



GE Energy
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Subject: Impact of Changing Fuel Gas Wobbe Number on GE Gas Turbine Operation


Dear Lee:

The following information is provided in response to your telephone request to me of December 14, 2005 regarding LNG being introduced into the natural gas supply to gas turbine power plants and resulting varying wobbe values.

To properly assess the impact of a change in wobbe index for the fuel at any specific site, we would require additional information and clarification with respect to the MWI limits under consideration. Our comments below are, therefore, general in nature and indicative of several, but not all, applicable GE specifications that would be relevant to any detailed study and subsequent equipment modification recommendations made for a specific gas turbine.

GE's fuel gas specification, GEI 41040i - Specification for Fuel Gases for Combustion in Heavy-Duty Gas Turbines, discusses limits for fuel gases for combustion in heavy-duty gas turbines. Additionally, we would recommend GER 3620K, Heavy-Duty Gas Turbine Operating and Maintenance Considerations, be followed with respect to gas turbine operational matters. Tuning of the combustion system is a recommended practice to achieve desired gas turbine operation, as specifically noted in GER3620K. Tuning or re-tuning may be required at any point along the entire modified wobbe range, as defined in GEI 41040i. Copies of these documents are being forwarded by mail.

As noted above, the wobbe number is believed to directly affect the gas turbine and combustor operation, and therefore, any change to it may have an affect on the operability of the gas turbine. We believe that any amount of change in wobbe number may result in the owner seeking (or themselves) conducting re-tuning of the gas turbine. Some of the areas that may be affected are, but are not limited to, dynamics, emissions, and performance. Tuning of the gas turbine is recommended, as specifically noted in GER3620K, to maintain an operating standard that accounts for both performance, as well as maintenance requirements. The design of GE's Dry Low NOx Combustion System incorporates tuning functionality for this purpose.

Historically, US pipeline natural gas has been typically consistent in constituents and composition. With the use of LNG mixed with natural gas, this compositional consistency may or will be altered. Based on this, GE is developing technology to provide steady state operation for fuels with a wide wobbe range. Although early in the development process,  are

targeting availability for early 2007. This estimated price does not include any combustion system hardware changes or any fuel heating systems that may be required as a result of fuel wobbe changes associated with the introduction of LNG in the natural gas fuel supply. Due to differences in gas turbine configurations, even within a common model series, e.g., the Fr7FA, a detailed site and unit specific assessment study would be needed to confirm exact technical scope requirements and corresponding price.

I trust that this information will address your concerns, but as always we are prepared to address any additional questions you may have.

Sincerely Yours,



William H. Jayne
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