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Decarbonizing Existing Natural Gas Systems via Hydrogen Blending: *Future Direction and Opportunities for Optimization*

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Abstract: Limiting global temperature rise to no more than 1.5ºC under the 2015 Paris Climate Agreement requires significant changes to the current energy system. Chief among these changes is the decarbonization of the existing natural gas system so that there the net carbon emissions are either reduced or eliminated when the fuel is combusted. Within the mix of technologies able to achieve decarbonization, hydrogen is seen as a key energy carrier since it does not emit any greenhouse gases when combusted and can be produced using sources of renewable energy. Further, hydrogen is also seen as a transitional solution for decarbonization since small percentages of the gas can be injected into the existing natural gas system in a process called hydrogen blending. Despite the promise of hydrogen as an energy carrier or hydrogen blending as a decarbonization method, significant barriers must be overcome to realize the advantages of hydrogen in a net-zero world which include the infrastructure needed to deliver hydrogen at a utility-scale. Supply chain network design and optimization models have been used to design and understand the infrastructure needed to produce and deliver hydrogen at the scale needed to meet the world's climate goals; however, much of this work has been focused on building new infrastructure as opposed to repurposing existing assets. This oral presentation proposes to present an overview of the past work, current opportunities, and future direction for the design and optimization of hydrogen supply chains to support the decarbonization of existing natural gas systems.

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