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June 28, 2013

Via E-Mail and Hand Delivery

California Energy Commission
1516 Ninth Street
Sacramento, CA 95814

<p>California Energy Commission DOCKETED 00-AFC-14C</p>
<p>TN 71457 JUN 28 2013</p>

Re: El Segundo Power Plant Project (00-AFC-14C)
Applicant's Letter dated June 27, 2013
to South Coast Air Quality Management District

Dear Sir/Madam:

On behalf of El Segundo Power Plant Project, enclosed please find for docketing Applicant's letter dated June 27, 2013, to South Coast Air Quality Management District.

Please don't hesitate to contact me if you have any questions regarding this filing.

Very truly yours,

John A. McKinsey

JAM:dh
Enclosure

June 27, 2013



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research**

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Kenneth L. Coats
AQ Engineer II
South Coast Air Quality Management District
21865 E. Copley Drive
Diamond Bar, CA 91765

Subject: El Segundo Power Facility Modification Project – SCAQMD Permit Application

Dear Mr. Coats:

On behalf of El Segundo Power, Sierra Research is providing the following supplemental analysis demonstrating that the Trent turbines proposed for the El Segundo Power Facility Modification Project qualify for exemption under Rule 1304(a)(2).

Background

Rule 1304(a)(2) states:

Rule 1304 (a) Modeling and Offset Exemptions

Upon approval by the Executive Officer or designee, an exemption from the modeling requirement of Rule 1303 (b)(1) and the offset requirement of Rule 1303(b)(2) shall be allowed, for the following sources.

...

(2) Electric Utility Steam Boiler Replacement

The source is replacement of electric utility steam boiler(s) with combined cycle gas turbine(s), intercooled, chemically-recuperated gas turbines, other advanced gas turbine(s); solar, geothermal, or wind energy or other equipment, to the extent that such equipment will allow compliance with Rule 1135 or Regulation XX rules. The new equipment must have a maximum electrical power rating (in megawatts) that does not allow basinwide electricity generating capacity on a per-utility basis to increase. If there is an increase in basin-wide capacity, only the increased capacity must be offset.

Eligibility for Exemption

Advanced Design – The policy purpose of the technology requirement of Regulation 1304(a)(2) is to restrict the availability of this exemption to projects that utilize equipment with high efficiency and low emissions on a mass per megawatt-hour basis.

The Rule explicitly identifies several gas turbine technologies (combined cycle turbines, intercooled gas turbines, chemically recuperated gas turbines) as being sufficiently efficient to qualify. Recognizing that other technologies might provide equivalent performance, the Rule allows “other advanced gas turbines” to qualify as well.

The District has already accepted another advanced design gas turbine—the intercooled (but not chemically recuperated) LMS100—as qualifying for the exemption¹, and it is our understanding that the District has rejected the LM6000 PC SPRINT as not qualifying. The Trent turbine’s performance lies between these two, closer to the LMS100 than the LM6000.

Similar to the District’s determination for the LMS100, we believe the Trent 60 qualifies for the exemption on two separate bases: it is an intercooled turbine, and it is an advanced gas turbine.

The Trent turbines are advanced gas turbines, using an Inlet Spray Intercooling system to reduce ambient inlet temperature and decrease the energy required for compression. The fact that the Trent 60 ISI proposed for use by El Segundo Power is intercooled is demonstrated in the vendor literature enclosed, at page 4. Thus, the Trent 60 units proposed for use by El Segundo Power are intercooled turbines eligible for the exemption provided by Rule 1304(a)(2).

With respect to the second criterion, the rule does not define “advanced gas turbine,” nor does it specify the required efficiency to qualify as “advanced.” One way of setting a benchmark, however, is to consider the efficiency of one of the explicitly mentioned acceptable technologies (i.e., combined cycle turbines), and accepting technologies with equivalent efficiency.

On January 25, 2007, the Public Utilities Commission adopted an interim Greenhouse Gas Emissions Performance Standard for baseload generation. The Performance Standard, which was based on typical combined cycle natural gas facilities operating in the Western Energy Coordinating Council (WECC) system, was set at 1,100 lb CO₂/MWh. As shown in the Application to the District in Appendix D, Table D-3, the CO₂ emission rate for the Trent 60 is 0.472 metric tons/MWh, or 1041 lb CO₂/MWh. Thus, even though the EPS is not applicable to these units, they would nonetheless comply, because they have CO₂ emission rates comparable to combined cycle units.

The advanced design of the Trent gas turbine allows it to operate more efficiently than some combined cycle systems that would qualify for exemption under 1304(a)(2). If the efficiency benchmark for advanced design simple cycle units is set at the level that would have been acceptable for combined cycle turbines at the time of the Rule’s last

¹ As shown in the 3/11/2011 Revised Final Determination of Compliance for the Walnut Creek Energy Center, the District treats intercooling and chemical recuperation as independent technologies for the purpose of this exemption: “Electric Utility Steam Boiler Replacement states that if the electric utility boilers are replaced by the combined cycle gas turbines, intercooled, or other advanced gas turbines the project will be exempt from emission offsets unless there is a basin-wide electricity generation capacity increase on a per utility basis. If there is an increase in basin-wide capacity, only the increased capacity must be offset. ***The GE LMS100 gas turbine is an intercooled gas turbine and is also considered as an advanced gas turbine.*** Replacing the utility boiler generator with an intercooled/advanced gas turbine is allowed by Rule 1304(a)(2).” Emphasis added. Revised FDOC at p. 31.

amendment, then the Trent simple cycle units proposed for use by El Segundo Power should likewise qualify.

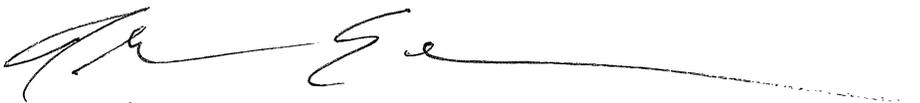
Rule 1135 as Benchmark – Rule 1135 contains a definition of “Approved Alternative or Advanced Combustion Resource.” The adoption of Rule 1135 was contemporary with the final amendment of Rule 1304. There is also a definition of “Advanced Combustion Resource” that uses language similar to that contained in Rule 1304. Although the definitions and limits of Rule 1135 are not applicable to Rule 1304, it is reasonable to look to Rule 1135 for an interpretation of the phrase “advanced gas turbines.”² Rule 1135(b)(3)(A) sets a NOx emission limit of 0.10 lbs/MWh_{net} on a daily average basis (excluding emissions during startups and shutdowns, per 1135(d)(1)(C)) for *approved* alternative or advanced combustion resources.

As shown in the Application to the District in Appendix B, Table B-17, the Trent turbines would meet the emission rate in Rule 1135 under all normal operating conditions³, excluding startup and shutdown, and would therefore be considered “approved alternative or advanced combustion resources” for the purposes of that rule. If the criterion in Rule 1135 were selected as a benchmark for Rule 1304, the Trents would qualify. However, as noted above, we do not believe the definitions and criteria for “approved alternative or advanced combustion resources” contained in Rule 1135 are applicable to the exemption in Rule 1304(a)(2).

Summary and Conclusion

The information submitted to the District in the Application for the project, summarized again here, clearly demonstrate that the Trent 60 ISI units proposed by El Segundo Power qualify for the exemption under Rule 1304(a)(2) both as intercooled gas turbines and advanced gas turbines.

Sincerely,



Tom Andrews
Principal Engineer

Attachment

cc: Craig Hoffman, CEC Project Manager
George Piantka, NRG
Ken Riesz, NRG
Steve Odabashian, NRG

² It is worth noting that the language of Rule 1135 makes it clear that, at least for the purposes of Rule 1135, “advanced combustion resources” includes sources with NOx emissions that are above the threshold for approved advanced combustion resources. Rule 1304(a)(2) does not limit the applicability of the exemption to “approved advanced combustion resources” as that term is defined in Rule 1135.

³ NOx emissions from each Trent 60 are not more than 4.8 lbs/hr / 55 MW (net) = 0.083 lbs/MWh



Rolls-Royce

The Trent 60

For power generation and mechanical drive



Trent 60 gas turbine

The most advanced aero-derivative gas turbine

The Trent utilizes the best in Rolls-Royce aerospace technology to create the most powerful, pure aero-derived gas turbine on the market today. Designed for industrial use in both power generation and mechanical drive applications, the Trent 60 has established a new benchmark for power output, fuel economy and cost savings.

In addition to the unmatched power and efficiency of the Trent 60, customers also experience the benefits of its flexible operation making it suitable for a variety of applications. Fast delivery and installation of equipment also provides a quicker return on investment for Trent 60 customers.



Power generation and mechanical drive

Flexible operation for a variety of applications

Power Generation

One of the most efficient gas turbines on the market, the Trent 60 provides up to 64MW in simple cycle service at 42 percent efficiency. Its cold start capability and high cyclic life allow it to add power to the grid very rapidly to compensate for the fluctuations and variability of renewable and other power sources, making it ideal for peaking markets.

Key Features for Power Generation

- Meets stringent 25ppm NOx requirements
- Power generation at 50 or 60 Hz without a gear box
- Full load train starting with a 205kW motor
- Electric start motor: 155kW and 215kW peak
- High cyclic life meets daily peaking market
- Cold start to full power in under 10 minutes
- Designed for ease of installation and maintenance

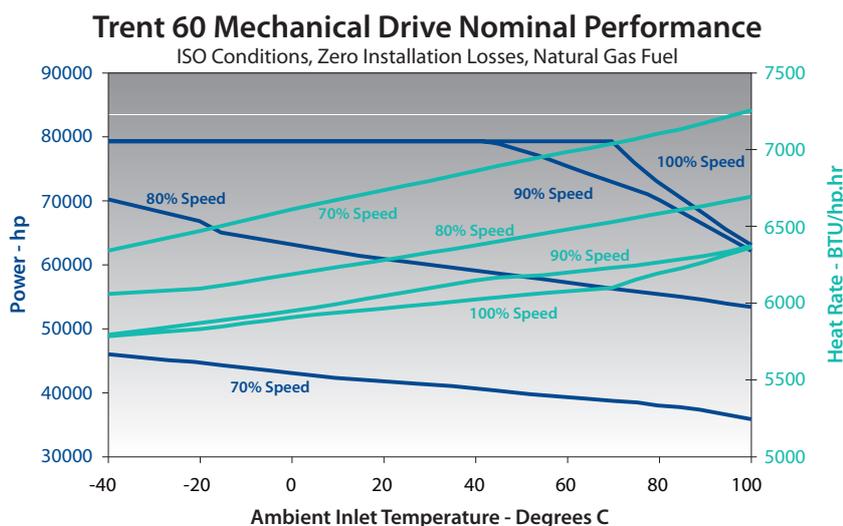
Mechanical Drive

The Trent 60 is ideally suited to meet the higher power, variable speed demands required by applications like natural gas liquefaction, gas transportation, and gas induction for oil recovery.

Due to its three independent shaft design, the Trent 60 is capable of meeting driven equipment power demand at reduced speeds with minimal drop off in efficiency.

Key Features for Mechanical Drive

- Designed for 100 percent speed of 3,400 rpm
- Can directly connect to driven equipment or use a gear box
- Controls system supports a variety of driven equipment
- Speed range of 70 to 105 percent
- Low starting power requirements for large trains
- Multiple daily starts with no extended wait time



Trent 60 performance data

For power generation applications

Trent 60 – Dry Low Emissions (DLE)

The Trent 60 DLE engine is designed to meet stringent environmental requirements. The use of eight radial staged combustors allows the successful operation of the engine in part load operation while still maintaining NOx and CO compliance. The engine is designed to produce 52MW of power at ISO conditions and is flat rated at 58MW power at temperatures below approximately 2° C.

Trent 60 – Wet Low Emissions (WLE)

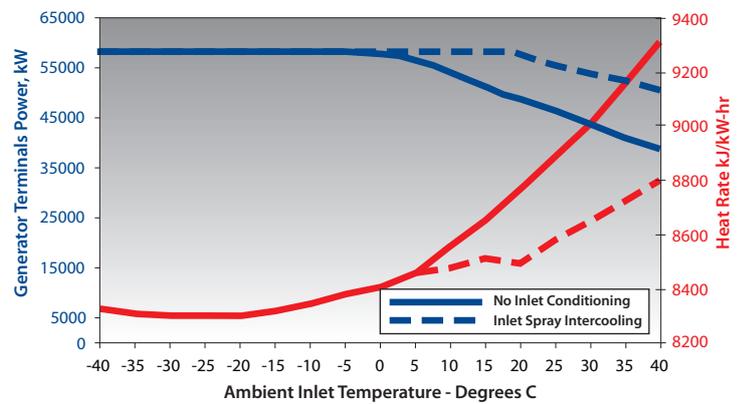
The Trent 60 WLE uses an annular combustor system from the Trent aero engine but modified to operate with liquid and gas fuel. The injection of water is used to reduce emissions and boost performance. At ISO conditions the engine is rated for 64MW.

Inlet Spray Intercooling

The Trent 60 can be offered with an Inlet Spray Intercooling (ISI) system to reduce the ambient inlet temperature and decrease the energy required for compression. This results in higher power and efficiency at ambients above 7° C.

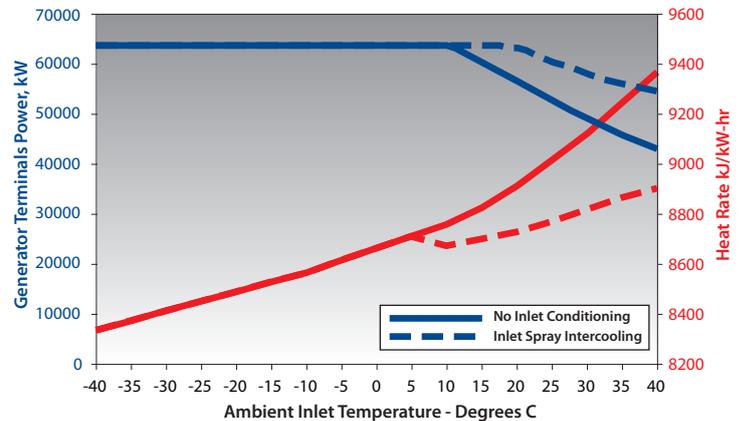
Trent 60 DLE Nominal Performance

ISO Conditions, Zero Installation Losses, Natural Gas Fuel



Trent 60 WLE (Water Injected) Nominal Performance

ISO Conditions, Zero Installation Losses, Natural Gas Fuel



The Trent 60 package

Modular for ease of installation and maintenance

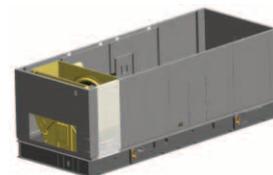
The Trent 60 package is designed with a modular concept to allow for quick installation and ease of maintenance in the field.

Each of the modules is fully assembled and tested before shipment. The gas turbine base plate holds the required oil system to allow installation, testing and flushing in a shop environment. This greatly reduces site installation time.

The control system is designed to allow for easy site installation by using remote I/O technology to decrease the number of interconnect cables between the unit control panel and the equipment skids. All train control systems are then accessed by a Human Machine Interface (HMI) which can be located in the main control room.

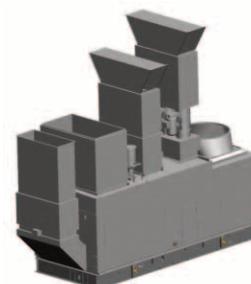
Step One

Install the main gas turbine skid baseplate. This includes all required engine lubrication and fuel systems as well as the remote I/O module.



Step Two

Install the gas turbine enclosure roof, ventilation system, and exhaust transition.



Step Three

Install air filter and support structure.



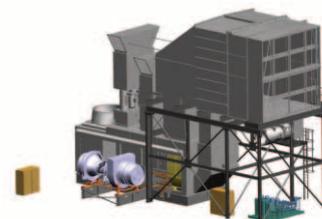
Step Four

Install auxiliary equipment skids.



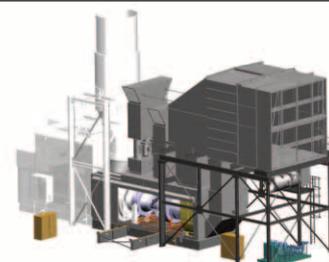
Step Five

Install Trent 60 gas turbine.



Step Six

Install driven equipment. This can be done concurrently with the other steps.

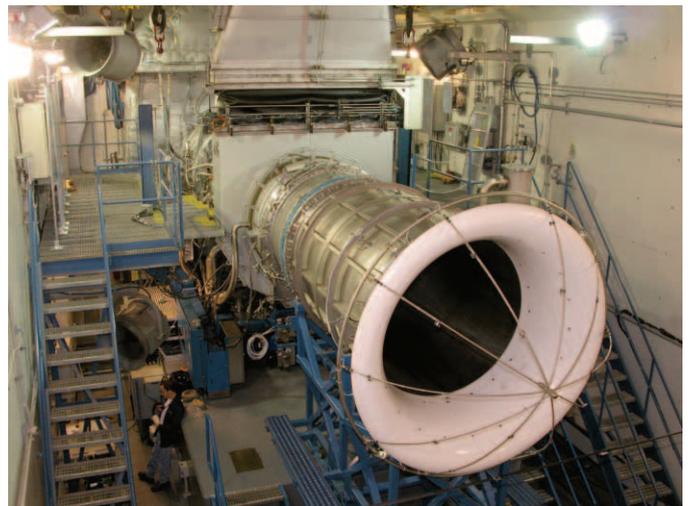


Trent 60 maintenance

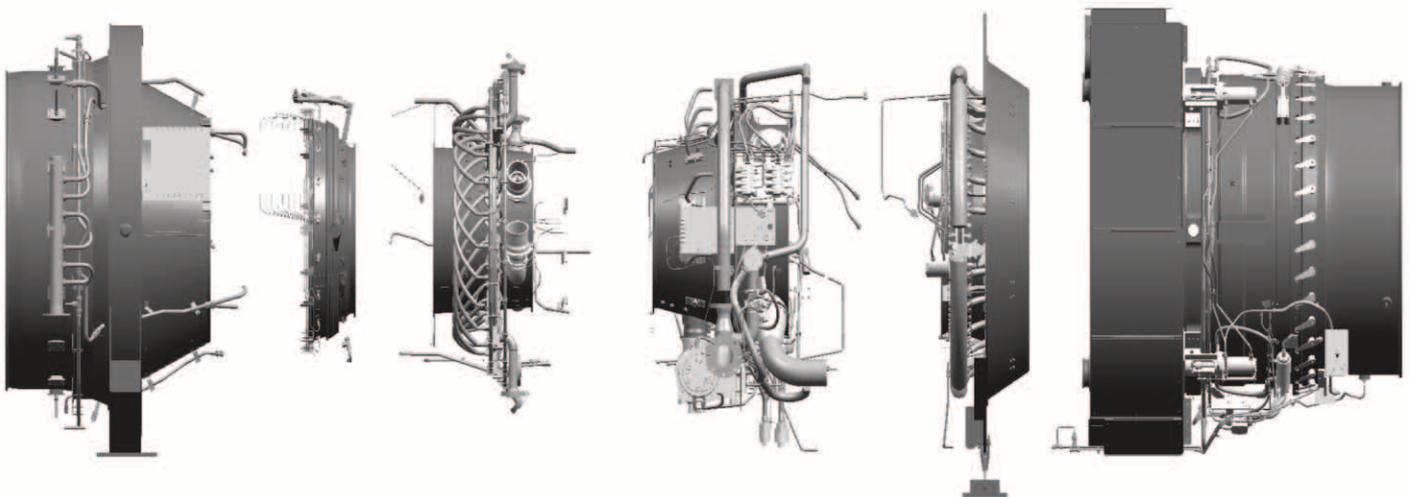
Quick and easy maintenance

Due to the Trent's aero engine lineage, maintenance of the engine can be accomplished quickly and easily. The Trent package is designed to facilitate engine change out in under 24 hours of working time. Complete engine servicing can take place in a Rolls-Royce facility.

Rolls-Royce can also offer access to a lease engine or module program. The modular design of the Trent engine can allow for rapid exchange of components, while detailed work is carried out at a major overhaul facility. This can greatly reduce the turn time for engine maintenance at overhaul. Rolls-Royce can also offer access to a lease engine to support customer operations during maintenance.



The Trent 60 engine on a test bed in Montreal, Canada



Comprehensive customer service

Experience holds the key to success

In today's evolving and demanding energy market, Trent gas turbine packages offer distinct advantages to the power generation and oil and gas industries. This competitive advantage is complemented by an innovative and diverse suite of service solutions tailored to customers' specific needs.

Our ability to keep customers operational is a direct result of our focus to develop customized service solutions for their business. Our TotalCare® service solutions create partnerships designed to share risk and help control operators' maintenance budgets while maximizing production.

This is accomplished through aligned metrics, priority service and support, and performance and availability guarantees. Utilizing Equipment Health Management (EHM), we can also diligently monitor equipment performance, avoid or minimize unscheduled maintenance, and increase the time between overhauls to consistently maximize its life cycle operational efficiency.

- Installation & commissioning services
- Spare parts
- Field services
- Technical support
- Customer training
- Repair and overhaul
- Lease and spare engines
- Long term service agreements
- Equipment upgrades
- Package refurbishments



UK power plant utilizes the efficiency and flexibility of the Trent 60

Other service options include on-site resident engineers, lease and exchange engine support, spare parts inventory management, and protection against unscheduled maintenance costs.

As equipment continues to operate over time, we are also constantly offering upgrades as part of our suite of Engineered Solutions. These provide the latest technology to maximize output, efficiency, reliability and minimize maintenance, operational costs and emissions.





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