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| **Presentation title:** Computational Fluid Dynamic Modelling Of Methane‐Hydrogen Mixture Versus Methane-Ammonia Mixture Transportation in Pipelines: Comparison Of Their Effect On Pipeline Capacity  |  |

**Corresponding Author name:** Mavis Sika Okyere (PhD)

**Affiliation:** Ghana National Gas Company Ltd

**Ph. No:** +233542158566

**Email ID’s:** msokyere@st.ug.edu.gh or mariiooh@yahoo.com or mavis.nyarko@ghanagas.com.gh

**WhatsApp No:** +233542158566

**Presentation type:** Oral presentation

**Abstract:**

Since ammonia and hydrogen does not contain carbon, it produces no carbon dioxide when burned, it is the current focus of considerable attention for reducing greenhouse gas emissions. Utilizing the world’s vast network of existing natural gas pipelines, methane-hydrogen blend or methane-ammonia blend has obvious appeal. In fact, authorities are interested in this possibility of ammonia production. At the delivery point for the pipeline, the ammonia can be separated from the natural gas and can be sold, as ammonia is a commercially valuable product. I considered transport of 70% methane blend with 30% ammonia or hydrogen at 10% erosional velocity.

From the ANSYS Fluent simulation, transport of methane - ammonia tmixture in the studied pipeline resulted in flowrate (capacity) reduction from 2.710m3/s to 2.697m3/s approximately 0.476% reduction of capacity. However, transmission of methane-hydrogen mixture in the same pipeline resulted in pipeline capacity (flowrate) increase from 2.710m3/s to 3.156m3/s., approximately 16.499% flowrate or capacity increase. The CFD simulation results compares well with the theoretical or analytical solution.

Some of the most difficult issues that arises from the blending of methane with ammonia or hydrogen is material selection, design of compressors for the mixture combustion, embrittlement, corrosion, efficient separation of ammonia-natural gas mixtures or hydrogen-natural gas mixtures. These challenges have also been discussed.

**Keywords:** Drag Reducing Agent, Turbulent Flow, Capacity, Ansys Fluent, `Methane-Ammonia Mixture, Methane-Hydrogen Mixture, Internal Coating, Flowrate.

**Biography:**

Mavis Sika Okyere has fourteen (14) years of experience in the energy industry. Her experience in natural gas transmission and distribution includes operations, construction, codes and standards, gas measurement and pipeline integrity management, She has served many roles including asset management, distribution integrity, flow efficiencies, product quality, fluid and thermodynamic properties, right-of-way protection and inspection, community outreach, in-line inspection.

Mavis studied PhD Materials Science and Engineering at University of Ghana. She studied MSc. Gas Engineering and Management at University of Salford, United Kingdom and BSc. Civil Engineering at Kwame Nkrumah University of Science and Technology, Ghana. She has published twelve (12) papers consisting of books, book chapters and journal articles, and is a member of many National and International organizations.