Network Innovation Competition Full Submission

Supplementary Answer Form

Tick if this answer is Confidential: ☒

Tick if this answer has been provided verbally: ☐

Project code:	NGGTGN01	Question Number	1
Question date	15 August 2013	Answer date	19 August 2013
Submission section question relates to	1.3		
Topic	Project Summary		
Question	Statistically how many compressors operate outside their envelope and on what frequency currently and how will this change in years 5, 10, 15 and 20 under business as usual, without the project?		
Notes on question			
Answer	Compressors on the NTS are generally constrained to operate within the design limits of surge, maximum speed and minimum speed. The choke line is not a hard limit but is manifested by a steep drop in efficiency and manufacturers set the choke line at an efficiency level beyond which they consider operational efficiency unacceptable. Consequently, compressors may operate beyond the choke line with a significant efficiency penalty and detrimental effect on machine life. Note that the "envelope where the compressors work most efficiently" refers to the **optimum operating region** highlighted in figure 3 (of the main submission document), not to the design limits of operation of the compressor bounded by the surge, maximum speed and minimum speed lines. For the purpose of the NIC submission it was assumed that 15 units at 9 compressor station would be fitted with the VECTOR technology between 2018 and 2040. This was based upon the scenario detailed in appendix 9 and section 4.1. There are currently between 8 and 12 NTS compressor stations featuring		

	compressor units with duty away from the optimum region of operation with varying degrees of severity. The frequency of operation away from the optimum operating region varies from year to year for each compressor depending on the unique combination of supply and demand conditions giving rise to the process duty. For example, each compressor unit at one of our compressor stations in the East of the country, which was the focus of the feasibility study and modelling exercise, showed between 38% and 46% of their operation was away from optimum region of operation over the period of study. In some cases where there has been a defined, long term shift in compression duty, a compressor re-wheel is indicated to be the best long term solution based on the currently observed operating regime and assumption of consistent future operation. In other cases, a re-wheel would be inadequate because of unpredictable future operation which may give rise to yet more re-wheeling due to process duty changes. The number of compressors operating away from their optimum region of operation is expected to change into the future as supply and demand become increasingly variable on the NTS e.g. due to the increase in wind generation. The exact number of compressor stations and units which will be affected is uncertain since there is significant uncertainty in the mix of supplies as well as CCGT plant which will be required into the future.
Attachments	-
Verbal Clarifications (Consultants)	