Data Article

Data on upstream segment of a hydrocarbon supply chain in Saudi Arabia

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\textbf{A B S T R A C T}

This article provides data related to different activities in the hydrocarbon supply chain (HCSC). HCSC structures from Crude oil and natural gas supply chains. There are three main sectors in the HCSC related to activities in the production areas, processing plants, and demand terminals. The considered activities comprise the upstream sector of the crude oil and all sectors of the natural gas. The data were collected from Saudi Arabia, considering the main production and processing plants. The provided data are useful in tactical planning of crude oil, natural gas, and natural gas products of the HCSC. These data support the research article entitled “A Multi-Objective Optimization Model for Tactical Planning of Upstream Oil & Gas Supply Chains” [1].

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1. Data

Data related to the activities on the upstream sector of the crude oil and all sectors of the natural gas represents the projected part of the HCSC. Figure 1 presented in Ref. [1] depicts a schematic

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representation of the activities of interest. Related data to these activities were collected from Saudi Arabia HCSC considering a relevant level of detail and main production and processing plants. The provided data can be classified as four groups, as follows:

1. Stream composition and yield at each plant:
   - Gas-oil ratio (GOR) corresponding to crude oil type for different reservoir streams.
   - Crude oil composition; yield of main components (e.g., natural gas, H2S) at each entity.
   - Natural gas composition, for instance, the yield of CO2, H2S, methane, and ethane.
2. The demand for crude oil and gas by-products by local customer, local industry, and international customer and the corresponding selling prices.
3. The capacity of each entity, the capacity of routes connecting the entities, and the transportation modes utilized through these routes.
4. Cost elements: production and processing costs at each entity, and transportation costs.

2. Experimental design, materials, and methods

This article includes quantitative data collected from published reports, official and government websites of Saudi Arabia, and Google Maps web. Cost of transportation via the pipelines has been estimated based on that it costs US$0.6 to transport and pump an oil barrel from Ras Tanura to Yanbu. It is estimated that the pipeline transportation cost per barrel is SR0.0016466/Km (US$1 = SR3.75).

To estimate the transshipment cost of each barrel, the Google Maps web [2] was used to measure the distance between any two entities of HCSC. Then transportation cost is determined by multiplying the distance times the cost of shipping a barrel per KM. It is estimated that the pipeline transportation cost per barrel is SR0.00165/Km (US$1 = SR3.75).

The local demand for crude oil and gas products have been estimated based on the population size of Saudi Arabia as per 2016 (32.28 Million) [3]. The local demand then was estimated for each region by
dividing the total domestic consumption per number of citizens of each region. The international
demand was obtained from [4]. Then the demand of each international terminal is calculated by
dividing the total international consumption per the terminal capacity. The penalty cost of producing
more than the demand was estimated to equal the cost of storing. While the penalty cost of producing
below the demand was estimated to equal the cost of satisfying demand from international markets
including.

The gas oil ratio (GOR) and yields of by-products were collected from published article [5] Plants
Capacities were collected from the Annual Saudi Aramco report of 2016 called [6]. International prices
of crude oil, natural gas, and by-products were collected from the website of U.S. Energy Information
Administration (EIA) [7, 8]. Local prices were collected from the General Authority for Statistics agency
in Saudi Arabia [9].

Conflict of Interest

The authors declare that they have no known competing financial interests or personal relation-
ships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.dib.2019.104804.

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