DOCKET	
09-AFC-3	
DATE	DEC 09 2010
RECD.	DEC 09 2010

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To: Commissioner Jeffrey Byron
Commissioner Robert Weisenmiller
Ken Celli Hearing Officer

State of California
State Energy Resources Conservation and Development Commission

In the Matter of:	)	Docket # 09-AFC-03
	)	
Mariposa Energy Project	)	
	)	Robert Sarvey Comments on
	)	the Staff Assessment
	)	

Dear Mr. Hoffman,

Thank you for the opportunity to comment on the Staff Assessment for the Mariposa Energy Project. We appreciate Staff's hard work and provide the following recommendations to improve staffs analysis and bring the project into compliance with CEQA and all relevant LORS.

Water Resources

Staff's Assessment properly concludes that the potential use of 186.9 AFY of surface water is a significant impact and does not comply with State Water Laws related to power plant cooling. Sixty Nine percent of that water usage is for NOx control. The project can by utilizing Dry Low NOx Combustors as an alternative NOx control method and eliminate the potential use of 130.2 AFY of surface water.

GE has several variants of the LM -6000 which incorporate DLE technology. For example The LM 6000 PF can, by incorporating DLE technology, eliminate the use of 130.2 AFY of water while lowering emissions of NO_x to 15 ppm as compared to the turbine the applicant is proposing which would lower NOx to only 25 ppm before post combustion controls. This can avoid annual water consumption of 130.2 AFY, and can yield $100,000 per year in operational savings and eliminate the need to purchase a water treatment system. [1] The turbine variant would provide superior NOx control and eliminate 69% of the projects water usage.

Another new variant of the LM -6000 is the LM -6000 PH. which also uses water only for power augmentation and not NOx. An updated control algorithm in the fuel core manages water usage for maximum efficiency for preset conditions such as NOx output, power output, and grid frequency. For a Single Annular Combustor (SAC) LM6000 model, water usage can be up to 13,400 l/hr during full load operation (not including any water used for cooling or inlet conditioning around the package). This water usage amount accounts for NOx abatement and for a power augmentation option called SPRINT®. Roughly 2/3 of the water consumption is for NOx abatement, and the rest is used for SPRINT®. In the control system, the water table algorithm controls water usage during key transitions of the gas turbine where excess water could be consumed. Such transitions include ramping up to full power, part power operation, and SPRINT® operation turning on/off. Figure 5 has an example of SPRINT utilization running the gas turbine at part power. As mentioned, plant efficiency analyses on operating costs are starting to analyze water consumption as well as fuel consumption. If a plant operation profile includes constant starts and stops, as well as part power operation, the savings in water can be substantial. Additionally, with improved water optimization at part power comes improved fuel efficiency seen through improved heat rate of the gas turbine. All this leads to improved operating costs for the power producer and lower greenhouse gas emissions and water usage.[2]

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[1] http://www.gepower.com/prod_serv/product

http://www.gepower.com/prod_serv/products/gas_turbines_cc/en/downloads/GEH12985H.pdf

[2] APPLICATION OF THE LATEST AERODERIVATIVE GAS TURBINE TECHNOLOGY Authors: Edward Wacekt, Warren Ferguson, *General Electric* http://www.iagtcommittee.com/symposium_2009/papers/203%20paper%20final.pdf Page 2

Air Quality

FDOC Updates

Staff's Assessment concludes that the project meets BACT with an emission rate of 3.0 pounds per hour. The FDOC in response to comments from the public limits the projects PM-2.5 emissions to 2.5 pounds per hour and an annual average of 2.2 pounds per hour.[3]

Staff's Assessment limits maximum allowable annual PM 2.5 emissions to 21.1 tons per year but the FDOC further limits PM 2.5 emission to 18.6 tons per year.[4] Staff should further limit the project's hourly PM 2.5 emission rate to a maximum 2.2 pounds per hour since this level has been achieved in practice.[5]

Staff's Assessment states that, "*MEP indicates that it would agree to a condition of certification specifying that no more than three combustion turbines would operate simultaneously in commissioning and that the fire water pump engine would not be tested while commissioning any turbine (AFC Table 5.1-25, MEP 2009a; Response to DR5, CH2M 2010b). Staff finds that the air quality impact of NO2 during commissioning of three combustion turbines would approach the California ambient air quality standard. To be protective of the NO2 standard, staff recommends that no more than two of the four CTGs undergo commissioning simultaneously. The prohibition of simultaneous commissioning is in* ***AQ-SC9***" The FDOC limits the commissioning of the MEP turbines to one at a time to avoid violations of the Federal One Hour NO2 standard.[6] Condition AQ-SC9 needs to be revised.

Mitigation Proposal

The majority of the projects emissions impact the San Joaquin Valley. The San Joaquin Valley is a much dirtier airshed than the BAAQMD partly due to the emissions from BAAQMD sources. Here in the Valley we have much stricter standards and Valley

[3] FDOC Page 19
[4] FDOC Page 26
[5] FDOC Page 56
[6] FDOC Page 66

residents are facing millions of dollars in extra vehicle registration fees and other taxes as penalties for not achieving clean air standards.[7]

The SA approach to mitigating the projects emissions in SJV is technically flawed. The SA provides no scientific basis to conclude that the projects impacts are mitigated to less than significant level under CEQA. The SA relies on a combination of the ERC's surrendered and an ill defined mitigation agreement between the SJVAPCD and the Applicant. There is no way to quantify the emission reductions that will be achieved from the mitigation agreement that has been executed between the applicant and the SJVAPCD. The staffs approach to analyzing the projects impacts on an expected 1,400 hours of operation does not comply with CEQA requirements or any air quality laws relevant to the project.

NO2 Standards

Staff's assessment properly determines that the project will violate the California 1 hour NO2 standard and the new Federal 1- hour NO2 standard which is applicable to the project.

PM 2.5 Mitagtion

We agree with staff's conclusions, "*that particulate matter emissions from routine operation would cause a significant impact because they will contribute to existing violations of PM10 and PM2.5 ambient air quality standards. Significant secondary impacts would also occur for PM10, PM2.5, and ozone because operational emissions of particulate matter precursors including SOx) and ozone precursors (NOx and VOC) would contribute to existing violations of these standards.*" We also agree with staff that, "*Mitigation should be provided for emissions of PM10, PM2.5, SOx, NOx, and VOC to reduce PM10, PM2.5, and ozone impacts".* We believe that staff's mitigation proposal falls short of its intended goals of mitigating all of the criteria and precursor emissions.

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[7] http://valleyair.org/recent_news/News_Clippings/2010/In%20the%20News%2008-26-10.pdf

This is partly based on staff's weighting of the ERC's provided by the applicant. We recommend that staff revise its analysis to more closely match the scientific method that was utilized in the Tesla and EAEC siting cases which has been previously accepted by the Commission and peer reviewed. Staffs current analysis lacks any scientific basis and is predicated on an incorrect interpretation of the SJVAPCD rules and regulations. Staff's mitigation proposal fails because it only proposes to mitigate a proposed operating scenario of 1,400 hours which is contrary to CEQA and all relevant air quality laws.

Ammonia Emissions

The Staff's Assessment properly recognizes that the ammonia emissions are a significant impact due to secondary particulate formation but fails to quantify or provide mitigation for this significant impact. This is due to the errant conclusion that the project area is ammonia rich.

Commissioning Emissions

Staff's Assessment states that, "MEP indicates that it would agree to a condition of certification specifying that no more than three combustion turbines would operate simultaneously in commissioning and that the fire water pump engine would not be tested while commissioning any turbine (AFC Table 5.1-25, MEP 2009a; Response to DR5, CH2M 2010b). Staff finds that the air quality impact of NO2 during commissioning of three combustion turbines would approach the California ambient air quality standard. To be protective of the NO2 standard, staff recommends that no more than two of the four CTGs undergo commissioning simultaneously. The prohibition of simultaneous commissioning is in **AQ-SC9**" The FDOC further limits the commissioning of the MEP turbines to one at a time to avoid violations of the Federal One Hour NO2 standard. Condition AQ-SC9 needs to be revised.

Innovation in Turbine Inlet Conditioning

Many GE Aeroderivative gas turbines are frequently needed to perform on the hottest days to provide peak power. Unfortunately, as the inlet air temperature to a turbine goes up, the power it can generate goes down. This has driven the need for inlet-chilling systems. Traditionally, there have only been two options available to customers: evaporative or mechanical coolers. In response to customers seeking more power with less variations due to ambient effects, GE Energy has teamed with Energy Concepts, Nooter/Eriksen and The Industrial Company (TIC) to design, build and supply an inlet air chilling unit that utilizes an ammonia-based absorption refrigeration cycle which recovers the exhaust heat from a gas turbine as the heat source. In place of a mechanical chilling system, the ARCTIC unit enables the gas turbine to provide up to 5 percent more power on hot days, no requirement for 4,160V power or switchgear, improved heat rate and less maintenance requirements. The preengineered skid allows for less site civil work and improves system interconnection compared to existing systems today. The use of an absorption system minimizes the impact of parasitic loads at hotter ambient temperatures. The use of inlet chilling on aeroderivative gas turbines provides a substantial improvement to a turbine's power output and efficiency. An innovative solution has been developed by a partnership to equip GE's aeroderivative gas turbines with a more efficient and factory packaged inlet chilling alternative. The new system provides more hot-day power than other chilling systems available on the market today. The first commercial unit has been shipped to site with commissioning to occur in the third quarter of 2009, where it will be operating on an LM6000 PC Sprint unit serving the Electric Reliability Council of Texas (ERCOT) market. The system description, customer benefits and market potential are discussed below.

Technology Alternatives

Turbine inlet chilling today is comprised of two primary technologies: mechanical chilling and evaporative cooling. Mechanical chilling uses mechanical compression to reduce the inlet air temperature to optimize the gas turbine's output. It does so, however, at the cost of high parasitic loads, which reduce the net gains achieved by chilling the inlet air. Evaporative cooling sprays water into the turbine inlet air stream where it evaporates, cooling the air. Evaporative cooling is not always as effective at increasing power output as mechanical chilling, but the capital costs associated with it are less than the costs of mechanical chilling, as are the parasitic loads. The LM6000 has been among the most widely accepted aeroderivative gas turbine to serve the power generation segment since its commercial debut in 1992. The diversity and depth of the market experience gained has shown several key performance criteria sought by customers: Consistent net output, low parasitic load for a lower heat rate, 10-minute fast start and high reliability and low maintenance requirement. Neither traditional mechanical or evaporative cooling systems can support all of these needs, which established the design parameters for the new Absorption Refrigeration Cycle Turbine Inlet Chilling, or ARCTIC, system. This new system has the ability to provide more power on the hottest temperature days, which enables an even better heat rate than all other alternatives. There are some key economic advantages ARCTIC provides customers, notably: more power and fewer support systems. The use of absorption chilling reduces the parasitic loads associated with mechanical chiller compressors, pumps and motors. In applications where selective catalytic reduction is needed for emissions abatement, the reduced temperature of the exhaust can also eliminate the need for tempering air fans.

The system can also produce chilled air during unit startup so that more power can be produced faster than existing mechanical systems. Also, the ARCTIC system does not require 4,160 volt transformer, switchgear and cabling, thus reducing the total number of systems to interconnect. These benefits have all been enabled in a system that can be packaged in a factory for faster site installation, improving the efficiency of the overall plant.

Arctic System

The employment of an ammonia-water refrigeration cycle has been used for many smaller applications over the past 100 years and its favorable properties have caused it to become the industrial refrigerant of choice. The ARCTIC system is comprised of five simple core components: turbine inlet air coil, heat recovery vapor generator, evaporative condenser, absorber cooler and ARCTIC skid. The turbine inlet air coil (TIAC) is placed in the same position within the air filter house as today’s mechanical chilling coils. The thermal energy of the gas turbine is extracted from the exhaust by the heat recovery vapor generator (HRVG) tubes. These tubes carry the high-pressure ammonia into the exhaust stream where it is heated to create the working temperature gradient needed for the ammonia water separation. The working fluid is then passed through the skid-mounted Rectifier where the separation of the ammonia water solution occurs. The ammonia is then passed through a condenser to convert the fluid back into a liquid stage before going through the TIAC. The vapor is then blended with the water-ammonia mixture loop in the absorber cooler. The process is complete when the mixture is then pressurized and passed back through the rectifier in a closed capacity before reentering the HRVG. The elegance of the ARCTIC system is the ability to provide all of these systems in a skid-mounted design that facilitates plant flexibility along with unit operability. This simplified summary of components underscores the robust engineering analysis performed on this refrigeration cycle. The system has been evaluated for its structural impact to the air filter, the airflow distribution to ensure adequate cooling and thorough reviews of the manufacturing and controls aspects as well. All applicable design practices by GE have been incorporated to the motors, controls, hazardous protection and detection systems, which the entire team has incorporated. In full, there have been over 100 drawings created and hundreds of engineering hours spent to ensure the ARCTIC system is reliable and capable of meeting or exceeding design targets.[8]

Greenhouse Gas Emissions

Staff's assessment of the projects compliance with greenhouse gas emissions fails because staff analysis concludes that the project will comply with the precedent set in the Avenal Decision and other state and federal regulations related to greenhouse gas emissions. The project based on staffs own analysis and a proper application of Commissions, State and Federal Law clearly demonstrate the projects failure to meet these standards.

Staff's Assessment does not quantify the life cycle emissions of greenhouse gases from the extraction, transportation, and usage of the natural gas for the project. Due to

[8] http://www.powergenworldwide.com/index/display/articledisplay/5563823368/articles/power-engineering/volume-114/issue-10/features/innovation-in-turbine-inlet-conditioning.html

the methane leakage from throughout the natural gas infrastructure (from extraction to pipelines to end uses), natural gas emissions are as bad or far worse than coal over a 20 year time. CEQA requires a complete assessment of the projects impact on the environment and that includes the life cycle emission of natural gas.

There are variations of the LM-6000 turbines other then the LM 6000-PC which result in substantial reductions in greenhouse gas emissions. **GE's** latest enhancement of its proven LM6000 aeroderivative gas turbine product line is the LM6000 PG with single annular combustor (SAC) and its dry low emissions (DLE) equivalent, the LM6000 PH. Both turbines offer a 25% simple cycle power increase.[9] This translates into a large reduction in Greenhouse gas emissions using a slight variation of the proposed LM-6000.

The LM 6000-PF has a superior heat rate and "avoids 15,000 metric tons of CO_2 emissions over the course of a 3,000-hour peaking season while producing the same electricity output, which is equivalent to the annual CO_2 emissions of more than 2,800 cars on U.S. roads.[10]

Incorporating the DLE system of the LM-6000-PF, Lm6000PH or the LM-6000 PD further reduces CO_2 emissions by eliminating two thirds of the water the facility uses for NOx control thus lowering the CO_2 emissions from the transportation, treatment and disposal of the ZLD waste.

Best Available Control Technology For Startup and Shutdown Conditions for Turbines

The LM6000 standard 10 minutes start time can be improved to just 5 minutes. "By properly maintaining the package purge requirements, and by keeping the lube oil 'warm', approximately 2 minutes can be removed from the 10-min start sequence. Then the gas turbine acceleration rate to full load can be increased from 12MW/min to 50MW/min, reducing the time from sync idle to full load from 4 minutes down to

[9] http://www.gepower.com/about/press/en/2008_press/060408b.htm

[10]http://www.gepower.com/prod_serv/product
http://www.gepower.com/prod_serv/products/gas_turbines_cc/en/downloads/GEH12985H.pdf

approximately 1 minute. This reduced start time greatly enhances the LM6000's ability to get online quickly to support a reduction in load from the wind farm due to sudden changes in wind conditions"[11] and also greatly reduces start up and shut down emissions for all pollutants. Since one of the projects objectives is to support intermittent generation from the windfarm at the Altamont Pass the fast start technology should be employed.

Worker Safety and Fire Protection

Staff's analysis concludes that the Fire support services to the site would be under the jurisdiction of the Alameda County Fire Department (ACFD). Staff's Assessment predicts the response time to the facility would be approximately 30 minutes form station 8 in Livermore. Obviously in a true medical emergency[12] or fire a 30 minute response time will be inadequate. In the event of a medical response or fire response Tracy Rural Fire would be the first responder. Tracy Rural Fire faces an enormous deficit and the citizens of Tracy recently had to pass a ½ cent sales tax measure in November to support fire services or face reduced fire protection and medical response. The applicant must provide mitigation to the Tracy Fire Department because the Tracy Fire department will be the first responder despite the project being in Alameda County's jurisdiction. We propose a condition of certification which provides mitigation to the Tracy Fire Department who are understaffed and in a difficult budget situation. Otherwise the burden of fire response and EMS services is financed by the citizens of Tracy.

Land Use

We completely disagree with Staff's Assessment of the projects compatibility with the ECAP and with the provisions of the Williamson Act. A plain reading of the ECAP demonstrates the incompatibility of the project with the East County Area Plan. The

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11 APPLICATION OF THE LATEST AERODERIVATIVE GAS TURBINE TECHNOLOGY Authors: Edward Wacekt, Warren Ferguson, *General Electric* http://www.iagtcommittee.com/symposium_2009/papers/203%20paper%20final.pdf Page 7

12 "The need for prompt response within a few minutes is well documented in the medical literature." Staff Assessment Page 4.14-11

MEP violates over 20 policies from the ECAP. The project is not consistent with the Williamson Act.