Notes on an Expert workshop on
"Burning of natural gas/hydrogen mixtures in DLE gas turbines"
12 October 2011

Attendees

Dr K Altfeld E.ON Ruhrgas AG)
Dr A Eroglu, Alstom)
Prof. Dr. M Aigner, Institut für Verbrennungstechnik)
Mr D Teichroeb, Enbridge, Canada)
Dr P Nitschke-Kowsky, E.ON Ruhrgas AG)
Mr D Potter, E.ON Generation
Ms B Parrag, European Turbine Network
Mr A Dijks, KEMA
Ms D Niu, DVGW
Dr U Orth, MAN Diesel & Turbo
Mr H de Laat, Kiwa
Mr G Bauduin, GE Inrastructuure
Dr J Larfeldt, Siemens
Dr C Brunhuber, Siemens
Mr M Zelinger, EUTurbines
Mr F Böger, EUTurbines
Mr D Pinchbeck, GERG
Mr F Linder, E.ON Innovation Centre Gas

The Meeting

The meeting began with short introductions to their organisations from the Secretaries of GERG and EUTurbines, Mr Pinchbeck and Mr Zelinger, respectively.

Dr Altfeld introduced the natural gas system and the potential for inter-linkage with the electricity grid. He went on to explain the significant advantages that could be gained by using the gas grid as a storage option at times of over-production of renewable electricity and the effect this could have on load balancing.

Dr Eroglu explained that currently 1 to 5% H_2 is feasible in gas turbines, but there are growing requests to increase H_2 content up to 20% or higher. There were potential problems associated with higher levels of H_2, such as higher NOx emissions and a flashback risk. He stressed that additional development would be needed on combustion hardware as well as for fuel and control systems. In addition clear information from gas companies was vital with regard to intended H_2 levels, the possible fluctuation range of H_2 concentrations and the rate at which these would change.

Prof. Aigner reinforced Dr Eroglu's concerns, but appeared quite confident that with additional research, adapted gas turbines could deal with higher amounts of H_2. He stressed that there is a need for more research and demonstration of combustion technologies adopted for H_2.

Mr Teichroeb's presentation on activities in N America was very relevant, particularly the potential for large scale electrolysis and H_2 storage. There was some interest in collaborating in the next stage R&D activities.

Dr. Nitschke-Kowsky presented results of some theoretical considerations regarding the addition of H_2 to natural gas and experimental results on fully premixed household burners. Despite a range of anticipated problems, it was clear that, for admixtures up to 10% H_2, the effects were negligible both from a theoretical standpoint and in practice.

After some considerable discussion it was agreed that turbines would probably be able, with modification, to operate successfully[1] with >5% H_2, but there was work to be done.

It was agreed that there could be scope for setting up a collaborative project to address the related issues.

[1] Post-meeting it was confirmed that "Siemens industrial gas turbines, i.e. the smaller range up to nearly 50 MW, with DLE combustion systems can operate on gas with up to 10% H_2 already today".