Utilization of Associated Gas to Power Drilling Rigs – a Demonstration in the Bakken

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Abstract

The Energy & Environmental Research Center (EERC) in partnership with the North Dakota Industrial Commission Oil and Gas Research Council; Continental Resources, Inc.; the U.S. Department of Energy National Energy Technology Laboratory; ECO-Alternative Fuel Systems; Altronic; and Butler Caterpillar conducted a project to demonstrate and evaluate utilization of wellhead gas for fueling diesel engines used to power a drilling rig in North Dakota. This evaluation consisted of preliminary testing at the EERC using a leased Caterpillar engine and a mixture of diesel and simulated wellhead gas. Subsequent field testing was conducted using a mixture of diesel and wellhead gas on a drilling rig during the drilling of two wells. This presentation summarizes the results of the demonstration project, including an assessment of engine performance, diesel fuel savings, and the impact on engine emissions. The results of the 47-day demonstration project illustrated that utilizing wellhead gas in bifuel applications to power a drilling rig can lead to an overall decrease in diesel fuel use, fuel cost, and truck transport of liquid fuel and emissions without adversely impacting drilling operations. Specifically, results included fuel-related cost savings of nearly $60,000 and a reduction in overall air emissions compared to diesel-only engine operation plus flaring an equivalent amount of gas. If implemented broadly across the Williston Basin, bifuel operation of nearly 200 drilling rigs using otherwise flared wellhead gas could result in:

- *1,800,000 Mcf of wellhead gas used to power drilling rigs in 1 year (2% of currently flared wellhead gas).*
- *18,000,000 gallons of diesel fuel saved in 1 year.*
- *$72,000,000 of diesel fuel costs saved in 1 year*
- *3600 fuel delivery trucks (5000-gallon tanker) avoided in 1 year.*
- *A 68% reduction in overall air emissions compared to diesel-only operation plus flaring •an equivalent amount of gas.*
- *Additional air emission reductions achieved using commercially available diesel engineexhaust gas treatment (catalytic conversion). These technologies are capable of reducing CO and nonmethane hydrocarbon emissions in bifuel-operated engines to levels similar to 100% diesel-only operation.*

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