ELSEVIER

Energy Policy 35 (2007) 2096–2109

ENERGY POLICY

www.elsevier.com/locate/enpol

# A supply model for crude oil and natural gas in the Middle East

R. Chedid[a,*], M. Kobrosly[a], R. Ghajar[b]

[a]American University of Beirut, Faculty of Engineering and Architecture, P.O. Box 11-0236, Beirut, Lebanon
[b]School of Engineering and Architecture, Lebanese American University, P.O. Box 36, Byblos, Lebanon

Available online 28 August 2006

**Abstract**

Crude oil (CO) and natural gas (NG) play an important role in the world economy. The Arab countries (ACs) share 64% of the total oil reserves and 40% of the NG reserves [OPEC, 2003. The Annual Statistical Bulletin]. On the production side, ACs contribute to 30% and 9% of the world production of CO and NG, respectively. Accurate forecast models are needed to do better planning and create less risky business environment. In this paper, an econometric model is built to capture the behavior of CO and NG production in the ESCWA[1] countries. The model is used to forecast future production trends of CO and NG, and thus provide a powerful tool for researchers, planners and investors working in the energy field.
© 2006 Elsevier Ltd. All rights reserved.

*Keywords:* Crude oil; Natural gas; Econometric models

## 1. Introduction

Crude oil (CO) is a major contributor to the world economy and natural gas (NG) is becoming a direct competitor for the first due to its environmental advantages and current and potential future role in electricity generation. Most of the Arab countries (ACs) in the ESCWA region are the main participants in the world energy because of their reserves, supplies and trade markets. From the Annual Statistical Bulletin of the Organization of Petroleum Exporting Countries (OPEC) for the year 2003 (OPEC, 2003), the share of proven CO reserve of the Middle East (ME) out of the world total increased from 56% (397,053.3 mb) to 64% (735,866.3 mb) between 1983 and 2003 (Fig. 1). While the proven NG reserve in the ME raised from 27.6% (26,405 billion standard cu m) to 40.4% (72,766 billion standard cu m) out of world reserves for the same period (Fig. 1). Moreover, the Arab share of CO production moved up from 21.2% in 1983 to 30.4% in 2003 to reach 20,451.6 thousands of barrels per day.

The next two decades are expected to see an increase in energy demand met predominantly by fossil fuels, with oil set to continue to maintain its major role complemented with an increasing role of NG mainly in electric power generation. ACs rely almost entirely on oil and NG to meet their energy requirements, accounting for 97% of total energy consumption. According to the 30th Annual Report of OAPEC in 2003 (OAPEC, 2003), the energy mix in AC heavily tilts towards oil, accounting for 54.4% of total energy consumption, followed by NG accounting for 42.6% (Fig. 2).

Many authors have investigated different energy models to help analysts forecast NG demand. Kaboudan and Liu (2004) investigated the use of an integrated genetic programming/multiple regression system of equations to forecast short-term US demand for NG. Genetic programming is employed to predict the system's explanatory variables. The demand equations are used to forecast 4 years of demand for NG. Krichene (2002) examined the use of a two-stage least-squares method for CO and NG to obtain short-run estimates of demand and supply. In order to strengthen the confidence in these estimates, the model is re-estimated in an Error Correction Model (ECM). Siemek et al. (2003) estimated the consumption of NG in Poland

*Corresponding author.
*E-mail addresses:* rchedid@aub.edu.lb (R. Chedid), rghajar@lau.edu.lb (R. Ghajar).

[1]ESCWA is the UN Economic and Social Council of West Asia. It deals with thirteen Arab countries; namely, Lebanon, Syria, Jordan, Palestinian authority, Iraq, Egypt, Saudi Arabia, Kuwait, Qatar, Bahrain, UAE, Oman and Yemen.

0301-4215/$ - see front matter © 2006 Elsevier Ltd. All rights reserved.
doi:10.1016/j.enpol.2006.06.011

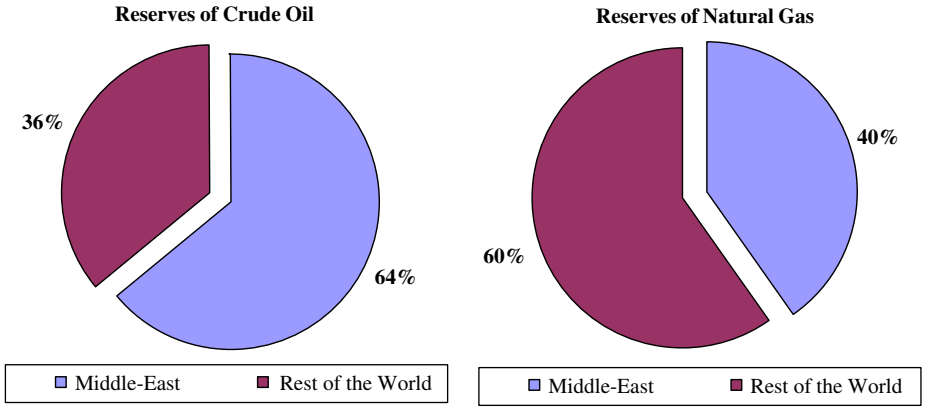


Fig. 1. World reserve for CO and NG in 2003. *Source:* OPEC (2003).

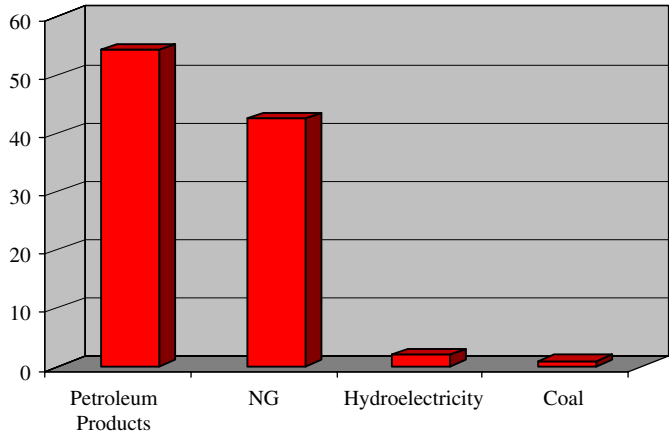


Fig. 2. Energy consumption in AC in 2003. *Source:* OAPEC (2003).

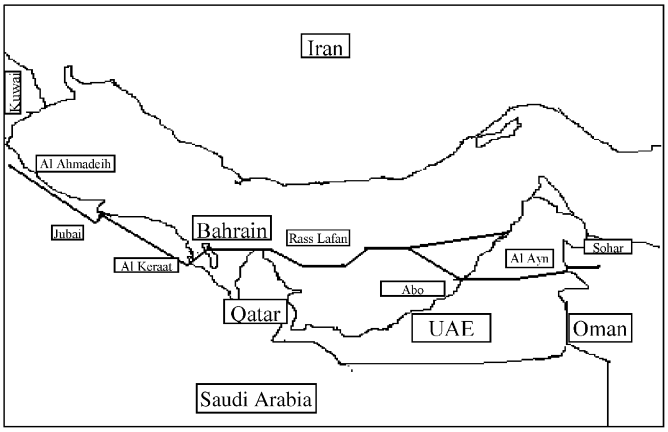


Fig. 3. Oman, Emirates, Qatar, Bahrain and Kuwait NG pipeline network. *Source:* E/ESCWA/SDPD/2004.

based on the logistic-curve interpretation, where an adaptation of the Hubbert model is implemented to the Polish situation based upon the Staizman modification.

Dahl (1994) found that the most commonly used modeling techniques for aggregate energy demand are the simple static and the Partial Adjustment Models (PAM). Erdogan and Dahl (1997) investigated the impact of income, price and population on the aggregate, industrial, manufacture and mining sectors of energy in Turkey. Nasr et al. (2000) built an EM to forecast the electric consumption in post-war Lebanon. They did include the impact of the gross domestic product (GDP), the total imports (TI), and degree days (DD) to formulate an electricity consumption model over different periods from 1993 to 1997. Eltony and Al-Mutairi (1995) and Eltony (1996) presented a cointegrating relationship for NG and gasoline demand in Kuwait, which included price, income and population as explanatory variables. Later Eltony and Hosque (1997) developed cointegrating relationship for electricity demand in Kuwait.

This paper develops an econometric model for forecasting the supply of CO and NG in AC located in the ESCWA region, and is organized as follows. Section 2 addresses the

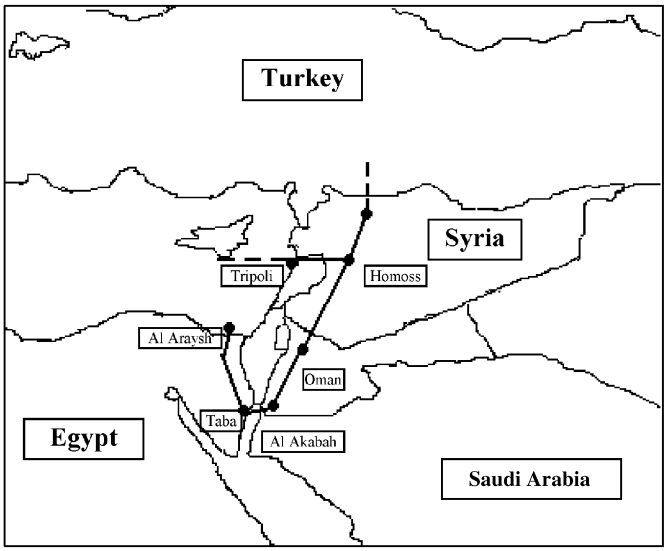


Fig. 4. Egypt, Oman, Syria, Lebanon and Turkey NG pipeline network. *Source:* E/ESCWA/SDPD/2004.

peculiarities of the selected parameters affecting the model. In Section 3, the proposed econometric model is developed and used to forecast the production of CO and NG.

Download English Version:

https://daneshyari.com/en/article/994488

Download Persian Version:

https://daneshyari.com/article/994488

Daneshyari.com