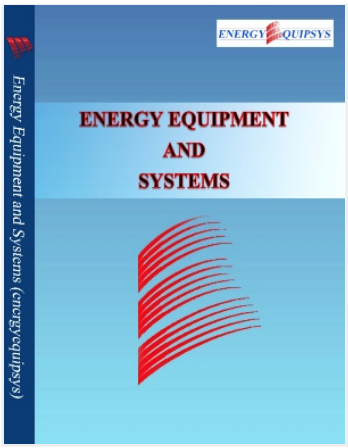

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Optimization of energy consumption and offering a procedure for cooling gas compression facilities at gas compression stations

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Abstract

One of the most important methods of transporting natural gas in Iran and other parts of the world is the utilization of a network of pipelines. Compression station and turbo compressor units play an important role in gas supply through pipelines. One of the primary concerns in these units is the reduction of fuel consumption. By cooling of exhaust gas from the source station, the pressure drop in the pipeline and fuel consumption can be reduced. In this research, two stations were investigated while ASPEN HYSYS software was used to evaluate the effect of various parameters on pipeline pressure and power compressors. Based on the results of the simulation, the cooling gas at a higher flow was more economical. Moreover, with reducing ambient temperature, there was a decrease in power consumption, which was required for electro fans. Thus, higher rates and lower temperatures of the environment resulted in more profit from cooling operations. Although highest economic efficiency was obtained at the highest flow rate (60 MMSCMD) with cooling at 25℃ and lowest ambient temperature of -8℃, but the conditions for hydrate formation in the pipeline became suitable and these conditions could affect the safety of process. In this study, and taking cognizance of the the limitations of hydrate formation and economic conditions, the cooling operational guidelines for use in Qazvin station are provided.

Keywords

ASPEN HYSYS; Compressor Stations; Economice Valuation; Naturalgas; Pipeline

References

[1] Mavrakis D., Thomaidis F., Ntroukas I., An Assessment of the Natural Gas Supply Potential of the South Energy Corridor from the Caspian Region to the EU. Energy Policy. (2006) 34,1671-80.

[2] Moore CW., Zielinska B., Pétron G., Jackson RB., Air Impacts of Increased Natural Gas Acquisition, Processing, and use: A Critical Review. Environmental Science & Technology. (2014) 48,8349-59.

[3] Farzaneh-Gord M., Hashemi S., Sadi M., Energy Destruction in Iran's Natural Gas Pipe Line Network. Energy, Exploration & Exploitation. (2007) 25,393-406.

[4] Haddad J., Behbahani R., Optimization of a Natural Gas Transmission System. International Journal of Computer Applications. (2013) 66.

[5] National Iranian Gas Transmission Company Documents (2014).

[6] Osiadacz A., Bell D., A Local Optimization Procedure for a Gas Compressor Station. Optimal Control Applications and Methods. (1981) 2,239-50.

[7] Mahmoudimehr J., Sanaye S., Minimization of Fuel Consumption of Natural Gas Compressor Stations with Similar and Dissimilar Turbo-Compressor Units. Journal of Energy Engineering. (2013)140:04013001.

[8] Woldeyohannes AD., Majid MAA., Simulation Model for Natural Gas Transmission Pipeline Network System. Simulation Modelling Practice and Theory. (2011)19:196-212

[9] Ríos-Mercado RZ., Borraz-Sánchez C., Optimization Problems in Natural Gas Transportation Systems: A State-of-the-Art Review. Applied Energy. (2015)147:536-55.

[10]Osiadacz AJ., Chaczykowski M., Comparison of Isothermal and Non-Isothermal Pipeline Gas Flow Models. Chemical Engineering Journal. (2001)81:41-51.

[11] Claxton KT., Collier JG., Ward J., Transfer H. HTFS Correlations for Two-Phase Pressure Drop and Void Fraction in Tubes: Heat Transfer and Fluid Flow Service (1972).

[12] Szilas AP., Production and Transport of Oil and Gas: Gathering and Transportation (1985).

[13] Safarian S., Saboohi Y., Kateb M., Evaluation of Energy Recovery and Potential of Hydrogen Production in Iranian Natural Gas Transmission Network. Energy Policy (2013) 61,65-77.