



March 31, 2010

Madhav Patil
Bay Area Quality Management District
939 Ellis Street
San Francisco, CA 94109

Subject: Availability of Gas Turbine Technology for Low Level Emissions

Dear Madhav:

The following information is being transmitted to Bay Area Quality Management District (BAAQMD) in response to your recent investigation surrounding availability of current gas turbine technology, which can operate between ~25 MW and ~50 MW, and has the ability to satisfy certain low level of emission requirements. Specifically, the pollutants and associated target low level emissions we discussed were, namely:

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|---------|------------------|
| 1) NOx | 2.5 ppm (1 hour) |
| 2) CO | 2.0 ppm (3 hour) |
| 3) VOC | 2.0 ppm (1 hour) |
| 4) PM10 | 2.5 lb/hr |

Although Siemens does not currently have gas turbine configured in simple-cycle plant operating at these levels; if someone requested Siemens to offer such; we would be prepared to provide one, as well as, would guarantee the specified low emission targets mentioned above. To accomplish this, Siemens would need to add NOx and CO catalyst. Furthermore, Siemens' approach would probably use air dilution fans to keep the temperature in front of the catalyst under control for optimal performance.

As for current pragmatic example; for El Centro, Siemens is guaranteeing the following:

NOx emissions (NO ppmv + NO2 ppmv) (gas turbine load 50-100 %, gaseous fuel operation)	£ 2 ppmv at 15 Vol.% O2 Dry gas
CO emissions (gas turbine load 50-100 %, gaseous fuel operation)	£ 2 ppmv at 15 Vol.% O2 Dry gas
NMVOC emissions (evaluated as CH4) (gas turbine load 50-100 %, gaseous fuel operation)	£ 1.5 ppmv at 15 Vol.% O2 Dry gas
NH3-slip (gas turbine load 50-100 %, gaseous fuel operation)	£ 5 ppmv at 15 Vol.% O2 Dry gas
PM10 (gas turbine load 50-100 %, gaseous fuel operation)	£ 2.5 lb/hr per HRSG

The above example was based on a combined cycle configuration; however, even simple cycle configuration with SCR would be sufficient to satisfy the subject target emissions you specified. Also, one item that needs to be highlighted is the very possible need to be allowed to deduct airborne impurities, as VOC and PM10 may be elevated above normal background levels in and around the subject area of location being analyzed.

I hope that helps clarify. Please let me know if you need anything else on this subject.

Best regards,

Benjamin R Beaver

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