

DOCKETED

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|-------------------------|---|
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| Project Title: | Alamitos Energy Center |
| TN #: | 201688 |
| Document Title: | Completeness Response Letter to South Coast Air Quality Management District |
| Description: | N/A |
| Filer: | Sarah Madams |
| Organization: | CH2M HILL |
| Submitter Role: | Applicant Consultant |
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| Docketed Date: | 2/10/2014 |



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February 7, 2014

Mr. Mohsen Nazemi, P.E.
Deputy Executive Officer
South Coast Air Quality Management District
21865 Copley Drive
Diamond Bar, CA 90803

**Re: Alamos Energy Center Air Permit Application Completeness Response
(Facility ID 115394)**

Dear Mr. Nazemi:

This letter provides the information the South Coast Air Quality Management District (SCAQMD) requested in your January 21, 2014 letter. The following information is presented in the same order as requested by the SCAQMD.

Rule 1304(a)(2) – Electric Utility Steam Boiler Replacement Exemption

- a. Please outline in detail the construction, demolition, start-up, and commercial operation for the three projects (Huntington Beach Energy Project, Redondo Beach Energy Project, and Alamos Energy Center). The table provided should include the megawatt changes (compared on a net and gross basis) for each phase for all units owned by AES Corporation to demonstrate that the generating capacity will not increase.

Response: Tables 1 through 3 present the construction and demolition schedules for Huntington Beach Energy Project (HBEP), Redondo Beach Energy Project (RBEP), and Alamos Energy Center (AEC). These tables also present the dates of start-up and commercial operation for new turbines and the shutdown dates, as applicable, for existing turbines that will be demolished.

**Table 1
 HBEP Project Schedule**

| Demolition/Construction Activity | Start and End Dates | First Fire Date | Commercial Operation Date |
|---|----------------------------|------------------------|----------------------------------|
| HBGS Unit 5 and Stack 3&4 Demolition | 4/2015 to 6/2016 | N/A | N/A |
| HBEP Block 1 Construction | 7/2016 to 12/2018 | 9/1/2018 | 12/1/2018 |
| HBEP Block 2 Construction | 3/2018 to 6/2020 | 3/1/2020 | 6/1/2020 |
| HBGS Units 1 and 2 Demolition | 10/2020 to 9/2022 | N/A | N/A |

N/A = Not applicable

**Table 2
 RBEP Project Schedule**

| Demolition/Construction Activity | Start and End Dates | First Fire Date | Commercial Operation Date |
|---|----------------------------|------------------------|----------------------------------|
| RBGS Units 1 – 4 Demolition | 1/2016 to 12/2016 | N/A | N/A |
| RBEP Construction | 3/2017 to 12/2019 | 9/1/2019 | 12/1/2019 |
| RBGS Units 5 - 8 Demolition | 1/2019 to 12/2020 | N/A | N/A |

**Table 3
 AEC Project Schedule**

| Demolition/Construction Activity | Start and End Dates | First Fire Date | Commercial Operation Date |
|---|----------------------------|------------------------|----------------------------------|
| AGS Unit 7 Demolition | 1/2016 to 8/2016 | N/A | N/A |
| AEC Blocks 1 and 2 Construction | 9/2016 to 5/2019 | 2/1/2019 | 5/1/2019 |
| AGS Units 5 and 6 Demolition | 10/2018 to 9/2020 | N/A | N/A |
| AEC Block 3 Construction | 3/2020 to 8/2022 | 5/1/2022 | 8/1/2022 |
| AGS Units 3 and 4 Demolition | 1/2022 to 12/2023 | N/A | N/A |
| AEC Block 4 Construction | 6/2023 to 11/2025 | 8/1/2025 | 11/1/2025 |
| AGS Units 1 and 2 Demolition | 8/2025 to 7/2027 | N/A | N/A |

Table 4 presents a Rule 1304(a)(2) proposed compliance assessment for the three AES repower projects, showing the timing for the first fire of the new generation equipment along with the gross and net electrical generation, the timing for shutdown of the existing units, and the megawatts for the existing units. The total HBEP megawatt ratings incorporate transmission interconnection constraints of 939 megawatts net and a permit limit of 972 megawatts gross. Table 4 shows that AES's basin-wide electricity generating capacity does not increase and that the timing and magnitude of the new generation and retirements comply with the SCAQMD's Rule 1313(d).

Table 4
 AES Rule 1304(a)(2) Compliance by Site

| Project Phase | First Fire or Shutdown Date | MWs Gross | MWs Net |
|--|------------------------------------|------------------|----------------|
| <i>HBEP</i> | | | |
| Block 1 | 9/1/2018 | 545.5 | 527.8 |
| RBGS Unit 6 Retired | 9/1/2018 | 175 | 175 |
| RBGS Unit 8 Retired | 9/1/2018 | 480 | 480 |
| Block 2 | 3/1/2020 | 545.5 | 411.2 |
| HBGS Unit 1 Retired | 5/29/2020 | 215 | 215 |
| HBGS Unit 2 Retired | 5/29/2020 | 215 | 215 |
| Megawatts Installed | | 972 | 939 |
| Megawatts Retired | | 1,085 | 1,085 |
| Surplus Megawatts | | 113 | 146 |
| <i>RBEP</i> | | | |
| Block 1 | 9/1/2019 | 546.3 | 530.4 |
| RBGS Unit 5 Retired | 1/31/2019 | 175 | 175 |
| RBGS Unit 7 Retired | 1/31/2019 | 480 | 480 |
| Megawatts Installed | | 546.3 | 530.4 |
| Megawatts Retired | | 655 | 655 |
| Surplus Megawatts (HBEP and RBEP) | | 221.7 | 270.6 |
| <i>AEC</i> | | | |
| Blocks 1 and 2 | 2/1/2019 | 1,077.9 | 1,047 |
| AGS Unit 5 Retired | 10/1/2018 | 480 | 480 |
| AGS Unit 6 Retired | 10/1/2018 | 480 | 480 |
| Block 3 | 5/1/2022 | 538.95 | 523.5 |
| AGS Unit 3 Retired | 1/1/2022 | 320 | 320 |
| AGS Unit 4 Retired | 1/1/2022 | 320 | 320 |
| Block 4 | 8/1/2025 | 538.95 | 523.5 |
| AGS Unit 1 Retired | 8/1/2025 | 175 | 175 |
| AGS Unit 2 Retired | 8/1/2025 | 175 | 175 |
| Megawatts Installed | | 2,156 | 2,094 |
| Megawatts Retired (Including HBEP and RBEP surpluses) | | 2,171.7 | 2,220.6 |
| HBEP, RBEP and AEC gross and net MWs based on ambient temperatures of 32, 33 and 28 °F, respectively. | | | |
| AGS = Alamos Generating Station, HBGS = Huntington Beach Generating Station, RBGS = Redondo Beach Generating Station | | | |
| MW = megawatt(s) | | | |

b. Please outline a comprehensive shutdown schedule for each subject unit.

Response: Table 4 above presents the expected shutdown schedule for each subject unit.

Greenhouse Gases (GHG) BACT Analysis

a. Please calculate the emission rate in net megawatt-hours, identifying heat rates at various operating loads, start-up and shutdown periods, and at different configurations (1 on 1, 2 on 1, and 3 on 1), as well as the amount of hours the facility expects to operate at each configuration.

Response: Table 5 presents the gross and net heat rates and the net electrical generation output for a single power block in a 1 on 1, 2 on 1, and a 3 on 1 configuration. Table 6 presents the average electrical production and gross and net heat rates for AEC's four power blocks based on the expected operating hours for each configuration (1 on 1, 2 on 1, and 3 on 1). Table 7 presents gross and net heat rates for the start-up and shutdown events along with the expected annual hours for each.

Table 5
AEC Heat Rates and Electrical Production for 1 Power Block

| Parameter | Turbine Output (%) | | | |
|---|--------------------|---------|---------|---------|
| | 70 | 80 | 90 | 100 |
| <i>Heat Rates for a 1 on 1 Configuration</i> | | | | |
| Net Plant Electrical Output (kW) | 116,977 | 130,750 | 144,285 | 161,150 |
| Net Plant Heat Rate (Btu/kWh-LHV) | 7,969 | 7,796 | 7,669 | 7,578 |
| Estimated Gross Heat Rate (Btu/kWh-LHV) | 7,737 | 7,569 | 7,446 | 7,357 |
| Estimated Net Heat Rate (Btu/kWh-HHV) | 8,766 | 8,576 | 8,436 | 8,336 |
| <i>Heat Rates for a 2 on 1 Configuration</i> | | | | |
| Net Plant Electrical Output (kW) | 241,081 | 268,702 | 295,720 | 329,459 |
| Net Plant Heat Rate (Btu/kWh-LHV) | 7,733 | 7,587 | 7,484 | 7,413 |
| Estimated Gross Heat Rate (Btu/kWh-LHV) | 7,508 | 7,366 | 7,266 | 7,197 |
| Estimated Net Heat Rate (Btu/kWh-HHV) | 8,506 | 8,346 | 8,232 | 8,154 |
| <i>Heat Rates for a 3 on 1 Configuration</i> | | | | |
| Net Plant Electrical Output (kW) | 363,249 | 403,656 | 443,066 | 492,265 |
| Net Plant Heat Rate (Btu/kWh-LHV) | 7,698 | 7,575 | 7,492 | 7,440 |
| Estimated Gross Heat Rate (Btu/kWh-LHV) | 7,474 | 7,354 | 7,274 | 7,223 |
| Estimated Net Heat Rate (Btu/kWh-HHV) | 8,468 | 8,333 | 8,241 | 8,184 |

Btu/kWh = British thermal unit(s) per kilowatt-hours
 HHV = higher heating value
 kW = kilowatt(s)
 LHV = lower heating value

Table 6
AEC Heat Rates and Electrical Production for 4 Power Blocks

| Parameter | Turbine Output (%) | | | |
|---|--------------------|-----------|-----------|-----------|
| | 70 | 80 | 90 | 100 |
| <i>Heat Rates for a 1 on 1 Configuration</i> | | | | |
| Hours per Configuration per Year | | 800 | | |
| Net Plant Electrical Output (kW) | 467,908 | 523,000 | 577,140 | 644,600 |
| Net Plant Heat Rate (Btu/kWh-LHV) | 7,969 | 7,796 | 7,669 | 7,578 |
| Estimated Gross Heat Rate (Btu/kWh-LHV) | 7,737 | 7,569 | 7,446 | 7,357 |
| Estimated Net Heat Rate (Btu/kWh-HHV) | 8,765.9 | 8,575.6 | 8,435.9 | 8,335.8 |
| Average Power Output (kW) | | 553,162 | | |
| Average Net Heat Rate (Btu/kWh-HHV) | | 8,528 | | |
| Average Gross Heat Rate (Btu/kWh-HHV) | | 7,527 | | |
| <i>Heat Rates for a 2 on 1 Configuration</i> | | | | |
| Hours per Configuration per Year | | 7,200 | | |
| Net Plant Electrical Output (kW) | 964,324 | 1,074,808 | 1,182,880 | 1,317,836 |
| Net Plant Heat Rate (Btu/kWh-LHV) | 7,733 | 7,587 | 7,484 | 7,413 |
| Estimated Gross Heat Rate (Btu/kWh-LHV) | 7,508 | 7,366 | 7,266 | 7,197 |
| Estimated Net Heat Rate (Btu/kWh-HHV) | 8,506 | 8,346 | 8,232 | 8,154 |
| Average Power Output (kW) | | 1,134,962 | | |
| Average Net Heat Rate (Btu/kWh-HHV) | | 8,310 | | |
| Average Gross Heat Rate (Btu/kWh-HHV) | | 7,334 | | |
| <i>Heat Rates for a 3 on 1 Configuration</i> | | | | |
| Hours per Configuration per Year | | 3,000 | | |
| Net Plant Electrical Output (kW) | 1,452,996 | 1,614,624 | 1,772,264 | 1,969,060 |
| Net Plant Heat Rate (Btu/kWh-LHV) | 7,698 | 7,575 | 7,492 | 7,440 |
| Estimated Gross Heat Rate (Btu/kWh-LHV) | 7,474 | 7,354 | 7,274 | 7,223 |
| Estimated Net Heat Rate (Btu/kWh-HHV) | 8,468 | 8,333 | 8,241 | 8,184 |
| Average Power Output (kW) | | 1,702,236 | | |
| Average Net Heat Rate (Btu/kWh-HHV) | | 8,306 | | |
| Average Gross Heat Rate (Btu/kWh-HHV) | | 7,331 | | |

**Table 7
 Start-up and Shutdown Heat Rates and Hours**

| | |
|---|--------|
| Start-up Heat Rate (Btu/kWh-LHV, Gross) | 18,267 |
| Shutdown Heat Rate (Btu/kWh-LHV, Gross) | 16,520 |
| Start-up Heat Rate (Btu/kWh-HHV, Net) | 19,508 |
| Shutdown Heat Rate (Btu/kWh-HHV, Net) | 17,643 |
| Annual Start-up Hours | 361 |
| Annual Shutdown Hours | 104 |

Table 8 presents AEC's greenhouse gas (GHG) efficiency estimates based on the annual average gross and net heat rate data presented in Tables 5 through 7 and using the SCAQMD's methodology, as presented in the HBEP Preliminary Determination of Compliance, issued on January 24, 2014.¹

Based on these assumptions, AEC's calculated operating profile GHG efficiency would be 1,024 pounds of carbon dioxide per megawatt-hour (lb CO₂/MWh) on a net basis, assuming the equipment is new and clean. Over time, the overall performance will degrade. Assuming a conservative degradation of 8 percent (as used in other SCAQMD analyses) the calculations result in an estimated GHG efficiency of 1,106 lb CO₂/MWh on a net basis.

California's emission performance standard applies to "base load generation", defined as electricity generation from a power plant that is designed and intended to provide electricity at an annualized plant capacity factor of at least 60 percent Senate Bill 1368 (Perata, Chapter 598, Statutes of 2006). Assuming the AEC is operated at a maximum electrical output of 1,902 MWs net for 3,785 hours per year (3,320 operating hours, 361 start-up hours, and 104 shutdown hours), the permitted plant capacity factor would be 43 percent.²

**Table 8
 AEC GHG Efficiency**

| | |
|---|-------|
| Overall Average Net Heat Rate (Btu/kWh-HHV) | 8,712 |
| Overall Average Gross Heat Rate (Btu/kWh-HHV) | 7,753 |
| Net Heat Rate Basis (lb CO ₂ /MWh) | 1,019 |
| Gross Heat Rate Basis (lb CO ₂ /MWh) | 906 |
| Net Heat Rate Basis with 8% degradation (lb CO ₂ /MWh) | 1,100 |
| Gross Heat Rate Basis with 8% degradation (lb CO ₂ /MWh) | 979 |

CO₂ = carbon dioxide
 lb/MWh = pound(s) per megawatt-hour

¹ See Appendix F - http://docketpublic.energy.ca.gov/PublicDocuments/12-AFC-02/TN201595_20140127T104536_SCAQMD_PDOC_for_AES_HB.pdf

² (1,902 MWs * 3,785 hours) / (1,902 MWs * 8,760 hours) * 100 = 43 Percent

Mr. Mohsen Nazemi
February 7, 2014
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Application Numbers 559395, 559396, and 559397 – Oil/Water Separators

- a. Please remit the difference of \$2,580.90 (\$7,017.70 - \$4,436.80 already paid) referencing A/Ns 559395, 559396, and 559397 to Permit Services.

Response: Attached is a check in the amount of \$2,580.90 which references Application Numbers 559395, 559396, and 559397.

Sincerely,



Stephen O'Kane
Vice-President
AES Southland Development, LLC

cc: Jennifer Didlo/AES
Jeff Harris/ESH
Jerry Salamy/CH2M HILL
Keith Winstead/CEC
Marcel Saulis/SCAQMD