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November 5, 2015

Eric Veerkamp
Compliance Project Manager
Siting, Transmission and Environmental Protection Division
California Energy Commission
1516 Ninth Street, MS-2000
Sacramento, CA 95814-5512

Subject: **PALMDALE ENERGY LLC'S RESPONSE TO CITY OF LANCASTER DATA REQUEST SET NO. 1 (1-13)**
PALMDALE ENERGY PROJECT (08-AFC-09C)

Dear Mr. Veerkamp,

On behalf of Palmdale Energy, LLC, enclosed for filing with the California Energy Commission is the electronic version of **PALMDALE ENERGY, LLC'S RESPONSE TO CITY OF LANCASTER DATA REQUEST SET NO.1 (1-13)**, for the Palmdale Energy Project (08-AFC-9C).

Sincerely,

Scott A. Galati
Counsel to Palmdale Energy, LLC

455 Capitol Mall • Suite 315 • Sacramento CA 95814 • Tel• 916. 441.6575

RESPONSE TO CITY OF LANCASTER DATA REQUEST SET NO. 1 (1-13)

In support of the

PETITION TO AMEND

for the

PALMDALE ENERGY PROJECT

(08-AFC-09C)

Submitted to the:

California Energy Commission

Submitted by:

PALMDALE ENERGY, LLC

Prepared by:

DAYZEN LLC

NOVEMBER 2015

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APPENDICES

INTRODUCTION

Attached are Palmdale Energy, LLC's) responses to City of Lancaster Data Request Set No. 1 (1-13) for the Palmdale Energy Project (PEP) Petition For Amendment. The City of Lancaster issued Data Request Set No. 1 (1-13) to Palmdale Energy LLC on October 20, 2015.

The Data Responses are grouped by individual discipline or topic area. Within each discipline area, the responses are presented in the same order as the City of Lancaster presented them and are keyed to the Data Request numbers (1-13). Additional tables, figures, or documents submitted in response to a data request (e.g., supporting data, stand-alone documents such as plans, folding graphics, etc.) are found in the Appendices and are not sequentially page-numbered consistently with the remainder of the document, although they may have their own internal page numbering system.

For context the text of the Background and Data Request precede each Data Response.

SUPPORTING DOCUMENTATION FOR PETITION – ADMINISTRATIVE (1-3)

Background: ***SUPPORTING DOCUMENTATION FOR PETITION***

Appendices 2 through 8 contain information to support the analyses presented in the Petition. A number of spreadsheets, drawings, and maps are truncated and/or illegible. Further, some modeling files were provided to the Commission on CD. Please provide all requested spreadsheets or modeling input/output files in electronic, native, unprotected format, if necessary under confidential cover.

Data Request 1

Please provide non-truncated, legible copies of:

a. Appendix 4.1-A:
    i. Construction schedule
    ii. Attachment 4.1A-1, Parts 1 and 2, Turbine Performance Spec Sheets
b. Appendix 4.1B-1: Facility Plot Plan
c. Appendix 4.1B-2a, -2b, -2c: Site Layout
d. Appendix 4.1B-3a, -3b: Facility Elevation Views
e. Appendix 4.1D
f. Appendix 6-A: Parcel Split Documentation
g. Appendix 6-B: Construction Worker Estimates

Response to Data Request 1

Palmdale Energy LLC provides the requested documents in Appendix DR-1 attached to these responses that appear to have been corrupted during efiling and docketing. For future requests, the City of Lancaster need not incur legal fees to formally request any document docketed by Palmdale Energy, LLC as Palmdale Energy LLC will provide copies of filings upon receipt of an email or telephone call to either Scott Galati (sgalati@dayzenllc.com – (916) 441-6574) or Tom Johns (tjohns@summitpower.com – (509) 926-3485).

Data Request 2

Appendix 4.1 refers to CDs containing modeling input/output files. Please provide a copy of these CDs with files in electronic, native format, including:

a. AERMOD modeling input/output files

b. HARP Version 2.03 risk assessment input and output files

Response to Data Request 2

A CD containing the requested information is provided in Appendix DR-2.

Data Request 3

On October 13, 2015, Palmdale Energy submitted a supplemental cumulative air quality impact analysis report to the Commission which refers to modeling CD containing modeling input and output files. Please provide a copy of these files in native, electronic format.

Response to Data Request 3

A CD contained the requested information in Appendix DR-3.

LICENSING PROCESS – AMENDMENT VERSUS NEW AFC (4)

Background: CERTIFICATION AMENDMENT VS. NEW APPLICATION FOR CERTIFICATION

The Petition aims to amend the Commission's certification for the Palmdale Hybrid Power Project ("approved project") which was issued on August 10, 2011. The approved project was certified as a nominal 570-megawatt ("MW") hybrid of natural gas-fired combined-cycle generating equipment integrated with solar thermal generating equipment. The approved project's stated objectives were to provide baseload power to increase the reliability of the electrical supply for the City of Palmdale and use solar technology as an integral part of the facility to generate a portion of the power output and thereby support the state of California's goal of increasing the percentage of renewable energy in the state's electricity mix. The EPA specifically added conditions to the prevention of significant deterioration ("PSD") permit it issued to the approved project in 2011 to ensure that the solar component would be constructed:

> *Conditions III.B, III.C, and X.I.11 have been added to the permit to require construction of a solar-thermal plant designed to generate 50 MW of power.*[1]

In contrast, the modified project would provide "fast-start flexible generation … to assist in the integration of renewable energy;" would increase the nominal output of the natural gas-fired combined-cycle generating equipment to 645 MW; would no longer directly provide power to Palmdale but instead utilize the existing CAISO Large Generator Interconnection Agreement; would eliminate the solar component; and would substantially increase operational emissions of nitrogen oxides ("NOx") from 115 to 139 tons/year, volatile organic compounds ("VOC") from 40 to 52 tons/year, sulfur oxides ("SOx") from 9 to 11 tons/year, carbon monoxide ("CO") from 255 to 351 tons/year, and carbon dioxide-equivalent ("CO2e") greenhouse gas ("GHG") emissions from 1.85 million metric tons/year ("MMTCO2e/year") to 1.95 MMTCO2e/year.[2]

In sum, the modified project has little in common with the approved project other than the project site.

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[1] EPA, In re: Palmdale Power Project, PSD Permit No. SE-09-01, PSD Appeal No. 11-07, February 17, 2012, EPA Region 9's Excerpts of Record, Excerpt 4, Responses to Public Comments on the Proposed Prevention of Significant Deterioration Permit for the Palmdale Hybrid Power Project, October 2011, Response to Comment 40, p. 39; http://yosemite.epa.gov/oa/eab_web_docket.nsf/filings%20by%20appeal%20number/b1b1430c6ca6e85c852579a7006f57f2/$file/response%20to%20petition%20excerpts%20of%20record%20...24.01.pdf.

[2] *See* Petition, pp. 1-3 through 1-3, Table 4.1-1, and p. 4.1-28; PHPP Final Staff Assessment, Table 3.

Data Request 4

Please describe why the modified project should be processed as an "amendment" to the approved project as opposed to a new application for certification ("AFC") when the stated objectives are substantially different, the proposed operating capacity is different, the operating scenario is different, the proposed equipment is substantially different and eliminates the solar component as an integral part of the facility, and all emission scenarios (and emission rates) are substantially different than for the approved project.

Response to Data Request 4

The governing law determining whether and applicant is required to file a Petition For Amendment can be found at Title 20, Section 1769 of the California Code of Regulations. Specifically Section 1769 (a) (1) states:

> After the final decision is effective under section 1720.4, the applicant shall file with the commission a petition for ***any modifications it proposes to the project design, operation, or performance requirements***. (Emphasis added).

The Petition For Amendment was filed pursuant to Section 1769 as the project design, operation and performance are being modified. The regulatory framework does not provide the balancing test that appears to be proposed by the City of Lancaster in its Background to this data request. The Petition For Amendment seeks to build a thermal power plant on the same site that was licensed by the Commission. The site is already subject to the Commission jurisdiction and therefore Section 1769 controls the filing and processing of amendments. The Commission retains exclusive jurisdiction over this previously licensed site until the license either expires or is voluntarily surrendered by the licensee. As such in order to propose any modifications to the project design, operation or performance requirements of the previously Approved Project, the applicant must file a Petition For Amendment under Section 1769.

With respect to the issues raised by the City of Lancaster in its Background to the Data Response, these issues relate to the scope of analysis that the Commission should perform. Palmdale Energy LLC acknowledges that the Commission should analyze and consider the modifications proposed to the PEP in determining whether, and under what conditions, the PEP Final Decision should be amended. When evaluating the scope of analysis, Palmdale Energy LLC disagrees with the City of Lancaster's assertion that the PEP has little in common with the Approved Project.

Data Request 5

Please describe all communications between the applicant and EPA concerning the modified project; and provide all written documentation for such communications.

Response to Data Request 5

Palmdale Energy LLC met with EPA Region 9 to discuss submission of a new PSD Permit Application. Palmdale Energy LLC submitted a modeling protocol for review to the EPA and has submitted a new application for a PSD permit, both of which are included in Appendix DR 5.

Data Request 6

Please describe how the substantially increased generating capacity for the modified project compared to the approved project was determined.

Response to Data Request 6

Palmdale Energy LLC's turbine selection criteria included proven quick start capability and high efficiency. The F class quick start capability meets the requirements for a flexible capacity resource and the high efficiency criteria is achieved with modern F class turbines operating in combined cycle. The generating capacity of the PEP is largely a function of the size of the gas turbines. The selection of gas turbine is limited to what the market offers in selecting turbine technology. F class technology turbines have increased in rated output since the approved project submitted its AFC. The design of the Approved Project's turbines is approaching ten years older than the turbines proposed for the PEP. When the Approved Project was proposed, the "state of the art" F class gas turbine produced about 180 MW maximum. Modern F class turbines range from approximately 200 MW to 230 MW. The increase in rated turbine output and improved efficiency over time is simply a characteristic of the turbine industry continually improving output and efficiency.

AIR QUALITY, GREENHOUSE GASES, AND PUBLIC HEALTH (9-13)

Background: EMISSION REDUCTION CREDITS FOR NOx AND VOCS

The City of Lancaster is concerned that emissions from the modified project which would be located at the boundary between the cities of Palmdale and Lancaster, will adversely impact local and regional air quality. Of particular concern are the banked emission reduction credits ("ERCs") that had been proposed for offsetting NOx and VOC emissions from the Approved Project since many of them are very old (some dating to 1987), were found by the EPA to have been unlawfully created, were transferred via inter-district, inter-basin transfers, and have not yet been incorporated into the Antelope Valley Air Quality Management District ("AVAQMD") ozone plan.[3]

In communications between the applicant, Summit Power Project Holdings, LLC and Lancaster public officials, Summit conveyed that it intends to acquire substitute ERCs to offset emissions from the modified project instead of using the original ERCs identified by the City of Palmdale in its original AFC for the approved project. Yet, review of Appendix 4.1G, shows that the modified project proposes to offset NOx and VOC emissions with the same ERCs proposed for the approved project. Specifically, Appendix 4.1D, refers to a December 17, 2013 resolution adopted by the AVAQMD to approve the transfer of 60 tons of VOC ERCs from the SJVAPCD and 150 tons of NOx ERCs from the MDAQMD.

Data Request 7

Please provide the substitute VOC and NOx ERCs Summit referred to in its communications with Lancaster and explain why such ERCs were not incorporated into the Petition.

Response to Data Request 7

The Palmdale Project has had discussions with the City of Lancaster to understand the City of Lancaster's concerns related to the Project and to look for opportunities to

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3 *See* Marvin Crist, City of Lancaster, Letter to Karen Douglas, California Energy Commission, December 20, 2013; http://docketpublic.energy.ca.gov/PublicDocuments/08-AFC-09C/TN201500_20131231T115341_121613_Letter_to_Gloria_D_Smith_re_Review_of_Requested_InterDis.pdf; and Petra Pless, Pless Environmental, Inc., Letter to Gloria Smith, The Law Offices of Gloria D. Smith, Re: Review of Requested Inter-District Transfer of Emission Reduction Credits from Mojave Desert Air Quality Management District and San Joaquin Valley Air Pollution Control District, Respectively, to Antelope Valley Air Quality Management District for Use as Offsets for Palmdale Hybrid Power Project, December 16, 2013; http://docketpublic.energy.ca.gov/PublicDocuments/08-AFC-09C/TN201500_20131231T115341_121613_Letter_to_Gloria_D_Smith_re_Review_of_Requested_InterDis.pdf.

address these concerns. One of the concerns raised by the City of Lancaster was the age and validity of the VOC ERC certificates that were approved for transfer into the AVAQMD on December 17, 2013. The Project has expressed a willingness subject to reasonable conditions to replace the older VOC certificates with alternative newer vintage ERC certificates as allowed in the December 17, 2013 AVAQMD resolution if such actions would lead to the City of Lancaster removing its objection to the PEP. Alternative VOC ERC's have not been identified at this time, nor does Palmdale Energy LLC believe they are necessary. In addition, there are no plans to substitute NOx ERC's that were approved for transfer into the AVAQMD.

Data Request 8

> According to Petition, p. 4.2-15, there "may be a lack for available ERCs for purchase from the existing and surrounding air basins to satisfy the maximum operational scenario for NOx and VOCs (Operational Scenario 1). If this case arises, then PEP is proposing to lower the operational emissions to a level based on the available emission offsets until such time that the offsets are available." Please describe how daily operations would be curtailed to ensure that maximum ramp-up for renewables would be maintained. Please provide emission calculations for the curtailed scenario to support this proposal.

Response to Data Request 8

If the ERCs are not available to satisfy the maximum operational scenario the Project would take lower annual operational limits that would be accomplished by any combination of reduced number of hours operated, the number of starts, hours operated at full load and hours of duct firing. These annual limits would not effect on the daily maximum ramp-up to support renewable generation and would be subject to enforceable conditions that Palmdale Energy LLC expects will be included in the AVAQMD Preliminary and Final Determinations of Compliance.

The PEP proposed to envelope the project emissions based upon the three (3) dispatch profiles provided in Appendix 4.1A and below. The daily operation always assumes 24 hours of operation with at least one cold or warm/hot start and one shutdown (except for PM and SO_2, which is based on 24-hour of continuous operation). The worst-case annual emissions profiles will be dependent upon pollutant and which worst-case dispatch assumption produces the maximum annual potential to emit. The Operational Scenarios 2 and 3 represent the profiles that allow for maximum plant flexibility for support of renewable energy sources by allowing an average of two starts per day and an annual capacity factor that is approximately 50 percent.

Thus, the following scenarios allow for adequate margin even if the available offsets are limited and the AVAQMD conditions restrict annual emissions as expected.

- For the highest annual emissions of NO_x, SO_2, PM10/2.5 and CO_2e, up to 7,960 hours of operation at base load, up to 35 warm starts, five (5) cold start, and up to 40 shutdowns per year for a total of 8,000 hours per year with up to 24 hours per day of operation. For this scenario, the auxiliary boiler is expected to operate up to 836 hours per year. This is identified on the attached spreadsheet in Appendix 4.1-A as Operational Scenario 1 (Table 4.1A-1A).
- For the highest annual emissions of CO and VOC, up to 3,625 hours at base load with up to 360 hot starts, 360 warm starts, five (5) cold starts, and up to 725 shutdowns for a total of 4,320 hours per year with up to 24-hour per day of operation. For this scenario, the auxiliary boiler is expected to operate up to 4,884 hours per year. This is identified in Appendix 5.1-A as Operational Scenario 2 (Table 4.1A-1B).
- The third Operational Scenario is based on 4,470 hours per year of base load operation, up to 180 hot starts, 360 warm starts, 5 cold starts, and up to 545 shutdowns per year for a total of 5,000 hours per year with up to 24-hours per day of operation. For this scenario, the auxiliary boiler is expected to operate up to 4,136 hours per year. This is identified in Appendix 4.1-A as Operational Scenario 3 (Table 4.1A-1C).
- All three emissions scenarios include 1,500 hours per year for the duct burners in the HRSG with up to 24 hours per day of operation, and 50 hours per year for fire pump and 26 hours per year for the emergency generator testing.

Background: CRITERIA POLLUTANT AND PRECURSOR BACT DETERMINATIONS

According to the Petition, pp. 4.1-4 through 4.1-6 and 4.1-28, the modified project would trigger best available control technology ("BACT") requirements for NOx, VOC, TSP, PM10, PM2.5, and CO under AVAQMD new source review ("NSR") Regulation XIII, Rule 1303. It would also require EPA to issue a PSD permit under the Clean Air Act, which also triggers BACT.

Petition, Table 4.1-17 and Appendix 4.1F, Table 4.1F-1, provide proposed BACT emission limits for criteria pollutant and precursor emissions from the modified project's combustion turbines and auxiliary boiler and the proposed systems to achieve these limits. The proposed BACT emission limits for the combustion turbines are based on BACT determinations for other large natural gas-fired combined-cycle facilities.

According to Petition, Appendix 4.1F, the most recent determinations for combined-cycle turbines were compiled from 2008 through 2015.

Review of the summary tables in Appendix 4.1F show that for turbines, NOx BACT determinations were compiled for 2000 through 2011, CO BACT determinations for 2006 through 2011, particulate matter ("PM") BACT determinations for 2008 through 2011, and VOC BACT determinations from 2008 through 2011. Appendix 4.1F also provides a range of BACT emission limits for these pollutants from April 2011 through April 2015 based on EPA's RACT/BACT/LAER Clearinghouse ("RBLC"). The Petition, Appendix 4.1F, does not provide information regarding the control systems or status of the respective facilities.

This approach violates the procedure for a top-down BACT analysis established in EPA's New Source Review Workshop Manual ("NSR Manual"), which requires the following steps:

1) *Identify all available control technologies*
2) *Eliminate technically infeasible options*
3) *Rank remaining control technologies by control effectiveness*
4) *Evaluate most effective controls and document results*
5) *Select BACT*[4]

Further, neither the Petition nor the RBLC BACT summary in Appendix 4.1F, Table 4.1F-1, present averaging periods for the respective BACT emission limits, which are an essential part of BACT emission limits.[5] *Moreover, the Petition does not specify separate limits for firing the combustion turbines with or without duct burners or for startup and shutdown.*

Emission Standards for > 1200 hp Generator Set[a] (g/hp-hr)	
EPA Tier 2	**EPA Tier 4F**
NOx + NMHC[b]: 6.4 CO: 3.5 PM: 0.20	NOx: 0.50 NMHC: 0.14 CO: 2.6 PM: 0.02

a From: FR Vol. 71, No. 132, July 11 2006, 39156

b Non-methane hydrocarbons

4 EPA, New Source Review Workshop Manual, Prevention of Significant Deterioration and Nonattainment Permitting, October 1990, Table B-1; http://www.epa.gov/ttn/naaqs/aqmguide/collection/nsr/1980wman.pdf.

5 NSR Manual, *op. cit.*, p. B.56 ("*BACT emission limits or conditions must* be met on a continual basis at all levels of operation (e.g., limits written in pounds/MMbtu or percent reduction achieved), demonstrate protection of short term ambient standards (limits written in pounds/hour) and be *enforceable as a practical matter (contain appropriate averaging times*, compliance verification procedures and recordkeeping requirements);" *emphasis* added).

As shown, Tier 4F emission standards are considerably lower for all pollutants. Thus, BACT for the emergency generator should be considered EPA Tier 4F certification.

Finally, the Petition, p. 4.18, specifies that the modified project would deploy a 140-hp Tier 3-certified diesel-powered Clarke or equivalent emergency fire pump. The proposed Puente Power Project proposes to use electric fire pumps backed up by the diesel-powered emergency generator set.[6] This configuration eliminates emissions from testing emergency fire pumps; thus, BACT for the emergency fire pump should be considered backup power from the emergency generator.

Data Request 9

Please provide a top-down BACT analysis for the modified project's combustion sources (natural gas-fired turbines, auxiliary boiler, emergency generator, and emergency fire pump) per EPA's NSR Manual including averaging times and methods to assure compliance with those limits (stack tests access ports, test methods, other emission monitoring methods, monitoring, and special recordkeeping methods) based on the most recent BACT determinations and achieved-in-practice emission levels.

a. For the combustion turbines, please specify separate BACT emission limits with and without duct firing and for startup and shutdown. Please specifically address the 1.5 parts per million ("ppm") NOx limit (1-hour average) and determined as BACT for the IDC Bellingham facility in Massachusetts in your analysis. The fact that the facility has been cancelled is not sufficient justification for not establishing NOx BACT at that level.[7] Further, please specifically address the 1.5 ppm CO limit without duct firing and 2.0 ppm CO limit with duct firing (1-hour average) determined as BACT for the Avenal Energy Project in your analysis.

b. For the diesel-fired emergency generator, please include EPA Tier 4F certification in your BACT analysis.

6 *Ibid*.

7 *See* NSR Manual, *op. cit.*, p. B.7. ("For example, in cases where the level of control in a permit is not expected to be achieved in practice (e.g., a source has received a permit but the project was cancelled, or every operating source at that permitted level has been physically unable to achieve compliance with the limit), and supporting documentation showing why such limits are not technically feasible is provided, the level of control (but not necessarily the technology) may be eliminated from further consideration. However, a permit requiring the application of a certain technology or emission limit to be achieved for such technology usually is sufficient justification to assume the technical feasibility of that technology or emission limit.")

c. For the emergency fire pump, please include the use of an electric emergency fire pump powered by the emergency backup generator set in your BACT analysis.

Response to Data Request 9

Section 5 and Appendix D of the PSD permit application submitted to EPA Region 9 (contained in Appendix DR-5) presents the "Top Down" BACT analysis. This analysis addresses the requested items. In addition, Palmdale Energy LLC submits the following additional comments:

- The proposed emergency generator engine is not required to meet Tier 4F emissions limits. For the emergency generator engine, EPA Tier 4 Final emissions standards do not apply. The Tier 4 initial regulations govern most diesel engines used in power generation, industrial applications, oil and gas applications, mining operations, and mobile equipment. However, generators used in EPA-defined emergency stationary applications with an engine rating at greater than 49 HP are exempt from this new standard and are allowed to stay at 2010 emissions tier levels when the regulations changed in 2011 (for engines of 174 HP and greater) or 2012 (for engines of 9 HP–173 HP). Throughout most of the United States, diesel-engine generator sets used strictly for emergency standby power (ESP) are exempt from EPA Tier 4 Interim and Tier 4 Final regulations. ESP installations have been exempted because Tier 2 and Tier 3 engine generators already exhibit emissions reductions of over 85 percent that have come about through in-engine design improvements. Additionally, because ESP units typically run fewer than 200 hours per year, their emissions have been judged to have an insignificant impact on local air quality. In fact, there are no time limits on running ESP generators in true emergency situations due to utility outages or equipment malfunctions. This means that all current Tier 2 and Tier 3 diesel generator sets in their applicable horsepower categories will be in EPA compliance through 2015 and beyond when used strictly for ESP. ESP installations are also allowed up to 100 hours of running time per year for testing and maintenance.

- For the emergency fire pump, note the following: The emergency generator set is not tasked to provide electricity for an electric fire pump for situations where grid power is not available. Such engines are in-place for use in order to provide emergency power for critical plant operations systems, not fire pumps. In the event of a plant fire, typically the plant would be brought off-line, which would mean that an electric fire pump would be useless if the event of a fire episode. In

addition, most fire protection agencies require a fire pump that is isolated from and not dependent upon the plant electrical supply. For these reasons the fire pump will be diesel fired, limited to 50 hours per year of runtime for testing and maintenance, and less than 200 hours per year for actual emergency fire protection/suppression use. Use of Tier 3, NSPS Subpart IIII, and NESHAPs Subpart ZZZZ compliant engine meets all applicable BACT requirements.

Background: GREENHOUSE GAS BACT DETERMINATIONS

According to the Petition Table 4.1-6, the modified project would be a major stationary source triggering PSD requirements for CO2e, which requires the use of BACT. The modified project would have a PTE of more than 2.1 million tons CO2e/year,[8] with the majority (99.7%) emitted by the combustion turbines.[9] Yet, the Petition does not provide a CO2e BACT analysis and CO2e BACT emission limits for any of the modified project's combustion equipment. Instead, according to the Petition, p. 4.1-32, the modified project would comply with the CO2e emission standard in EPA's forthcoming NSPS Part 60 Greenhouse Gas Standards of Performance for Greenhouse Gas Emissions for New Stationary Sources: Electric Utility Generating Units.

NSPS emission standards are not a substitute for a project-specific BACT analysis. Instead, the standards establish a BACT floor, i.e., a minimum control requirement that must be met. The NSPS Part 60 Greenhouse Gas Standards of Performance for Greenhouse Gas Emissions for New Stationary Sources: Electric Utility Generating Units is clear:

> *BACT is a case-by-case review that considers a number of factors. These factors include the availability, technical feasibility, control effectiveness, and the economic, environmental and energy impacts of the control option. See GHG Permitting Guidance at 17-46. The fact that a minimum control requirement (i.e., the BACT Floor) is established by the EPA through an applicable NSPS does not bar a permitting agency from justifying a more stringent control level as BACT for a specific PSD permit.[10]*

Petition Appendix 4.1F further provides a one-page summary of proposed GHG BACT limits for the modified project's combustion sources and circuit breakers, which proposes compliance with the current California GHG emissions performance standards

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8 *Petition, Table 4.1-3, p. 4.1-5.*

9 *(2,112,350 tons CO2e/year) / (2,117,730 tons CO2e/year) = 0.997.*

10 *Promulgated on August 3, 2015.*

for baseload power facilities at 1100 lb/MWh net and heat rates for turbine operations plus duct burners at 7100 Btu/kWh and turbine operations without duct burners at 8030 Btu/kWh on a 365-day rolling average. In contrast, the PSD permit for the approved project sets BACT limits for carbon dioxide emissions at 774 lb/MWh source-wide net output and 7319 Btu/kWh source-wide net heat rate on a 365-day rolling average.[11] *EPA noted in its response to comments on the proposed PSD permit for the approved project:*

> *The solar component of the Project was described in the EJ [environmental justice] Analysis, but was not the basis for any specific determination or conclusion in our analysis of the proposed permit's limits or impacts. Upon review of this comment, we find it appropriate to clearly state that the solar component is a lower-emitting GHG technology at this facility. Because the solar component is integrated into the heat recovery portion of the project, it has the potential to reduce GHG emissions by reducing use of the duct burners during peak energy demand. The Project, as described in the application, includes the development of 50 MW of solar energy. As an integrated part of the Project with the ability to reduce GHG emissions, we consider the solar component to be part of the GHG BACT determination for the combustion turbines and associated heat recovery system. In addition, the permit has been revised to ensure that the solar component is a required part of the facility.*[12]

The Petition, Appendix 4.1F, contains no discussion whatsoever in its GHG BACT analysis why a solar component was not or cannot be incorporated into the facility.

Further, according to Appendix 4.1F, states that based upon the Approved Project GHG BACT analysis "the use of carbon capture and/or sequestration were found to be not technically feasible for the project at its current location, nor were these options found to be cost-effective." The Petition may not rely on a several years-old BACT analysis that was prepared for an entirely different facility. Since, carbon capture and/or sequestration may have become technically feasible or cost-effective and other new technologies may have become available. The latter include, for example, bulk energy storage with flywheels, compressed air, heat pumps, or thermal utility-scale batteries (e.g., from Aquion Energy[13]*, Electrovaya*[14]*). The Con Edison Project in the Central*

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11 *PHPP PSD Permit, p. 8.*

12 *EPA, In re: Palmdale Power Project, Excerpt 4, op. cit., Response to Comment 40, p. 39.*

13 *Aquion Energy, Bulk Energy Storage; http://www.aquionenergy.com/products/grid-scale-batteries.*

Valley, for example, will include an 8-MWh lithium-ion energy storage system provided by General Electric[15] and NextEra Energy, a Fortune 200 firm with utility revenues of $17 billion and 44,900 megawatts of generating capacity intends on deploying $100 million in energy storage projects in the next 12 months in PJM, California and Arizona.[16]

Finally, the heat rates of duct burners are approximately the same, or worse, than the efficiency of new internal combustion engine generators; in other words, the use of duct burners is very inefficient as a source of peaking generation capability. Addressing the least efficient part of a proposed facility, the duct burning peak topping generation, can significantly increase a plant's overall efficiency without redefining the project. There are numerous alternatives for short-term, peak power generation at the scale proposed for duct burning at the modified project that would achieve significant reductions in emissions of not only GHGs but also other pollutants. These include bulk energy storage options standalone or with a solar hybrid configuration), a small combustion turbine, or using the auxiliary boiler for supplemental steam.

Data Request 10

Please provide a project-specific top-down BACT analysis for facility-wide GHG emissions.

a. Please include carbon capture and/or sequestration and bulk energy storage options (flywheel, compressed air, heat pumps, utility-scale batteries, etc.) in your analysis and analyze their potential to eliminate the use of duct burners.

b. Please specifically address the use of a solar photovoltaic and/or solar thermal component, both as a standalone component and/or in connection with the above energy storage options to reduce facility GHG emissions in your analysis.

c. Please specifically address the elimination of duct burners as an option, instead relying on bulk energy storage options standalone or with a solar hybrid configuration), a small combustion turbine, or using the auxiliary boiler for supplemental steam as a source of peaking generation capability.

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[14] *Electrovaya, Lithium Ion SuperPolymer® 2.0 Battery Solutions for Grid & Uninterrupted Power Supply; http://www.electrovaya.com/applications/gridApp/gridApplications.aspx.*

[15] *GE Providing 8 MWh of Utility-Scale Energy Storage for Cali Con Edison Project; http://cleantechnica.com/2015/04/29/ge-providing-8-mwh-utility-scale-energy-storage-cali-con-edison-project/.*

[16] *Eric Wesoff, Greentech Media, NextEra on Storage: 'Post 2020, There May Never Be another Peaker Built in the US,' September 30, 2015'; http://www.greentechmedia.com/articles/read/NextEra-on-Storage-Post-2020-There-*

Response to Data Request 10

The BACT analysis referred to in Response to Data Request 9 also contains the GHG BACT analysis for the identified plant systems. In addition, the applicant submits the following additional comments:

- Carbon capture and sequestration are discussed in the above noted BACT analysis. Technologies such as flywheels, compressed air, heat pumps, or utility scale batteries, have not, to the applicant's knowledge, been shown to be technologically feasible or cost effective on the scale of a 660 MW combustion turbine combined cycle power plant. In addition, BACT does not require the fundamental re-design of a project just to incorporate that technology.

- The use of photovoltaic and/or solar thermal technology is discussed in the GHG BACT analysis noted above.

- Duct burners are only required to be fired to boost steam production on hot days when turbine efficiency decreases. Combined cycle technology is the basis for EPAs GHG performance standards for power production systems. Use of the duct burners on hot days helps to maintain optimum steam turbine power production which minimizes GHG emissions when compared to operating another combustion device, such as a small turbine, to produce the difference in power.

Data Request 11

The Petition, Appendix 4.1F, refers to combined-cycle operations (turbines plus duct burners) and simple-cycle operations (without duct burners). Simple-cycle operations, i.e., operations without heat recovery steam generators ("HRSGs") are not discussed elsewhere in the Petition. Please verify that the modified project would not operate in simple-cycle mode and revise Appendix 4.1F accordingly or provide a discussion and analysis of simple-cycle operations.

Response to Data Request 11

The City of Lancaster is referring to the statement under the GHG BACT summary section in Appendix 4.1F which states:

Maintain heat rates for combined cycle operations (turbines plus duct burners) at levels equal to or less than 7100 btu/kW-hr (HHV), and heat rates for simple cycle operations (without duct burners) at levels equal to or less than 8030 btu/kW-hr (HHV).

The use of the word phrase "simple cycle" in the above referenced text is simply a typographical error that should read "combined cycle". The facility is a combined cycle facility with a HRSG that can be fired or not fired. Regardless of the firing status of the HRSG, i.e., duct burners on or off, the HRSG is still producing steam for the steam turbine generator, therefore both HRSG firing modes maintain the combined cycle designation.

Background: SF6 EMISSIONS FROM CIRCUIT BREAKERS

The Petition provides estimates for CO2e emissions for facility potential to emit ("PTE"), which exclude emissions from emergency equipment (Table 4.1-6: 2,117,730 tons CO2e/year) and maximum facility emissions, which include emissions from emergency equipment (Table 4.1-13:

2,117,775 tons CO2e/year). Review of these estimates based on the calculations provided in the Petition, Appendix A, shows that these emissions estimates only include stationary combustion equipment; the calculations do not include emissions of sulfur hexafluoride ("SF6") from circuit breakers. SF6 is a potent GHG gas which must be included in the PTE and maximum facility emissions.

Data Request 12

Please provide estimates of SF6 emissions from circuit breakers for the modified project.

Response to Data Request 12

At the time of submittal of the Petition For Amendment, Palmdale Energy LLC had not confirmed the types, number, and capacities of the electrical breakers to be used at the proposed facility. This data was supplied and is included in the PSD application (included in Appendix DR-5), as follows:

# of SF6 breakers: 6

SF6 capacity of each breaker: 360 lbs

BACT leak rate of <=0.5% wt.

Calculated SF6 emissions: 111.7 MT CO2e/yr

The calculation methodology is included in Appendix DR-12. The GWP used in these calculations was derived from 40 CFR 98, Subpart A, Table A-1 (2014). The SF6 GWP value is 22,800.

Background: GLOBAL WARMING POTENTIALS

The direct global warming potential ("GWP") is a relative measure of how much heat a greenhouse gas traps in the atmosphere; it compares the amount of heat trapped by a gas in question to the amount of heat trapped by carbon dioxide based on a certain time horizon. To calculate CO2-equivalent emissions, the Petition, Appendix 4.1A, Tables 4.1A-1A, 4.1A-5, and 4.1A-6, relies upon GWPs from the "IPCC/SAR," i.e., the Second Assessment Report ("SAR") published by the International Governmental Panel on Climate Change ("IPCC") in 1996. For methane ("CH4") and nitrous oxide ("N2O"), the SAR established GWPs of 21 and 310 over a 100-year time horizon, respectively, which are incorporated into the Petition's calculations.
These GWPs have been updated since. In 2007, the IPCC's Fourth Assessment Report ("AR4") revised the GWP for CH4 to 25 over a 100-year time horizon and the GWP for N2O to 298 over a 100-year time horizon;[17] EPA accordingly updated its GHG reporting rule in 2013.[18] The most recent IPCC report, the Fifth Assessment Report ("AR5"), which was finalized in November 2014, incorporates climate-carbon feedback and updates the GWP for methane to 34 over a 100-year time horizon,[19] a 36 percent increase over the IPCC's 2007 recommendation[20] and a 62 percent increase over the IPCC's 1996 recommendation[21] which the Petition relied upon.

Data Request 13

Please revise Project GHG emission estimates using the most recent GWPs over a 100-year time horizon established by the IPCC (34 for CH4, 298 for N2O, and 23,500 for SF6).

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17 IPCC, Climate Change 2007, The Physical Science Basis, Table TS-2; http://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4_wg1_full_report.pdf.

18 EPA, 40 CFR Part 98, [EPA-HQ-OAR-2012-0934; FRL-9902-95-OAR], RIN 2060-AR52, 2013 Revisions to the Greenhouse Gas Reporting Rule and Final Confidentiality Determinations for New or Substantially Revised Data Elements, November 15, 2013, Table 2, page 21; http://www.epa.gov/ghgreporting/documents/pdf/2013/documents/2013-data-elements.pdf.

19 IPCC, Climate Change 2013, The Physical Science Basis, Chapter 8: Anthropogenic and Natural Radiative Forcing, Appendix 8.A: Lifetimes, Radiative Efficiencies and Metric Values, Table 8.A.1; http://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WG1AR5_ALL_FINAL.pdf.

20 (34)/(25) = 1.36.

21 (34)/(21) = 1.62.

Response to Data Request 13

Please note the following:

- The IPCC GWP values are not absolute regulatory values, but are rather recommendations.
- In the current GHG emissions calculations the applicant used the GWP values found in the CARB Mandatory Reporting program. These values were consistent with the GWP values used in the previous PHPP analysis.
- Palmdale Energy LLC has re-calculated the GHG emissions for the identified plant processes using the GWP values as promulgated by the USEPA (effective on 1/1/14), as found in 40 CFR 98 Subparts A (Table A-1) and C (Tables C-1 and C-2). The GWP values used are 1 for CO2, 25 for CH4, and 298 for N2O. The revised emissions using the 40 CFR 98 emissions factors and the 40 CFR 98 GWP values are as follows by system:

Combustion Turbines (Max Ops case)	1,920,420 MT CO2e/yr
Auxiliary Boiler (Max Ops case)	28,573.8 MT CO2e/yr
EGS Engine	27.5 MT CO2e/yr
FP Engine	4.8 MT CO2e/yr
SF6 Breakers	111.7 MT CO2e/yr
Facility Total	**1,949,138 MT CO2e/yr**

Previous emissions from the facility combustion equipment, excluding SF6, were estimated to be 2,117,730 tons CO2e/yr (1,925,209 MT CO2e/yr). The re-calculated emissions represent an approximate difference of 1% on an annual basis. When considering this difference, it must be remembered that the emissions were calculated using emissions factors which were developed over a large range of similar type devices and operating modes, thus the factors and the resulting calculations can only be considered as “estimates”.

APPENDICES

DR-1

PORTIONS OF APPENDICES 4.1 AND 6

(Previously docketed with Revised Petition to Amend. Hardcopies provided to City of Lancaster)

DR-2

AIR QUALITY MODELING FILES

(Submitted to Dockets Unit separately on compact disk)

DR-3

CUMULATIVE AIR QUALITY MODELING FILES

(Submitted to Dockets Unit separately on compact disk)