

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

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	)	Appeal No. PSD 13-___
In the Matter of La Paloma Energy	)	
Center, LLC	)	PSD Permit No. PSD-TX-1288-GHG
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PETITION FOR REVIEW OF PREVENTION OF SIGNIFICANT DETERIORATION  
PERMIT ISSUED BY REGION VI FOR LA PALOMA ENERGY CENTER,  
HARLINGTEN, TEXAS

David C. Bender  
MCGILLIVRAY WESTERBERG & BENDER LLC  
2115 S. Paterson Street, Ste 320  
Madison, WI 53703  
608.310.3560  
608.310.3561 (fax)

Travis Ritchie  
Sierra Club Environmental Law Program  
85 Second Street, 2nd Floor  
San Francisco, CA 94105  
415.977.5727

## TABLE OF CONTENTS

TABLE OF AUTHORITIES.....	iii
INTRODUCTION AND STATEMENT OF FACTS.....	1
A. The Proposed Facility .....	1
THRESHOLD PROCEDURAL REQUIREMENTS.....	2
ISSUES PRESENTED FOR REVIEW .....	3
ARGUMENT.....	4
I. Background on Establishing BACT Limits.....	4
II. The Region Erred By Defining BACT as Combined Cycle Combustion Turbines, An Entire Category of Technology, And Then Failing To Establish an Emission Limit Based On The Maximum Emission Reduction Achievable With That Technology .....	7
A. The BACT Limit For Greenhouse Gases Must Represent The Emission Rate Achievable With The Most Efficient Applicable Turbine Design.....	9
B. Sierra Club’s Comments and The Region’s Response.....	11
C. The Region’s Justification For Not Establishing A BACT Emission Limit Based on the Lowest Emitting Turbine Design Relies on an Incorrect Application of the Tow-Down Process .....	12
III. The Region Erred Because The Use of Solar Preheating To Increase The Fuel Efficiency of the Plant Does Not Redefine The Source .....	16
A. Solar Preheat Add-On Technology .....	16
B. Sierra Club’s Comments and the Region’s Response.....	21
C. The Region Clearly Erred In Applying the “Redefining The Source” Precedents .....	23
CONCLUSION.....	29

## TABLE OF AUTHORITIES

### Cases

<i>Alaska Dept. of Env'tl. Conservation v. EPA</i> , 540 U.S. 461 (2004) .....	4
<i>Citizens for Clean Air v. EPA</i> , 959 F.2d 839 (9 <sup>th</sup> Cir. 1992) .....	10
<i>In re Cash Creek Generation, LLC</i> , Petition Nos. IV-2008-1 & IV-2008-2 (EPA Adm'r, Dec. 15, 2009) .....	25, 28
<i>In re CertainTeed Corp.</i> , 1 E.A.D. 743 (Adm'r 1982) .....	5
<i>In re Christian Cnty. Generation, LLC</i> , 13 E.A.D. 449 (EAB 2008) .....	10
<i>In re Desert Rock Energy Company, LLC</i> , PSD Appeal Nos. 08-03 through 08-06 (EAB, Sept. 24, 2009) .....	<i>passim</i>
<i>In re Gen. Motors, Inc.</i> , 10 E.A.D. 360 (EAB 2002) .....	4
<i>In re Knauf Fiber Glass, GmbH</i> , 8 E.A.D. 121 (EAB 1999) .....	<i>passim</i>
<i>In re Mississippi Lime Co.</i> , 15 E.A.D. __, PSD Appeal No. 11-01 (EAB, Aug. 9, 2011) .....	<i>passim</i>
<i>In re Newmont Nev. Energy Inv., LLC</i> , 12 E.A.D. 429 (EAB 2005) .....	4
<i>In re Northern Michigan University</i> , 14 E.A.D. __, PSD 08-02 (EAB, Feb. 18, 2009) .....	6, 27
<i>In re Pennsauken County</i> , 2 E.A.D. 667 (Adm'r 1988) .....	27
<i>In re Pio Pico Energy Center</i> , PSD Appeal Nos. 12-04 through 12-06 (EAB, Aug. 2, 2013) .....	23

<i>In re Prairie State Generating Co.</i> , 13 E.A.D. 1 (EAB 2006) .....	10
<i>In re: Spokane Regional Waste-to-Energy Applicant</i> , PSD Appeal No. 88-12 (EPA June 9, 1989) .....	10
<i>Sierra Club v. EPA</i> , 499 F.3d 653 (7 <sup>th</sup> Cir. 2007) .....	24, 25
<i>Texas v. EPA</i> , 726 F.3d 180 (D.D.C. 2013) .....	1
<i>In re Hibbing Taconite Co.</i> , 2 E.A.D. 838, 843 (Adm’r 1989) .....	27

**Federal Statutes**

42 U.S.C. § 7475(a)(4) .....	4
42 U.S.C. § 7479(3) .....	4, 6, 9, 23

**Federal Regulations**

40 C.F.R. § 52.21(b)(12) .....	4, 24
40 C.F.R. § 52.21(j)(2) .....	4
40 C.F.R. § 124.19 .....	1
40 C.F.R. § 124.19(a) .....	1, 2
40 C.F.R. § 124.19(a)(3) .....	1
40 C.F.R. § 124.19(a)(4)(i)(A) .....	23

**Federal Register**

75 Fed. Reg. 81,874 (Dec. 29, 2010) .....	1
---	---

**Other**

Office of Air Quality Planning and Standards, U.S. EPA, *New Source Review Workshop Manual* at B.10 (Draft, Oct. 1990) ..... *passim*

Office of Air Quality Planning and Standards, U.S. EPA, *PSD and Title V Permitting Guidance for Greenhouse Gases* at 29, EPA-457/B-001 (March 2011). Available at [www.epa.gov/nsr/ghgdocs/ghgpermittingguidance.pdf](http://www.epa.gov/nsr/ghgdocs/ghgpermittingguidance.pdf) .....6

Websters New World College Dictionary 837 (3<sup>rd</sup> Ed. 1997) .....4

## INTRODUCTION AND STATEMENT OF FACTS

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 PSD-TX-1288-GHG, issued by the United States Environmental Protection Agency, Region VI (“Region”) for a natural gas fired electric generating station.<sup>1</sup> The permittee facility is to be owned by La Paloma Energy Center, LLC, (LPEC) and would be located at 24668 FM 1595, Harlingen, Texas. The permit from the Region is dated November 6, 2013, and notes that it becomes effective thirty days later unless review is requested pursuant to 40 C.F.R. § 124.19. A copy of the PSD permit is attached as Sierra Club **Exhibit 1**. The thirty day period in which to file this review expires on December 6, 2013. 40 C.F.R. § 124.19(a)(3). This petition is therefore timely.

### **A. The Proposed Facility.**

According to the application submitted by LPEC, it seeks to construct:

a new combined cycle electric generating plant, La Paloma Energy Center (LPEC), in Cameron County, Texas. LPEC will consist of two natural gas-fired combustion turbines, each exhausting to a fired heat recovery steam generator (HRSG) to produce steam to drive a shared steam turbine. Three models of combustion turbines are being considered for this site: the General Electric 7FA, the Siemens SGT6-5000F(4), and the Siemens SGT6-5000F(5). The final selection of the combustion turbine model will not be made until after the permit is issued.

Prevention of Significant Deterioration Greenhouse Gas Permit Application for a  
Combined Cycle Power Plant at the La Paloma Energy Center, Cameron County, Texas

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<sup>1</sup> Pursuant to a Federal Implementation Plan issued December 23, 2010, U.S. EPA is the PSD permitting authority for Greenhouse Gas emissions in Texas. 75 Fed. Reg. 81,874 (Dec. 29, 2010); *see also Texas v. EPA*, 726 F.3d 180 (D.D.C. 2013) (dismissing challenges to the federal implementation plan for Texas).

(Revised 07/17-12) at 1 (“Revised Application”) (attached as Exhibit 2). According to the Revised Application, the “business purpose” of the plant “is to generate 637-735 megawatts (MW), of gross electrical power near the City of Harlingen in an efficient manner while increasing the reliability of the electrical supply for the State of Texas.” Revised Application at 11; see also Response to Comments at 9 (“the business purpose of the proposed project for a new combined cycle EGU is to generate 637-735 MW of gross electrical power near the City of Harlingen.”) (attached as Exhibit 3).

### **I. 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 and its members participated in the public comment period on the draft permit. 40 CFR § 124.19(a). *See* Comments on behalf of the Sierra Club (April 19, 2013) (attached as Exhibit 4), and Corrected Comments on Behalf of Sierra Club (April 30, 2013) (attached as Exhibit 5). The issues raised by Sierra Club below were raised with the Region during the public comment period or are directly related to the Region’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.

## 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 Region clearly erred by setting three different greenhouse gas limits, each purporting to represent best available control technology (“BACT”) for the proposed plant’s generating units, but ranging from 909.2 pounds of carbon dioxide per megawatt hour gross (lb CO<sub>2</sub>/MWh) to 934.5 lb CO<sub>2</sub>/MWh gross. Ex. 1, Final Permit at 7-10. These different “BACT” limits differ due to the difference in heat rate between three alternative turbine technologies. *Id.* at 13 (ranging from 7,649.0 Btu/kWh<sub>(HHV)</sub> to 7,891.8 Btu/kWh<sub>(HHV)</sub>). Rather than selecting BACT based on the most efficient turbine that meets the applicant’s project purpose, the Region set three different limits and allowed the applicant to choose which would apply depending on which turbine design was ultimately installed. This does not comply with the top-down BACT process, nor the policy underlying BACT to establish the most stringent limit achievable with the lowest emitting control option that meets the project purpose. And, even if not clear error, whether the Board should review this issue because it has important policy implication for implementing BACT for greenhouse gas emissions.
2. Whether the Region clearly erred by refusing to consider solar thermal hybrid addition to the proposed natural gas combined cycle power plant, despite being a demonstrated method to reduce greenhouse gas emissions without changing the fundamental business purpose of producing electricity through a combined cycle power plant. The Region incorrectly determined that including solar thermal supplemental heat to a combined cycle plant would “redefining the source.” And, even if not clear error, whether the Board should review this issue because it has important policy implication for implementing BACT for greenhouse gas emissions.

## ARGUMENT

### I. 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, cleaner production processes. 42 U.S.C. § 7479(3) ("best available control technology" means an emission limitation based on the maximum degree of reduction of each pollutant... achievable for such facility through application of production processes"); 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." Webster's 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. \_\_, 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) 132; *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); *NSR Manual* at B.2 (“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.”).

Importantly, the BACT definition incorporates the concept that pollution avoided is as important as pollution removed. 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. *Knauf*, 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 NO<sub>x</sub> emissions at a gas-fired turbine.

Office of Air Quality Planning and Standards, U.S. EPA, *New Source Review Workshop Manual* at B.10 (Draft, Oct. 1990) (“NSR Manual”). A cleaner production process is central to this definition. Cf. *In re N. Mich. Univ.*, 14 E.A.D. \_\_\_, PSD 08-02, Slip. Op. at 17-18 (EAB, Feb. 18, 2009) (finding that a option for reducing pollution among those specifically listed by Congress in 42 U.S.C. § 7479(3) to be “prominent” and Congress’ instruction to consider it to be “emphatic”) (“NMU”).

EPA has recognized that lower polluting practices or processes are especially important to BACT determinations for greenhouse gases because:

the use of add-on controls to reduce GHG emissions is not as well-advanced as it is for most combustion-derived pollutants. Initially, in many instances energy efficient measures may serve as the foundation for a BACT analysis for GHGs, with add-on pollution control technology and other strategies added as they become more available.

Office of Air Quality Planning and Standards, U.S. EPA, *PSD and Title V Permitting Guidance for Greenhouse Gases* at 29, EPA-457/B-001 (March 2011)<sup>2</sup>. Put another way, applying efficiency and other fuel and production process control options correctly in BACT determinations is critical because those are the only control options currently being applied for greenhouse gases.

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<sup>2</sup> Available at [www.epa.gov/nsr/ghgdocs/ghgpermittingguidance.pdf](http://www.epa.gov/nsr/ghgdocs/ghgpermittingguidance.pdf).

**II. The Region Erred By Defining BACT as Combined Cycle Combustion Turbines, An Entire Category of Technology, And Then Failing To Establish an Emission Limit Based On The Maximum Emission Reduction Achievable With That Technology.**

The final permit, like the draft permit, establishes three different sets of emission limits for three different combustion turbine designs. Ex. 1, Final Permit at 7-11. The combustion turbine greenhouse gas emission limits for carbon dioxide (CO<sub>2</sub>) range from 909.2 lb CO<sub>2</sub>/MWh-gross to 934.5 lb CO<sub>2</sub>/MWh-gross. (Id.)<sup>33</sup> The Region's BACT determination considered combustion turbines "as a collective option," Response to Comments at 6, and then setting different emission rates for the various combustion efficiencies of turbine designs within that "collective." Thus, the Region's analysis failed to establish a BACT limit based on the lower emission rate achievable by the most efficient design.

If allowed to stand, the Region's decision undermines the purpose of BACT to set the bar high through a site-specific BACT limit for a particular applicant's proposed emission source. In fact, according to the Region, there is actually an emergent practice by permitting authorities to issue permits with multiple "BACT" limits for various combustion turbine designs and to let the applicant choose between turbines and therefore choose its own BACT limit. Ex. 3, Resp. to Comments at 9 ("LPEC's permit is not the first PSD permit to afford the permit holder the flexibility to later choose

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<sup>33</sup> The permit also sets different annual emission limits that differ due to both the emission rate difference and the overall plant size difference assumed. This petition focuses on the difference in emission rate, on the constant basis of emissions per common unit of output (Megawatt Hour or MWh). This is the typical method for determining the difference between lower polluting production processes. NSR Manual at B.22.

between multiple turbine models. The RACT/BACT/LAER Clearinghouse illustrates that multiple permitting authorities have drafted and issued permits allowing for post-issuance selection of turbine models, including in cases where the selection would be consequential to operative limits of the permit.” (citing 9 final and one draft permit.) This menu approach to BACT allows the applicant to select a less stringent limit than one that could be achieved with a turbine design that also meets the applicant’s purpose. Unless addressed by the Board, this menu approach to BACT permitting threatens to undermine the requirement that BACT be based on the most efficient and least emitting production process that meet the applicant’s project purpose, by substituting a range of limits for a range of differing production processes and efficiencies.

And, since efficient is all there currently is to control greenhouse gas emissions at this time, at least according to EPA’s PSD Permitting Guidance for Greenhouse Gases at 29, the Region’s BACT analysis in this case vitiates any pollution control that could have been achieved through PSD permitting. If the Region does not require a limit based on the best achievable energy-efficient turbine design available, then the entire greenhouse gas BACT analysis is essentially meaningless. Under the Region’s rationale, applicants are free to pick any turbine design they like, and the Region will simply devise a limit for the applicant’s chosen turbine (plus a generous compliance margin). This is a meaningless paper exercise that will not result in any attempt to make efficiency improvements to turbine designs, encourage adoption of the more efficient turbines on the market, or in any way gradually reduce greenhouse gas BACT limits.

**A. The BACT Limit For Greenhouse Gases Must Represent The Emission Rate Achievable With The Most Efficient Applicable Turbine Design.**

There is no dispute in this case that any of the three turbine designs included in the final permit are available, applicable, and fulfill the applicant's claimed "project purpose." Indeed, all were proposed and selected and all are permitted as options. (Final Permit at 7-12.) Nor is there any dispute that if the LPEC applies the "SGT6-5000F(4)" design, it can achieve a lower emission rate per Megawatt hour than the other two turbine designs considered. (Final Permit at 11.) Yet, the Final Permit as written allows the LPEC to emit at rates several percent higher than the rate achievable with the SGT6-5000F(4) design. *Compare* Final Permit at 7 (934.5 lb CO<sub>2</sub>/MWh) *with id.* at 9 (909.2 lb CO<sub>2</sub>/MWh).

Best Available Control Technology is defined by Congress to mean an emission limit based on the maximum degree of pollution reduction that the permitting authority deems achievable at the applicant source, after considering certain factors including energy, environmental, and economic impacts and other costs. 42 U.S.C. § 7479(3). The Region's analysis in this case purports to have followed the well-known, almost universal, "top-down" BACT process. That process progresses in five steps.

The first step requires the permitting authority to identify all potentially "available" control options.

Available control options are those technologies, including the application of production processes or innovative technologies, that have "a practical potential for application to the emissions unit and the regulated pollutant under evaluation." ...

[S]tep 2 allows the elimination of “technically infeasible” options. This step involves first determining for each technology whether it is “demonstrated,” in other words, whether it has been installed and operated successfully elsewhere on a similar facility. If it has not been demonstrated, the permit issuer then determines whether the technology is both “available” and “applicable.”...

In step 3, the permit issuer ranks the remaining control options by control effectiveness, with the most effective alternative at the top.

In step 4, the permitting authority considers energy, environmental, and economic impacts and either confirms the top alternative as appropriate or determines it to be inappropriate...

Ultimately, in step 5, for the pollutant and emission unit under review, the permit issuer selects as BACT the most effective control option that was not eliminated in step 4. The reviewing authority should then specify an emission limit for the source that reflects the imposition of the control option selected.

*Mississippi Lime, Slip Op.* at 11-12 (internal citations omitted). 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); *In re Prairie State Generating Co.*, 13 E.A.D. 1, 12 (EAB 2006); *Knauf Fiber Glass*, 8 E.A.D. at 128-29. The burden is on the applicant to avoid a limit based on the most effective option. *Citizens for Clean Air v. EPA*, 959 F.2d 839, 845 (9<sup>th</sup> 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)).

### **B. Sierra Club’s Comments and The Region’s Response.**

Sierra Club’s comments on the draft permit noted that the Region’s Statement of Basis document identified three different combined cycle plant designs that would fulfill the applicant’s purpose, but that had different heat rates and therefore emission rates. *See Ex. 4, Comments at 2.* Sierra Club specifically objected to the Region’s failure to establish a single BACT limit representing the lower emission rate achievable by the most efficient combined cycle design, or to at least to rank these different designs for comparison in the top-down process. (*Id.* at 2-4.)

In response to these comments, the Region asserted an inconsistent response that first ignoring the difference in efficiency and emissions between turbine designs when identifying and ranking control options, but then relying on such differences to set different emission rates as “BACT.” First, the Region refused to distinguish between combustion turbine designs as separate control options in step one of the top-down process. Instead, the Region asserted that “BACT is combined cycle technology,” as a category, and that combustion turbines with different efficiencies should not be considered alternative control options in the top-down BACT process. (RTC at 4, 7.) Specifically, the Region asserted that distinct models of turbines, with different efficiencies and therefore emission rates, are not “different technologies for purposes of this BACT analysis.” (*Id.* at 7.) So, combustion turbines as a whole were identified as a single control option in step one.

Second, after defining the entire category of combined cycle turbines as the highest-ranked option that was not rejected for collateral impacts, the Region pivoted at the final step. In step 5, the Region concluded that it would not establish BACT limits at the 909.2 lb CO<sub>2</sub>/MWh rate that LPEC's own application acknowledged is achievable by combustion turbines as a whole.<sup>4</sup> Rather, contrary to its treatment of them as the same in the first four steps, the Region concluded the different turbine designs' individual efficiencies, as reported in LPEC's application, must be distinguished. Ex. 3, Response to Comments at 5. The Region thus set different emission limits for different turbines so the applicant could select its own least stringent emission limit by choosing the least efficient combustion turbine design.

**C. The Region's Justification For Not Establishing A BACT Emission Limit Based on the Lowest Emitting Turbine Design Relies on an Incorrect Application of the Top-Down Process.**

As a BACT analysis progresses through each step, some control options are removed. *Mississippi Lime Co., Slip Op.* at 11-12 (describing 5 step process). But, after the first step, additional control technologies are never added to the process mid-stream. *Id.* Notably, there is continuity between the steps: the ultimate limit is to reflect the ability of the control option selected, which is the site-specific "best" of those identified in the first step.

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<sup>4</sup> Sierra Club further provided evidence in public comments that additional turbine designs not considered by the applicant or analyzed by the Region could achieve even better GHG emission rates. Ex. 5, Corrected Comments, Table 1, p.5. But, there is no dispute that emissions at least no higher than 909.2 lbs/MWh can be achieved by LPEC.

The Region's implementation here allowed the General Electric 7FA turbine design and the STG6-5000F(5) turbine design to ride through the first four steps of the top-down BACT process as part of the same category that included the SGT6-5000F(4) turbine, avoiding being ranked separately in step 3. Then, at the last step, the category was unpacked and the less efficient turbines were assigned less stringent emission limits. This circumvents the BACT process.

The NSR Manual suggests that for categories of controls that have a range of emission rates, the most recent permit limits or emission data be used to represent the category. NSR Manual at B.23. The best-in-class emission rate can then represent the entire class of similar control options all the way through the process to the setting the emission limit without having to determine the bottom of the range for options in the same category. But, where an emission limit is set at anything less stringent than the lowest emission rate achieved by the best controlled similar source, the Board requires a clear record to justify that less stringent limit. *Mississippi Lime, Slip Op.* at 21-22. And in those cases where such a justification has been accepted, the case involved emission rates achieved by the best controlled similar source that were found by the permitting authority not to represent achievable emission during all periods of operations of even the best controlled sources – due to test variability or fluctuations in control efficiency from the technology. *Id.* The Board's prior cases therefore allowed less stringent limits to be set at step 5 in order to account for *unavoidable* variability, ensuring that the limit is achievable on a consistent basis. *Id.* at 25-27 (quoting *In re Vulcan Constr. Materials, L.P.*, PSD Appeal No. 10-11, slip op. at 30, 15 E.A.D. at \_\_\_ (EAB Mar. 2, 2011)). The Board's

prior decision have never allowed this narrow exception to justify a limit set to accommodate *avoidable* higher emissions caused by selecting a design known not to achieve the pollution reductions possible with an available alternative design.

Here, the Region's top-ranked control option through the first four steps of the top-down BACT process was a category of "comparably efficient CCGTs." Ex. 3, Response to Comments at 6, 8. That category includes the Siemens SGT6-5000F(4), which can achieve a rate no higher than 909.2 lb CO<sub>2</sub>/MWh. Ex. 1, Final Permit at 9. But the permit also provides less stringent limits to accommodate less efficient turbines. Emissions at those higher rates are not caused by anything other than the applicant's decision to purchase a lesser performing technology in that category (according to vendor data) instead of the efficiency guaranteed by the SGT6-5000F(4) turbine vendor.<sup>5</sup> That is not the type of "differences across sources using a given control technique," "variability in measured emissions rates include[ing] test method variability," or "fluctuations in control efficiency," that the Board has accepted in the past as reasons justifying a limit less stringent than what is achievable by the best controlled similar source. *Mississippi Lime, Slip Op.* at 21. There is no basis in the Manual, in this Board's precedents, or anywhere else, for using the best-in-class emission rate to represent the

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<sup>5</sup> To be clear, Sierra Club does not suggest that the permit require the applicant to install the Siemens SGT6-5000F(4). Only that it meet the BACT limit associated with that turbine design regardless of which turbine it ultimately installs. Given the conservative tendency of vendors to understate achievable heat rates and the generous compliance margins built into the permit, LPEC could likely achieve the 909.2 lb CO<sub>2</sub>/MWh emission rate with any of the three turbine options. However, the limit must be based on the best performance achievable.

class only to the final step and then setting separate limits for the range of lesser performing designs (based on vendor statistics) within the class.

The error in the Region's logic is even more apparent when applied to control options other than efficiency. For example, the Region's logic applied to add-on controls would treat all sulfur dioxide scrubbers as the same control technology in the first four steps of the BACT analysis. The best performing scrubbers would set the bar and establish scrubbers at the top ranked option in step 3. Yet when it came time to establish a limit, the category would be unpacked and a separate emission limit set separately for each possible scrubber design. Thus, one of the least effective SO<sub>2</sub> scrubber on the market and its correspondingly poor emission limit can be selected as BACT – completely contrary to the intent of BACT to establish a limit based on what is achievable with best technology.<sup>6</sup>

The Region's analysis and conclusions allowing three different "BACT" limits to provide the LPEC the option of choosing a more polluting turbine design over a less polluting turbine design that also meets the project purpose contradicts the purpose of BACT. The menu approach the Region employed contains two emission limits that clearly do not represent the lowest emission rate achievable by efficient combustion turbines. Review and remand is appropriate.

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<sup>6</sup> As another example, the Board has remanded where a permit limit was based on coal with a sulfur content of 3.5% when the record demonstrated that a lower emission rate was achievable with 3.2% sulfur coal. *Mississippi Lime, Slip Op.* at 23-24. Under the Region's logic in this case, the permitting authority in *Mississippi Lime* could have identified "coal" as the control option and then set different limits at step 5 for 3.2% and 3.5% coal.

### **III. The Region Erred Because The Use of Solar Preheating To Increase The Fuel Efficiency of the Plant Does Not Redefine The Source.**

As noted above, 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 add-on 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 non-emitting solar energy as a supplement to energy supplied by burning natural gas in what is otherwise the same natural gas combined cycle electricity production process proposed by the applicant. This process reduces the air pollution emissions per unit of electricity generated without changing the fundamental purposes of the plant. *See e.g.*, PSD Permitting Guidance for Greenhouse Gases 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 showing that efficiencies in energy use... lead to reductions in emissions from the facility."). The Region erroneously refused to consider this cleaner production process in the BACT analysis; that decision should be reviewed and reversed.

#### **A. Solar Preheat Add-On Technology.**

Supplemental solar thermal energy in a natural gas combined cycle generating process is a demonstrated technology. EPA Region IX issued a PSD permit in 2011 for a combined cycle plant called the Palmdale Hybrid Power Project in Palmdale, California.

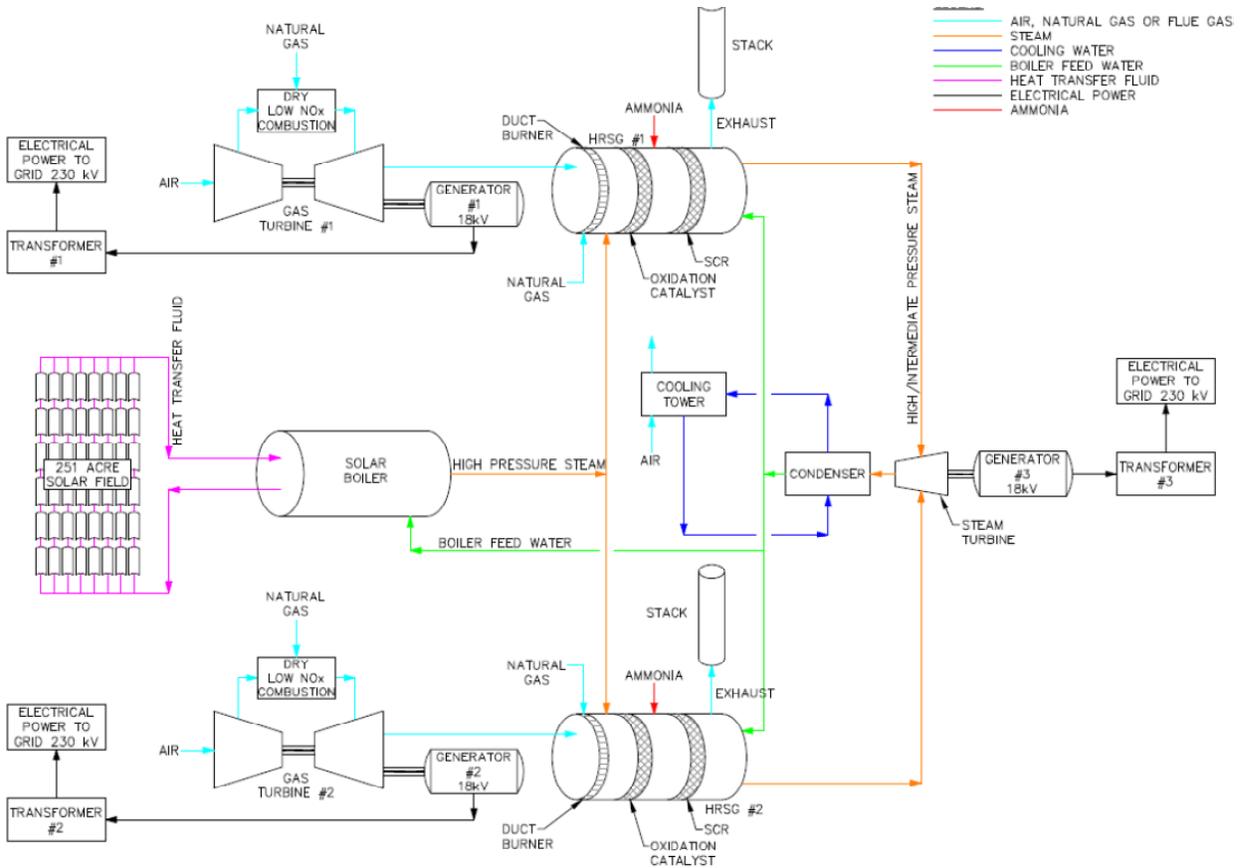
The Palmdale plant integrates a solar thermal component into the combined cycle natural gas plant to increase the plant's overall efficiency and thereby decrease emissions. According to the application for that plant:

The PHPP is a 570 MW "hybrid" natural gas-fired combined-cycle power plant integrated with solar thermal generating equipment, which enhances PHPP's overall thermal efficiency. The combined cycle equipment utilizes two state-of-the-art (i.e., thermally efficient) natural gas-fired combustion turbine generators (CTGs), two heat recovery steam generators (HRSGs), and one steam turbine generator (STG). The solar thermal component of the PHPP has the potential to produce up to almost 10 percent of facility total generation.

...

PHPP fully integrates a 50 MW solar thermal generation component into the natural-gas generation component which enhances PHPP's overall thermal efficiency. The solar generation component utilizes arrays of parabolic collectors that use solar energy to heat a HTF). The HTF is used to boil water to generate steam. The combined-cycle equipment is integrated thermally with the solar equipment at the HRSG and both utilize the single STG that is part of the project. The solar thermal input will provide almost ten percent of the peak power generated by the facility during the time of day when electrical demand is highest, enhancing the peak thermal efficiency of the PHPP.

Palmdale Greenhouse Gas BACT Application at 5-6 (attached as Exhibit 6). The design of the Palmdale plant integrates the solar thermal created steam into the middle of the combined cycle natural gas plant, between the gas fired turbines and the heat recovery steam generators that produce the steam to drive the turbine generator. By doing so, it replaces some of the steam created by burning natural gas and thereby the emissions to produce the same amount of electricity from the combined cycle plant.



Ex. 6, GHG BACT Application at 10; *see also id.* at 12 (describing introduction of high pressure steam from solar thermal into process). By adding zero-emission energy into the middle of the combined cycle combustion turbine system, approximately 3-5 percent more energy can be produced annually from the same amount of natural gas combustion in the plant. *Id.* at 11.

In its review of the Palmdale plant, EPA Region 9 noted that the project design included 50 MW of potential solar thermal power generation “that represents an inherently lower-emitting technology for the facility as a whole.” Fact Sheet, Palmdale Hybrid Power Plant at 27 n.28 (attached as Exhibit 7). The final 774 lb CO<sub>2</sub>/MWh BACT limit for the Palmdale plant accounts for the increased energy output from the solar

without any additional fuel consumption creating emissions. Absent the solar thermal input, the emission rate from the combined cycle combustion turbines was estimated to be “0.370 MT CO<sub>2</sub>/MWh (815 lb/MWh).” Ex. 6, Palmdale GHG BACT Application at 23. According to the Palmdale permit, the plant has a 774 lb CO<sub>2</sub>/MWh-net plant output limit and 7,319 Btu/kWh net plant-wide heat rate when the solar component is included. See Palmdale Final Permit at 8 (attached as Exhibit 8).<sup>7</sup> This compares to a net heat rate between 7,527.5 and 7,772.7 Btu/kWh and emissions between 944.4 and 965.7 lb CO<sub>2</sub>/MWh, net, for the three turbine designs considered by the Region for LPEC. See Ex. 3, Response to Comments at 11.

EPA Region 9 also granted a PSD permit to the Victorville 2 project in 2010. See Victorville 2 PSD Permit. The Victorville project proposed for San Bernadino County, California, would utilize a hybrid solar thermal auxiliary input to a typical combined cycle natural gas plant. *Id.* Specifically, according to the Victorville permit:

Electrical power will be generated from the combustion of natural gas in two 154 MW combustion turbine generators (CTG). Exhaust from each gas turbine will flow through a dedicated Heat Recovery Steam Generator (HRSG) to produce steam to power a shared 267 MW Steam Turbine Generator (STG). Each HRSG will be equipped with natural gas-fired duct burners to augment steam production during peaking operation. The facility will include a field of parabolic trough solar collectors to produce additional high

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<sup>7</sup> It is not actually necessary for the BACT decision for Palmdale to have been based on the solar thermal input as a cleaner production process enhancement to the combined cycle generator for that technology to be considered available and applicable for use to reduce greenhouse gas emissions from combined cycle plants. Rather, since the technology has been permitted and actually constructed for full scale operations, it is available for consideration in a top-down BACT analysis. NSR Manual at B.11. After the two California permits issued for solar thermal hybrid incorporated into combined cycle natural gas plants, there can be no serious dispute that the technology is available and applicable.

pressure steam for the HRSG. Solar thermal energy can displace up to 50 MW of duct burning, with the same total overall capacity.

Victorville Permit at 1 (attached as Exhibit 9). Because it was permitted prior to January 2, 2011, the Victorville permit did not include a greenhouse gas emission limit.

Trade publications also identify solar thermal hybrid technology as an option for increasing efficiency and decreasing emissions from fossil fuel plants. *See Public Utilities Fortnightly*, "Solar Boost" (July 2012) (attached as Exhibit 10).

In a standard coal- or gas-fired plant, heat in the boiler creates steam to drive a turbine, which produces electricity. In a typical combined-cycle power plant, a gas-fired turbine is paired with a steam turbine; exhaust heat from the turbine engine drives a separate cycle to raise fuel efficiencies to 55 percent and above. An integrated solar combined-cycle power station can further increase efficiencies by double digits, by providing a separate line of additional steam to the steam turbine, displacing fossil fuel cost for the same amount of electricity.

*Id.*

LPEC's application did not identify solar thermal preheating as a control option in the top-down BACT analysis. However, the final step of the BACT analysis after selecting combined cycle technology without auxiliary solar thermal as the basis for BACT, the application did identify the more efficient Palmdale Hybrid Power Project and attempted to distinguish its much lower emission rate. (Revised Appl. at 50-51.) According to LPEC, the Palmdale plant proposes two gas-fired GE 7FA turbines followed by a steam turbine generator plus a 50 MW 251 acre solar thermal array field with a solar steam boiler. (*Id.*) The LPEC application notes that the Palmdale plant has an overall heat rate of 6,970 Btu/kWh, resulting in estimated CO<sub>2</sub> emissions of 816 lb

CO<sub>2</sub>/MWh without the contribution of solar, but a 774 lb CO<sub>2</sub>/MWh limit. No attempt was made to consider the application of solar thermal hybrid technology to LPEC as a control option to increase fuel efficiency and reduce overall emissions.

### **B. Sierra Club's Comments and the Region's Response.**

Sierra Club's public comments noted that the Palmdale Hybrid Power Project is a combined cycle natural gas generating station with solar thermal preheating equal to approximately 50 MW and was issued a PSD permit containing a BACT limit for greenhouse gases of 774 lb CO<sub>2</sub>/MWh-net. Ex. 4, Comments at 11. This compares to the Final Permit's limits of 909.2 to 934.5 lb CO<sub>2</sub>/MWh-gross, Final Permit at 7-11, representing 944.4 to 965.7 lb CO<sub>2</sub>/MWh-net. Ex. 3, Response to Comments at 11.

Sierra Club's comments further described the solar preheat control option, as follows:

The application identified the Palmdale Hybrid Power Project, which included a 2-on-1 combined -cycle configuration with two GE 7FA gas turbines and one steam turbine producing a nominal electrical output of 563 megawatts (MW), of which up to 50 MW is produced from a solar thermal collection field. This project used the solar thermal auxiliary, in combination with the [heat recovery steam generator], to power the steam generator [in the combined cycle unit]. This hybrid configuration resulted in a much better source-wide GHG emission rate because solar thermal energy displaced some of the duct firing for the steam turbine. EPA Region 9 determined that the source-wide GHG BACT limit was 774 lb CO<sub>2</sub>/MWh.

Another similar hybrid facility, the Victorville 2 plant, is a 563 MW facility that achieves a thermal efficiency of 59.0 percent when using thermal solar hybrid technology to preheat water (steam) to provide a supplement to the combustion turbine exhaust that flow to a HRSG that feeds to the steam turbine. This configuration achieves a 6.3 percent gain in thermal efficiency compared to the

Victorville 2 plant with duct burners. It is also 9.1 percent higher than the proposed LPEC heat rate of 49.9 percent.

Several utilities in the United States are installing hybrid concentrated solar thermal technology to increase generation and increase efficiency of fossil fuel power plants. The concentrated solar provides a separate line of steam to the steam turbine to displace some of the fossil fuel requirements. Such systems can decrease fuel use and thereby decrease emissions by 10 percent in a combined cycle power plant.

Ex. 4, Comments at 18. Sierra Club's comments noted that the Region has not provided a site-specific basis for why solar thermal preheating add-on technology is not feasible at LPEC. *Id.*

The Region responded to these comments with a terse, conclusory, response that it would not, and need not, consider solar hybrid technology because doing so would "redefine the source." Specifically, the Region stated:

We disagree with the commenter's view that requiring construction of a hybrid power project that incorporates solar auxiliary preheat would not redefine the source. While we acknowledge there may be many ways for solar thermal processes to be integrated with a facility that intends to use steam to generate electricity, we believe that requiring such processes in combination with fossil-fuel combustion would represent the merging of distinct and different source types. While Region 9 required 50 MW of solar energy as part of its BACT determination for the Palmdale Hybrid Power Project NGCC facility, the permit applicant in that case had proposed the solar project as part of its project purpose, which included supporting California's goal of increasing the percentage of renewable energy in the State. Indeed, Region 9 specifically explained that it incorporated the solar project into its BACT determination not because it

was required to do so, but because doing so was compatible with the permit applicant's goals and would not redefine the source...

Response to Comments at 37.

**C. The Region Clearly Erred In Applying the "Redefining The Source" Policy.**

Review and remand is appropriate here to correct the Region's clear error in interpreting and applying the "redefining the source" policy. 40 C.F.R. § 124.19(a)(4)(i)(A). The Region rejected consideration of supplementing gas fired steam with solar thermal steam in the high pressure steam turbine of the LPEC combined cycle plant. The Region's sole basis – that doing so would "redefine the source"-- was incorrect and inconsistent with decisions by EPA, including by this Board. Because the LPEC would still be a predominantly gas fired combined cycle power plant of the same size and producing the same energy, but with lower overall greenhouse gas emissions, adding supplemental solar thermal as a cleaner production process does not redefine the plant's purpose.<sup>8</sup>

The applicable law requires that BACT limits be established based on the maximum degree of pollution reduction achievable with a number of specified methods, including cleaner and innovative production processes and cleaner fuels. 42 U.S.C. § 7479(3) (BACT includes "available methods, systems, and techniques, including

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<sup>8</sup> As a preliminary matter, this is a case reviewing the Region's failure to identify a control technology option in the first step of the top-down process: "in which the permit issuer failed to consider a control option" and not one where the Region considered the option of solar thermal hybrid efficiency improvement and rejected it. See *In re Pio Pico Energy Center*, PSD Appeal Nos. 12-04 through 12-06, Order Remanding in Part and Denying Review in Part at 48 (EAB, Aug. 2, 2013) (explaining the two types of cases reviewing BACT technology selection).

clean fuels, fuel cleaning or treatment or innovative fuel combination techniques for control of the air contaminant.”); 40 C.F.R. § 52.21(b)(12) (same). 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,” which EPA’s NSR Manual defines as requiring a completely different process but not requiring changes to the applicant’s preferred design to make it less polluting. NSR Manual at B.13-.14. Thus, the “redefining” policy does not shield an applicant from having to alter its design to use a cleaner process changes. As the Seventh Circuit held, discussing the clean fuels provision in the BACT definition but equally applicable to the cleaner production processes component of the BACT definition, there must be some adjustment allowed to an applicant’s design or the BACT definition’s requirement to consider cleaner processes, fuels, and methods to reduce pollution would be rendered meaningless. *Sierra Club v. EPA*, 499 F.3d 653, 656 (7<sup>th</sup> Cir. 2007) (“Some adjustment in the design of the plant would be necessary in order to change the fuel source... but if it were no more than would be necessary whenever a plant switched from a dirtier to a cleaner fuel the change would be the adoption of a ‘control technique.’ Otherwise ‘clean fuels’ would be read out of the definition of such technology.”); see also *In re Desert Rock Energy Company, LLC*, PSD Appeal Nos. 08-03 through 08-06, Remand Order at 63 n.60 (EAB, Sept. 24, 2009) (quoting *Sierra Club*, 499 F.3d at 655); PSD Guidance for Greenhouse Gases 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...").

If the "proposed facility" is defined too broadly – as excluding pollution controls, clean fuels, or cleaner production processes – it vitiates those important provisions in the statute. Thus, while the applicant initially "defines the proposed facility's end, object, aim or purpose," it is not given line-item veto authority over the definition of BACT by defining its process or purpose in a way that forecloses cleaner options. *Desert Rock*, 63-64 and n.60 (the applicant's defined purpose must be given a "hard look" and cannot be allowed to read components of the BACT definition out of the statute); *NMU*, Slip. Op. at 27 ("Clean fuels may not be 'read out' of the Act merely because their use requires 'some adjustment' to the proposed technology.") (quoting *Sierra Club*, 499 F.3d at 656). Thus, 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' ..." *Desert Rock*, Slip Op. at 64 (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").

Here, the use of the solar hybrid option to decrease greenhouse gas emissions per unit of electricity produced from the combined cycle natural gas plant is not a change to the facility's "end, object, aim or purpose." Nor did the applicant make any claim that it would. Nor did the Region take a "hard look" at any such claim. The solar hybrid option injects additional energy, in the form of steam, into the combined cycle plant's steam path. *See e.g.*, Exhibit 6, Palmdale GHG BACT Application at 10, 12. The other components of the combined cycle plant are otherwise identical to any other combined cycle plant. And, in fact, a natural gas combined cycle plant with solar thermal hybrid technology can and does operate as any other combined cycle plant when the solar hybrid equipment is not operating (at night, for example). In any event, other than stating that requiring solar thermal technology as an auxiliary heat source would "represent the merging of distinct and different source types," the Region provided no explanation of how it determined that the auxiliary heat input would redefine the applicant's purpose. This is not sufficient to satisfy the Region'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, Slip Op.* at 65.<sup>9</sup>

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<sup>9</sup> The Region's reasoning also appears to be erroneously based on the reasoning that because renewable energy resources are treated with certain preference under California law, any use of a renewable resource to improve the efficiency of a natural gas power plant must **necessarily** be a redefinition of the fundamental business purpose of the applicant. Ex. 3, Resp. to Comments at 37. But there is no reason that using a cleaner production process to improve the efficiency of a natural gas plant that uses a renewable resource should be treated differently than any other add-on component that would similarly increase efficiency.

Moreover, an applicant's desire to operate a proposed source in 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 "imposition of the conditions may, among other things, have a profound effect on the viability of the proposed facility as conceived by the applicant"; *NMU*, Slip op. at 25-26 (applicant's business plan to rely on "just in time" fuel deliveries and existing coal suppliers did not shield fuel choices from alteration through BACT limits that would have altered these business plans of the applicant), 27 ("Clean fuels may not be 'read out' of the Act merely because their use requires 'some adjustment' to the proposed technology."); *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, LPEC's desire to operate the power plant without including supplemental solar energy to enhance fuel efficiency and decrease emissions is not controlling.

Nor is it relevant to a "redefining the source" decision that the other plants that use solar hybrid technology as part of their natural gas combined cycle plants identified producing renewable energy as part of their project purpose. The omission of that additional project purpose from LPEC's application cannot shield a cleaner production process from consideration. *Knauf*, 8 E.A.D. at 142 and n.34 (finding that considering a competitor's production processes "may be included as one of the alternatives in the first step of the BACT analysis" without redefining the source, but that proprietary nature of the alternative process may makes its application "technically infeasible"). In

*Knauf*, the Board rejected the argument that using a different fiberglass manufacturing processes than the one proposed by an applicant to reduce emissions would “redefine” the source. *Id.* If using a different fiberglass manufacturing process was not redefining the source in *Knauf*, then using the same fundamental production process (combined cycle natural gas plant) but including an auxiliary input from solar thermal production used by other similar plants does not redefine the source here.

The inquiry is not whether LPEC describes its project purpose exactly the same as the developers in Palmdale or Victorville, nor whether the solar hybrid option satisfies an additional business purpose of those developers meeting California renewable energy standards, but whether the solar thermal hybrid technology can be implemented at LPEC “without disrupting [LPEC’s] basic business purpose.” *Desert Rock, Slip. Op.* at 69. There is no evidence in the record here to indicate that including solar thermal hybrid auxiliary heat input to increase efficiency and therefore decrease emissions would frustrate LPEC’s basic business purposes “to generate 637-735 megawatts (MW), of gross electrical power near the City of Harlingen in an efficient manner while increasing the reliability of the electrical supply for the State of Texas.” Ex. 2, Revised Application at 11. Remand is appropriate. *See Desert Rock, Slip Op* at 76 (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”).

Moreover, rather than asserting that it constitutes an impermissible “redefinition of the source,” the fact that solar hybrid technology was used on a similar natural gas

combined cycle plant by another EPA Region should have prompted the Region to determine whether similarly low greenhouse gas emission rates were achievable at the LPEC plant here. *See e.g., Desert Rock, Slip Op.* at 70 (where control option has been used, the permitting authority is expected to determine whether it is applicable at the latest facility as well).

Of course, including solar hybrid technology in the first step of a BACT analysis, rather than rejecting out of hand, does not mean that it will ultimately be the basis for BACT for the LPEC. *Id.* at 70 n.73 (technology erroneously excluded from step 1 may still be rejected in later steps after remand). But a remand is necessary here before that determination can be made. *Id.* at 71.

### **Conclusion**

The Region's BACT analysis is flawed for several reasons. It fails to ensure the emission reductions achievable by the application of the more efficient turbine considered and which meets the project purpose. And then it erroneously excludes an applicable solar thermal auxiliary option that would not change the project purpose but would reduce greenhouse gas emissions. Where efficiency measures are the only control options identified by the Region, it must do better to capture the pollution reduction achievable through those measures when developing BACT limits. Review and remand is appropriate.

Respectfully submitted, this 6th day of December, 2012.

MCGILLIVRAY WESTERBERG & BENDER LLC

A handwritten signature in black ink, appearing to read "D.C. Bender".

David C. Bender  
211 S. Paterson Street, Ste 320  
Madison, WI 53703  
Phone: (608) 310-3560  
Fax: (608) 310-3561  
[bender@mwbattorneys.com](mailto:bender@mwbattorneys.com)

Travis Ritchie  
Associate Attorney  
Sierra Club Environmental Law Program  
85 Second Street, 2nd Floor  
San Francisco, CA 94105  
415-977-5727  
[travis.ritchie@sierraclub.org](mailto:travis.ritchie@sierraclub.org)

## Statement of Compliance

The foregoing complies with 40 C.F.R. § 124.19(d)(1)(iv) and (3). The length is 8,141 words, using the word count function in Microsoft Word.

A handwritten signature in black ink, appearing to read "D.C. Bender", written over a horizontal line.

David C. Bender

## 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 REGION VI FOR LA PALOMA ENERGY CENTER, HARLINGTON, TEXAS, upon the following parties by FedEx:**

Kathleen Smith  
La Paloma Energy Center, LLC  
4011 West Plano Parkway  
Suite 128  
Plano, TX 78550

Ron Curry  
Regional Administrator  
EPA Region 6  
1445 Ross Avenue  
Dallas, TX 75202

Aimee Wilson  
Air Permitting Section (6PD-R)  
EPA Region 6  
1445 Ross Avenue  
Dallas, TX 75202  
[Wilson.aimee@epa.gov](mailto:Wilson.aimee@epa.gov)

Dated at San Francisco, CA, this 6<sup>th</sup> of November of 2013.

/s Anthony Raduazo  
Anthony Raduazo  
Legal Assistant  
Sierra Club Environmental Law  
Program  
85 Second Street, Second Floor  
San Francisco, CA 94105  
(415) 977-5629  
Anthony.Raduazo@sierraclub.org

### Table of Attachments

Exhibit Number	Description of Exhibit
1	Final Prevention of Significant Deterioration Permit for La Paloma Energy Center (November 6, 2013).
2	La Palomoa Energy Center, LLC, Revised Application for a Prevention of Significant Deterioration Air Quality Permit for Greenhouse Gas Emissions (July 17, 2012).
3	Responses to Public Comments, La Paloma Energy Center PSD-TX-1288-GHG, U.S. EPA (November 6, 2013)
4	Comments of the Sierra Club (April 19, 2013)
5	Corrected Comments of the Sierra Club (April 30, 2013)
6	Palmdale Hybrid Power Project Greenhouse Gas BACT Analysis (May 2011)
7	Fact Sheet and Ambient Air Quality Impact Report, Palmdale Hybrid Power Project (August 21, 2011)
8	Prevention of Significant Deterioration Permit, Palmdale Hybrid Power Project, PSD Permit No. SE 09-01 (October 18, 2011).
9	Prevention of Significant Deterioration Permit, Victorville, PSD Permit No. SE 07-02 (March 11, 2010).
10	Solar Boost, <i>Public Utilities Fortnightly</i> (July 2012)