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THE EFFECT ON SAFETY OF ADDING HYDROGEN TO THE NATURAL GAS SYSTEM

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Abstract

Hydrogen is seen as an important energy carrier for the future which offers carbon free emissions at the point of use. In order to facilitate the transition to the hydrogen economy, the EC funded project NATURALHY is studying the potential for the existing natural gas pipeline networks to transport hydrogen from manufacturing sites to hydrogen users. The hydrogen introduced, into the pipeline network, would mix with the natural gas.

The existing gas pipeline networks are designed, constructed and operated based on the premise that natural gas is the material to be conveyed. However, hydrogen has different chemical and physical properties which may adversely affect the integrity or durability of the pipeline network, or which may increase the risk presented to the public. Consequently, the Safety Work Package of the NATURALHY project is focussed on assessing how much hydrogen could be introduced into a gas pipeline network without adversely impacting on the overall safety of the network and the risk to the public.

Risk is the combination of the likelihood of an adverse event and the severity of that event. Therefore, both these aspects have been reconsidered within the Naturalhy project for a range of natural gas/hydrogen mixtures. For example, the current failure frequency may increase if hydrogen adversely affects the performance of pipeline materials or other components of the gas infrastructure. Similarly the consequences of failures, that is, the explosion or fire severity, may be significantly different for a mixture of natural gas/hydrogen due to the presence hydrogen. This presentation summaries some of the work of the Safety Work Package of NATURALHY, including the results of some large scale explosion and fire experiments which assessed the effect of hydrogen on the hazard severity.