DOCKETED

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TN #:	201896
Document Title:	Response to South Coast Air Quality Management District from Redondo Beach Energy Projects re Greenhouse Gas Emissions
Description:	N/A
Filer:	Sarah Madams
Organization:	CH2M HILL
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March 17, 2014

Vicky Lee
Air Quality Engineer
South Coast Air Quality Management District
21865 Copley Drive
Diamond Bar, CA 90803

Re: Redondo Beach Energy Project Response
(Facility ID 115536)

Dear Ms. Lee:

This letter provides the information you requested via electronic mail regarding the Redondo Beach Energy Project's (RBEP) greenhouse gas (GHG) emissions.

NSPS for GHG Emissions from Electric Utility Generating Units

1. NSPS for GHG Emissions from Electric Utility Generating Units

a. Is the MWh_{gross} you provided in previous calculations the same as the gross energy output in megawatt-hours (P_{gross}) defined for the NSPS?

Response: Yes. For RBEP, the equations presented in Section 60.5540 of the proposed New Source Performance Standard (NSPS) Subpart TTTT is P_{gross} equals electric power from the combustion turbine generator plus electric power from the steam turbine generator.

b. Please provide thermal efficiency calculations demonstrating that RBEP will be able to meet 1000 lb CO_2/MWh_{gross} standard.

Response: Compliance with the proposed NSPS carbon dioxide (CO_2) efficiency of 1,000 pounds of CO_2 per megawatt-hour (lb CO_2/MWh) on a gross basis is based on RBEP's operating profile. Once this regulation is promulgated, AES will operate RBEP in compliance with the NSPS by increasing the amount of time RBEP is operated at the

most efficient heat rates. Using the table from our February 14, 2014 letter, we have revised Tables 2 through 4 from our February 7, 2014 letter to present an operating profile that demonstrates RBEP's compliance with the proposed NSPS. Revisions to Table 2, as shown in Table 2R, include the use of the most efficient heat rate in the 2 on 1 configuration, as opposed to the average heat rate over the range of operating loads.

Table 2R
RBEP Heat Rates and Electrical Production – REVISED

Parameter	Turbine Output (%)				
	70	**80**	**90**	**100**	**100 + DB**
Heat Rates for a 1 on 1 Configuration					
Hours per Configuration per Year			125		
Net Plant Electrical Output (kW)	116,977	130,750	144,285	161,150	203,570
Net Plant Heat Rate (Btu/kWh-LHV)	7,969	7,796	7,669	7,578	7,979
Estimated Gross Heat Rate (Btu/kWh-LHV)	7,737	7,569	7,446	7,357	7,747
Estimated Net Heat Rate (Btu/kWh-HHV)	8,766	8,576	8,436	8,336	8,777
Average Power Output (kW)			151,346		
Average Net Heat Rate (Btu/kWh-HHV)			8,578		
Average Gross Heat Rate (Btu/kWh-HHV)			8,328		
Heat Rates for a 2 on 1 Configuration					
Hours per Configuration per Year			5,515		
Net Plant Electrical Output (kW)	241,081	268,702	295,720	329,459	367,913
Net Plant Heat Rate (Btu/kWh-LHV)	7,733	7,587	7,484	7,413	7,683
Estimated Gross Heat Rate (Btu/kWh-LHV)	7,508	7,366	7,266	7,197	7,459
Estimated Net Heat Rate (Btu/kWh-HHV)	8,506	8,346	8,232	8,154	8,451
Average Power Output (kW)			300,575		
Most Efficient Net Heat Rate (Btu/kWh-HHV)			8,154		
Most Efficient Gross Heat Rate (Btu/kWh-HHV)			7,917		
Heat Rates for a 3 on 1 Configuration					
Hours per Configuration per Year			730		
Net Plant Electrical Output (kW)	367,918	403,656	443,066	492,265	N/A
Net Plant Heat Rate (Btu/kWh-LHV)	7,681	7,575	7,492	7,440	N/A
Estimated Gross Heat Rate (Btu/kWh-LHV)	7,457	7,354	7,274	7,223	N/A
Estimated Net Heat Rate (Btu/kWh-HHV)	8,449	8,333	8,241	8,184	N/A
Average Power Output (kW)			414,031		
Average Net Heat Rate (Btu/kWh-HHV)			8,335		
Average Gross Heat Rate (Btu/kWh-HHV)			8,092		

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

N/A = Not applicable

In Table 3R, the number of start-up and shutdown events was reduced from 624 to 300, with 295 combined hot and warm start-ups, 5 cold start-ups, and 300 shutdown events per turbine.

Table 3R
Start-up and Shutdown Heat Rates and Hours - REVISED

Start-up (9 Minutes) Heat Rate (Btu/kWh-HHV, Net)	20,094
Shutdown (9 Minutes) Heat Rate (Btu/kWh-HHV, Net)	18,172
Start-up (Balance of Start) Heat Rate (Btu/kWh-HHV, Net)	8,766
Shutdown (Balance of Shutdown) Heat Rate (Btu/kWh-HHV, Net)	8,766
Start-up Hours (9 Minutes)	45
Shutdown Hours (9 Minutes)	47.5
Start-up Hours (Balance of Start-up)[1]	122.3
Shutdown Hours (Balance of Shutdown)[1]	2.5

[1] Balance for a cold start-up is 81 minutes (81 min / 60 min * 5 start-ups), for warm/hot start-ups are 23.5 minutes, and for a shutdown is 0.5 minutes.

AES expects that, after commissioning, RBEP will experience a permanent 3 percent performance degradation. Between major maintenance events, AES assumes an additional 5 percent performance degradation can occur, which can be recovered through inspection and maintenance of plant equipment. AES understands that, when NSPS Subpart TTTT is promulgated, RBEP may be subject to a CO_2 emission limit and AES will manage RBEP operation to comply with an applicable CO_2 emission limitation by developing and implementing a maintenance program that incorporates the equipment manufacturers' recommended inspection and maintenance activities.

Table 4R presents RBEP's GHG efficiency estimates based on Tables 2R and 3R. Based on these calculations, RBEP's expected operating profile GHG efficiency is 976 lb CO_2/MWh on a gross basis, assuming a 3 percent performance degradation.

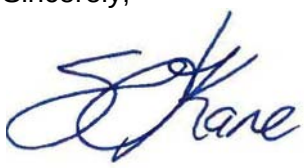
Table 4R
RBEP GHG Efficiency – REVISED

Overall Net Heat Rate (Btu/kWh-HHV)	8,348
Overall Gross Heat Rate (Btu/kWh-HHV)	8,105
Net Heat Rate Basis (lb CO_2/MWh)	976
Gross Heat Rate Basis (lb CO_2/MWh)	948
Net Heat Rate Basis with 3% degradation (lb CO_2/MWh)	1,005
Gross Heat Rate Basis with 3% degradation (lb CO_2/MWh)	976

As noted in Section 2.4 of the air permit application, AES expects RBEP to have a capacity factor between 15 and 25 percent, which means the proposed NSPS Subpart TTTT CO_2 emission limitation would not apply.

If you have any additional questions, please contact either me or Jerry Salamy (916-286-0207).

Sincerely,



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

cc: J. Didlo/AES
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