record that such capability is part of APS’s business purpose or need. To the contrary, in its January 2015 Application, APS asserted only that Ocotillo “must have firm electric capacity which can be quickly and reliably dispatched when renewable power, or other distributed energy sources are unavailable.” (SC Ex. 7, App. at PDF p.3.) Later in the Application, APS dismissed alternative turbine configuration on the grounds that it could not ramp quickly enough “compared to approximately 10 minutes to achieve the full rated electric output for the proposed GE Model LMS100 simple cycle gas turbines.” (*Id.* at PDF p.153.) Indeed, the description of the ability to ramp 375 MW in less than 2 minutes is included only as a descriptive capability of APS’s preferred configuration, not as a business purpose or need. In addition, that description was only added after APS reviewed Sierra Club’s comments; it was not included in APS’s January 23, 2015 Application, nor in APS’s July 31, 2014 CEC Application. (SC Ex. 4, SC Comments at 203-08.)

Second, energy storage units such as batteries can provide the flexibility and quick response timing that is something that APS included as a project purpose – and on a much faster basis as well (seconds as opposed to minutes). The only limitation the energy storage unit would have compared to idling the five combustion turbines at 25% load would be the magnitude of the ramping capability for the 10 minutes that it take to startup the combustion turbines from black

start.<sup>14</sup> To the extent the County or APS subsequently attempt to amend a description of the project purpose in this proceeding to include a specific need to ramp the entire 375 MW within 2 minutes, the Board should disregard that claim as unsupported by the record. Furthermore, such a post-hoc adjustment to narrow the purported project need in order to avoid consideration of a feasible control technology would undermine the BACT analysis of other feasible technologies. *See In re Pio Pico Energy Center*, 16 E.A.D.\_\_\_\_, 67 (2013) (“Sierra Club’s fear that applicants and permit issuers could so narrowly define the source type they consider in step 2 as to make all other control technologies infeasible is well taken”).

Moreover, an applicant’s desire to operate a proposed source in a certain way has never been allowed to shield the applicant’s specific design preference from the effects of a BACT determination. *See e.g., In re Pennsauken County*, 2 E.A.D. 667, 673 (Adm’r 1988) (noting that imposing BACT conditions may have a profound effect on the viability of the proposed facility as conceived by the applicant); *In re Northern Michigan University Ripley Heating Plant*, 14 E.A.D. 283, 302 (EAB 2009)(finding that redefining the source arguments asserted by a permitting authority after a petition for review was filed and with meager record support could not be sustained), *In re Hibbing Taconite Co.*, 2 E.A.D. 838, 843 (Adm’r 1989) (requiring consideration of burning natural gas, rather than petroleum coke, in the BACT analysis notwithstanding the applicant’s desire and intent to use a different fuel). Thus, APS’s desire to operate the power plant without including energy storage to increase efficiency and decrease emissions is not controlling.

The County must inquire whether energy storage paired with combustion turbines can be implemented at Ocotillo “without disrupting [APS’s] basic business purpose.” *Desert Rock*, 14

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<sup>14</sup> Even this shortcoming could be overcome by making the energy storage unit bigger, though such a large energy storage unit would likely be unnecessary if paired with the combustion turbines.

E.A.D. at 530. There is no evidence in the record here to indicate that including energy storage with the combustion turbines to increase efficiency and therefore decrease emissions would frustrate APS's basic business purposes to "provide peaking and load shaping electric capacity in the range of 25 to 500 MW (including quick ramping capability to backup renewable power and other distributed energy sources)..." (SC Ex. 6, TSD at 6.) Energy storage paired with combustion turbines will not change that basic business purpose and therefore does not constitute a redefinition of the source. *See Desert Rock*, 14 E.A.D. at 538 (remanding because the Region failed to adequately explain its "redefining the source" conclusion); *Cash Creek Generation*, Order at 8 (finding that permitting authority failed to provide a reasoned explanation for why a cleaner fuel would "redefine the source").

**2. Energy Storage Paired with Combustion Turbines is an Available and Demonstrated Technology.**

A BACT analysis must consider efficient production processes that are capable of reducing the amount of pollution created per unit of output. Such options are to get no less attention than pollution controls that attempt to remove the pollution from a facility's emission stream after it has been created. In this case, Sierra Club identified a cleaner production process option to use energy storage in conjunction with the combustion turbines to eliminate or mitigate the need to operate the combustion turbines at inefficient, low loads. (SC Ex. 4, SC Comments at 7.) A hybrid energy storage-gas turbine process would provide the same peaking capacity, response time, and load shaping capabilities that would otherwise be supplied by the natural gas simple cycle electricity production process proposed by the applicant. Pairing energy storage with the combustion turbines would reduce the air pollution emissions per unit of electricity generated without changing the fundamental purposes of the plant. *See e.g.*, GHG Guidance at 30 ("EPA recommends that permitting authorities consider technologies or processes that not

only maximize the energy efficiency of the individual emitting units, but also process improvements that impact the facility's energy utilization assuming it can be shown that efficiencies in energy use... lead to reductions in emissions from the facility.”). The County erroneously failed to identify this cleaner production process in the BACT analysis; that decision should be reviewed and reversed.

Sierra Club specifically discussed a hybrid coal-battery power plant in Chile as an example of the successful deployment of energy storage to increase the efficiency of a thermal power plant. (SC Ex. 4, SC Comments at 7, 84-90.) Neither the final TSD nor the County's RTC even mentioned the Angamos hybrid facility in Chile, despite the fact that Sierra Club specifically described the plant in its comments and included an attachment with a detailed description of the facility as Exhibit 3 to Sierra Club's Comments. (*Id.*) The Angamos facility is a baseload plant with two coal-fired turbines. The addition of a 20 MW battery energy storage system, “allows the plant to reduce the mandated spinning reserve, thus allowing the plant to operate at increased load.” (SC Ex. 4, SC Comments at 89.) This is the same concept that would apply to the LMS 100 units. An energy storage unit paired with the Ocotillo combustion turbines would eliminate the need for the turbines to idle at 25% load because the battery would provide the necessary fast response reserve to meet unexpected load changes, the same function served by the battery at Angamos. As a result the combustion turbines at Ocotillo would be free to either operate at higher, more efficient loads (when called upon) or to turn off completely (when not called upon).

While the operation of the Angamos facility is slightly different because it involves a baseload facility and coal-fired turbines, the use of the battery energy storage system to improve efficiency, thereby reducing emissions, of the thermal turbines is the same. The County was

therefore required to consider the use of energy storage as an available and demonstrated technology. “The control options should include not only existing controls for the source category in question, but also controls determined through ‘technology transfer’ that are applied to source categories with exhaust streams that are similar to the source category in question.” GHG Guidance at 24.

In addition to the example cited by Sierra Club of the Angamos plant in Chile, Sierra Club also included as Exhibit 12 to its comments a 2011 study by the Boston Consulting Group titled “Revisiting Energy Storage.” (SC Ex. 4, SC Comments at 209-33.) Although Sierra Club cited this study as support for the black start capabilities of energy storage units, the study also discussed the role that energy storage has played for years in enabling utilities “**to make the best use of conventional** and renewable generation assets. This can be accomplished by minimizing ramping (in the case of conventional power plants) and minimizing throttling (in the case of renewables).” (SC Ex. 4, SC Comments at 219 (emphasis added).) The study went on to describe specific data gathered from the deployment of energy storage in Germany. *Id.* at 221.

Other examples of the availability and feasibility of energy storage paired with combustion turbines continue to emerge. In California, a developer recently submitted an application with the California Energy Commission for the construction of the Mission Rock Energy Center, which the application described as follows:

The Mission Rock Energy Center (MREC) will be a natural gas-fired, simple-cycle combustion turbine electrical generating facility rated at a nominal generating capacity of 275 megawatts (MW), co-located with battery units for the storage of electricity that can deliver an additional 25 MW.



(Sierra Club Exhibit 9, Mission Rock Executive Summary at 2.)<sup>15</sup> This project configuration is precisely the design that Sierra Club recommended for the Ocotillo project, pairing energy storage with simple-cycle gas turbines. Moreover, the Mission Rock applicant's project description is very similar to the project purpose for the Ocotillo project: "The MREC's primary objective is to combine dispatchable, operationally flexible, and efficient energy generation with state-of-the-art energy storage technology, to meet the need for new local capacity... The MREC will thus provide a resource to balance the variability of renewable resources, to satisfy peak energy and capacity needs during high load events, and to support the electrical grid during outages of transmission lines and other generating facilities." *Id.*

The examples cited by Sierra Club in its comments, as well as new examples that continue to emerge, demonstrate that energy storage paired with combustion turbines is an available control technology. Therefore, the County committed clear error by failing to identify energy storage paired with combustion turbines as an available control technology in Step-1 of the BACT analysis. Similarly, had the County properly considered energy storage paired with combustion turbines in Step 1, it should have also determined that such technology was feasible under Step-2 of the BACT analysis because there are several examples where the technology has been deployed for this precise purpose. The Board must therefore remand the final permit to the County with instructions to conduct a full BACT analysis that considers energy storage paired with combustion turbines as a control technology. Furthermore, given the ongoing advancement of this technology, Sierra Club requests that the Board direct the County to solicit additional

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<sup>15</sup> Sierra Club did not include this example in its comments. However, good cause exists for failing to raise it because the December 30, 2015 application did not exist when Sierra Club submitted its April 9, 2015 comments. 40 C.F.R. § 124.76. Moreover, the example cited merely provides additional evidence to support an issue that was timely raised in Sierra Club's comments. Had the County properly considered and investigated Sierra Club's comments on energy storage paired with combustion turbines, it very likely would have discovered this facility.

public comment on the topic so that interested parties can provide the County with the most up to date information on the availability, feasibility and cost of energy storage systems.

### **C. Sierra Club's Comments and the County's Response**

The Board's standard of review requires that the record demonstrate that "the permit issuer 'duly considered the issues raised in the comments and ultimately adopted an approach that is rational in light of all information in the record.'" *In re Pio Pico Energy Center*, 16 E.A.D. \_\_\_ (EAB 2013) (internal quotations omitted) (citing, *In re Gov't of D.C. Mun. Separate Storm Sewer Sys.*, 10 E.A.D. 323, 342 (EAB 2002); *accord In re City of Moscow*, 10 E.A.D. 135, 142 (EAB 2001); *In re NE Hub Partners, LP*, 7 E.A.D. 561, 567-68 (EAB 1998), *review denied sub nom. Penn Fuel Gas, Inc. v. EPA*, 185 F.3d 862 (3d Cir. 1999)). In this case, Sierra Club repeatedly and clearly raised the issue in its comments recommending that the County consider energy storage paired with the combustion turbines as a control technology.

#### **1. Sierra Club's Comments Raised the Issue of Energy Storage Paired with the Combustion Turbines.**

Sierra Club discussed the use of energy storage paired with the combustion turbines throughout its comments. The Comments first raised the issue with specificity in the section titled "Energy Storage Options Improperly Omitted":

[Energy storage] technologies can be paired with traditional thermal generating units or renewable generation to provide an independent source to charge the storage and to provide other backup services. Energy storage is always synchronized to the grid and able to provide key reliability services such as frequency regulation, spinning reserves, and renewable integration without a minimum set point.

(SC Ex. 4, SC Comments at 6.) In the subsequent section, the Comments discussed in detail the specific configuration of the energy storage system paired with the combustion turbines, and

provided a specific example of the AES Angamos Power Plant in Chile where the technology had been successfully deployed:

Energy storage has been successfully deployed to address this problem [of operating combustion turbines at less efficient loads]. In Chile, the AES Gener Angamos Power Plant paired two 260 MW thermal units with a 20 MW high-efficiency lithium-ion battery energy storage system...The battery energy storage system therefore allows the plant to operate at increased load. The same application could be used to increase the load of the Ocotillo [sic] plant, which would allow it to operate more efficiently and with fewer emissions.

Interfacing energy storage with gas turbines would eliminate the need to operate the LMS100 turbines at low loads. This configuration would improve overall Project heat rate and efficiency, thus reducing GHG and other criteria pollutant emissions. Energy storage technology is capable of starting nearly instantaneously and changing loads quickly without the need to idle. These capabilities would eliminate the need for the LMS100 units to idle or operate at 25% load when they are not called upon for more efficient capacities. The option of using energy storage to mitigate the need to operate the LMS100s was not considered in the GHG BACT analysis.

*Id.* at 7. In further support of this point, Sierra Club included Exhibit 3 to its comments, which is a detailed description of the Angamos Power Plant in Chile. (SC Ex. 4, SC Comments at 84-90.)

Other references to and descriptions of energy storage paired with combustion turbines were included throughout Sierra Club's comments. (SC Ex. 4, SC Comments at 11) ("Furthermore, integrating energy storage into the design of the Ocotillo Power Plant could increase the inherent efficiency of the LMS100 units by mitigating the need to operate at low loads."); *id.* at 11-15 (enumerating the specific capabilities of energy storage with respect to peaking, high plant efficiency, etc.); *id.* at 16 ("Neither the Applicant nor the County considered either a full energy storage facility **or a hybrid energy storage-LMS100 facility.**") (emphasis added); *id.* at 33 ("As discussed elsewhere, operation at 25% of the LMS100 design load, or about 25 MW, could be achieved by either using hybrid battery or other storage options .... This

type of configuration or operational parameters would eliminate the need to operate the LMS100 units at 25% loads for any extended periods of time.”).

Although other issues were discussed, the comments about the potential of energy storage paired with the combustion turbines were at the heart of Sierra Club’s comments. Even setting aside the other issues raised by Sierra Club with respect to the wholesale replacement of the turbines with storage, the comments regarding a paired operation of energy storage with the combustion turbines stand on their own. The County was therefore fairly apprised of Sierra Club’s comments and had an obligation to both consider energy storage paired with the combustion turbines in Step 1 of the BACT analysis and to respond to Sierra Club’s comments on the issue.

**2. The County Clearly Erred Because it Failed to Respond to Sierra Club’s Comments Regarding Energy Storage Paired with the Combustion Turbines.**

The County clearly erred by failing to appropriately respond to Sierra Club’s comments regarding battery storage paired with the combustion turbines. Rather than directly responding to this issue, the County cited various reasons for why the complete replacement of the combustion turbines with energy storage was either infeasible or constituted a redefinition of the source. (*See, e.g.*, SC Ex. 2, RTC at 6, 8-10, 16-17.) This conflation of two separate issues resulted in a failure of the County to meet its obligation to identify and respond to all significant comments. As this Board held in *In re Russel City Energy Center*, 15 E.A.D 1, 24 (EAB 2010), “Section 124.17 requires permit issuers to ‘[b]riefly describe and respond to all significant comments on the draft permit \* \* \* raised during the public comment period, or during any hearing.’” (citing 40 C.F.R. § 124.17(a)(2))(internal quotations omitted). While the County was not required to

respond to all comments with the same level of detail, it was required to demonstrate that each comment was considered. *Id.*

The County's response to the issue of battery storage paired with the combustion turbines is, at best, ambiguous because much of the County's RTC conflates the issue with the wholesale replacement of the turbines.<sup>16</sup> The closest the County came to directly addressing Sierra Club's proposal to consider energy storage paired with combustion turbines occurred in response to a specific discussion about battery storage technology:

The suggestion by the commenter that a **natural gas combined cycle unit combined with battery storage** could reduce GHG emissions by 30% **is not technically feasible, since there are no commercially demonstrated, available and applicable battery storage units on the scale of the proposed Project**. Therefore, the battery storage option may be eliminated at Step 1 of the BACT analysis because it would not meet the business purpose of the Project – to provide between 25 MW to 500 MW of electrical energy as needed on an immediate basis, and potentially for an extended period of time. The comment requires redefining the source, and under Step 2 **because it is not technically feasible at this time to produce up to 500 MW** of electrical energy using this technology, and may not even be technically feasible at much lower capacities.

(SC Ex. 2, RTC at 9 (emphasis added).) This response is confusing because it incorrectly assumed that the energy storage unit would need to be sized at the same scale as the five combustion turbines (i.e. 500 MW). A 500 MW energy storage system is not what Sierra Club proposed with respect to energy storage paired with the combustion turbines. Rather, Sierra Club specifically stated that a unit around 25 MW should be considered to eliminate or mitigate the need to operate the combustion turbines at low load: “operation at 25% of the LMS100 design load, or about 25 MW, could be achieved by...using hybrid battery or other storage options...”

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<sup>16</sup> See, e.g., SC Ex. 2, RTC at 6 (“Based on these previous EPA determinations and EAB decisions, MCAQD has determined that combined cycle combustion turbines, batteries, and other energy storage options would fundamentally redefine the source, and therefore will not be considered in the BACT analysis.”)

(SC Ex. 4, SC Comments at 32.) Similarly, the Angamos hybrid plant in Chile, cited by Sierra Club, has a combined thermal unit capacity of 520 MW (260 MW per unit) that is paired with a 20 MW battery energy storage system. (SC Ex. 4, SC Comments at 87-89.) In that example, as discussed above, the battery clearly was not sized to replace the entire capacity of the thermal units, yet the battery increased the efficiency of the units by allowing them to operate at higher loads. That was the configuration recommended by Sierra Club in its comments on the Draft Permit. However, the County did not even mention the Angamos example anywhere in its RTC or the TSD, nor did it ever address the concept of pairing a smaller energy storage system with combustion turbines to improve the efficiency of the turbines.

Throughout the RTC, the County rejected energy storage on the grounds that there is no available energy storage system that can supply a maximum power output of 500 MW:

[T]he use of energy storage would not fulfill the site-specific purpose and need of the Project, which is to provide up to 500 MW of peak electric generating capacity for potentially extended periods of time at an existing plant site... (SC Ex. 2, RTC at 8)

[T]here is no available energy storage option that could supply a maximum power output of 500 MW for a potentially extended period of time, which is what this project requires... (*Id.*)

Conversely the Project will be designed for a maximum energy output of approximately 500 MWh [sic]. Thus the required electric energy output of the Project is some 50 times larger than the largest battery storage facilities currently in service. (*Id.* at 8-9)

Therefore, like batteries, the LAES option may be eliminated at Step 1 of the BACT analysis because it would not meet the business purpose of the Project, which is to generate and provide to the grid 25 to 500 MW of electricity as needed. (*Id.* at 9)

MCAQD has determined that...Battery and other energy storage options are not a technically feasible option for the Project and would redefine the project. (*Id.* at 16)

Whether or not energy storage systems are available at 500 MW is irrelevant to the issue of whether a small energy storage system paired with the combustion turbines is an available

control technology. None of the County’s responses addressed Sierra Club’s comments recommending energy storage paired with combustion turbines could reduce emissions by eliminating or mitigating the need to operate the combustion turbines at low load, despite the fact that Sierra Club devoted an entire subsection to discuss this option. “These [energy storage] capabilities would eliminate the need for the LMS 100 units to idle or operate at 25% load when they are not called upon for more efficient capacities.” (SC Ex. 4, SC Comments at 7.)

The County’s failure to address the issue of energy storage paired with combustion turbines does not meet the Board’s standard of review, which requires that the record demonstrate that the County duly considered the issues raised by Sierra Club and ultimately adopted an approach that is rational in light of all information in the record. *In re Pio Pico Energy Center*, 16 E.A.D. \_\_ (EAB 2013). The Board must therefore remand the permit with instructions to the County to respond to the issue of whether energy storage paired with combustion turbines is an available control technology.

**VI. CONCLUSION**

The County committed clear error by failing to identify energy storage paired with combustion turbines as an available controls technology in Step 1 of the top down BACT analysis. The County also erred by failing to adequately respond to Sierra Club’s comments raising this issue. There is clear evidence in the record demonstrating that energy storage paired with combustion turbines is both an available and demonstrated technology. Sierra Club therefore respectfully requests that the Board grant review or and remand the final permit for the

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Ocotillo facility with instructions for the County to conduct a full BACT analysis considering energy storage paired with combustion turbines.

Respectfully submitted, this 21<sup>st</sup> day of April, 2016.

/s/ Travis Ritchie .

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**STATEMENT OF COMPLIANCE**

The foregoing complies with 40 C.F.R. § 124.19(d)(1)(iv) and (3). The length is 10,006 words, using the word count function in Microsoft Word.

Travis Ritchie

**CERTIFICATE OF SERVICE**

I hereby certify that I have this day served the foregoing document, PETITION FOR REVIEW OF PREVENTION OF SIGNIFICANT DETERIORATION PERMIT ISSUED BY MARICOPA COUNTY AIR QUALITY DEPARTMENT FOR THE OCOTILLO POWER PLANT upon the following parties by FedEx:

Arizona Public Service  
Attn: Anne Carlton  
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Richard A. Sumner, PE  
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Jared Blumenfeld  
Regional Administrator  
U.S. EPA, Region 9  
75 Hawthorne Street  
San Francisco, CA, 94105

Dated at San Francisco, CA, this 21<sup>st</sup> day of April of 2016.

/s/ Travis Ritchie  
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