FORECASTING OF NATURAL GAS PRODUCTION AND CONSUMPSION USING GREY PREDICTION MODEL

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Overview

Production and consumption are two important stages of the natural gas management activities. Natural gas is an important source of energy that has been continuously produced and consumed in significant quantities since 1970 [1]. The consumption and production of natural gas & oil have been increasing rapidly with time. Bangladesh is the nineteenth-largest producer of natural gas in Asia and gas supplies cover 56% of domestic energy demand [2]. Natural gas meet about 75% of the commercial energy of the country [1]. Moreover, the country faces energy crisis in meeting the demands of its vast and growing population [3]. Natural gas is the most important fuel, both in terms of energy and diversity of use and it burns more cleanly than other fuels, such as oil and coal, and produces less carbon dioxide per unit of energy released. So, forecasting of natural gas production and consumption can play a significant advancement for future management and utilization of it.

Methods

Grey prediction model is proposed for forecasting of natural gas production and consumption in this paper. The models for time series have been widely applicable for demand prediction because there are required only limited data to build a time series model without any statistical assumptions. In 1982, this model is first proposed by Deng [4]. It is an effective model for dealing with partially known and unknown information. The concept of this model is used in different fields such as rainfall prediction [5], industry [6], business [7] and geological systems studies [8], environmental studies [9], decision making [10], and so on. Very recent, grey prediction models [11] are widely used in time-series prediction because of its simplicity, ability and high precision to characterize an unknown system by using a few data points [12] [13]. The time series data of natural gas production and consumption is collected from Energy & Mineral Resources Division (EMRD), Dhaka. Forecasting of production & consumption are performed by Grey prediction model using this time series data.

Results

Remarkable outputs are found from this research. From results, it is clear that the demand of production and consumption of natural gas is steadily rising with time. It is performed the forecasting of production and consumption from 2001 to 2030. Since, it is available information of real production and consumption of natural gas for period 2001-2017, the prediction results are compared with real data. It is found that the predicted results are closely matched with real situations. It indicates that the prediction is performed as an accurate forecasting of production and consumption of natural gas for next 13 years (2018-2030). It is also calculated some statistical parameters i.e. correlation coefficients, errors (MAPE, MAE) using real and predicted values of production and consumption. The values of these statistical parameters are showed good matching between real and predicted results of natural gas.

Conclusions

Results accuracy is considered as primary criterion in selection among forecasting techniques. However, new tools and criteria are desirable in selection and evaluation of these techniques from practical perspective. The main

objective of this research is to design a reliable, easy and low-cost forecasting method to assist project directors. This paper finds that the Grey prediction model can be used for prediction of yearly and monthly natural gas production and consumption. Even, data frequency is not enough for mathematics, or probabilistic analysis, the model provides a more accurate, easy method for forecasting in comparison with the traditional predicting methods. The obtained results show that the proposed concept is able to get more accurate forecast. The low MAPE values showed reflect that the accuracy of the Grey prediction model is highly efficient for production and consumption of natural gas.

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