Online ISSN : 3049-3455

Mineral Metal Energy Oil Gas and Aggregate

Contents available at: www.informaticsjournals.co.in/index.php/2MEOGA

# Are Oil and Gas the Catalysts for Development? A Conundrum

**Pratap V. Nair**

*Retired Exploration Petroleum Geologist, Devidarshan, Kawdiar, Thiruvananthapuram - 695003, Kerala, India; vpratapnair@gmail.com*

## Abstract

*The halcyon days of easy oil exploration are fading as major discoveries become rare. Oil industry professionals operate under challenging conditions, such as deep waters and extreme climates. Despite the rapid strides in Artificial Intelligence(AI) to enhance data analysis and project management, AI in oil exploration continues to be in its infancy. Oil plays a crucial role in a nation's economic development, and while our country aspires to progress by 2047, it currently meets only a fraction of its requirements. The Organization of the Petroleum Exporting Countries (OPEC) employs a longstanding oil economics tactic of reducing oil production by millions of barrels whenever prices decline. Saudi Arabia stands out as oil has been instrumental in that country's development. However, several other oil rich countries remain undeveloped despite their oil resources. Nations that do not depend heavily on oil tend to experience faster growth, putting to rest the model that oil revenue is a prerequisite to development. India's remarkable rise despite being an oil importer indicates that while oil revenues support development, they are not indispensable. Effective oil finding strategies and geoscience research to catalyse and contribute to achieving our 2047 objectives must be our driver in India.*

**Keywords:** *Oil, Artificial Intelligence, Oil economics, OPEC, Saudi Arabia, 2047*

## 1.0 Introduction

Karl Benz introduced the world's first gasoline-powered automobile in 1888. Fifteen years later, the Wright brothers utilized the same type of fuel to propel their Flyer into the realm of aviation. Before World War II, the rate of oil discovery significantly outpaced consumption. However, following the war, the replenishment of reserves could not keep up with the increasing demand. The halcyon days of oil exploration seem to have come to an end, as successful discoveries have become less frequent. The field of geology is captivating, and a geologist's primary objective is to produce an accurate geological map, a task that requires considerable time and effort. In contemporary practice, vast amounts of seismic data can be analyzed through computational methods. The emergence of artificial intelligence has the potential to enhance the efficiency of mapping processes, provided that a clear and detailed description of the target is formulated by the trained models. Nevertheless, a distinctive responsibility of a petroleum geoscience team is determining the optimal locations for drilling for oil and gas. The success of a well is evaluated based on its alignment with predictions, and it is generally accepted in petroleum geoscience that a successful well is more readily excused than a failure to locate petroleum.

## 2.0 Challenges

We do not need to tell anyone how tough the oil and gas industry is. The challenges inherent in the oil and gas industry are well understood. Professionals often operate in extreme conditions, whether in the deep seas, the dense jungles of Venezuela or Nigeria, or the frigid climate of Siberia and the Arctic. The pursuit of oil necessitates venturing into these harsh environments,

a reality that remains unchanged today. In an era dominated by Artificial Intelligence, which facilitates swift and secure access to vast amounts of data and enables project management from virtually any location, one must ponder the criteria for a nation's development. Throughout my career as a petroleum geologist, working with both national and international oil companies, I have witnessed how oil can significantly influence a nation's developmental trajectory, for better or worse. Our nation has set an ambitious goal of achieving development by 2047, yet we currently produce only a fraction, merely one-tenth, of our total requirements. When you are looking for oil, you have to go to extremes, and there is no second thought on this today.

## 2.1 Oil Economics

Oil prices peaked in 2008 for a record high, and what followed was a great economic recession due to various other reasons. We also saw a few years ago that the oil prices fell apart and then regained momentum, and that's how oil pricing works. The cartel of oil-producing countries, OPEC, has the age-old strategy of when the price begins to nosedive, they slash oil production by millions of barrels. OPEC's actions cannot be characterized as charitable towards developing nations; in fact, the organization has historically not engaged in charitable practices, even during favourable circumstances. A review of their official website, www.opec.org, reveals that all member countries are classified as developing nations that depend on oil export revenues for their economic stability[1]. Figure 1 indicates that the lion's share of the world's crude oil reserves in 2023 are with the OPEC nations.

One of the primary objectives of OPEC is to ensure that oil prices remain stable, providing fairness and reasonableness for both producers and consumers. This leads me to ponder the duration required for a country to achieve development. The Ghawar oil field in Saudi Arabia has been operational since 1951, while countries such as Venezuela, Iran, Iraq, and Indonesia commenced oil production well before the dawn of the 20th century. Additionally, Nigeria, where I was employed by a major oil company, has been extracting oil since 1956. The disparities in development are striking, with only Saudi Arabia being able to assert that it is fully developed. This raises the question: What is the necessary timeframe for a country to reach a developed status?

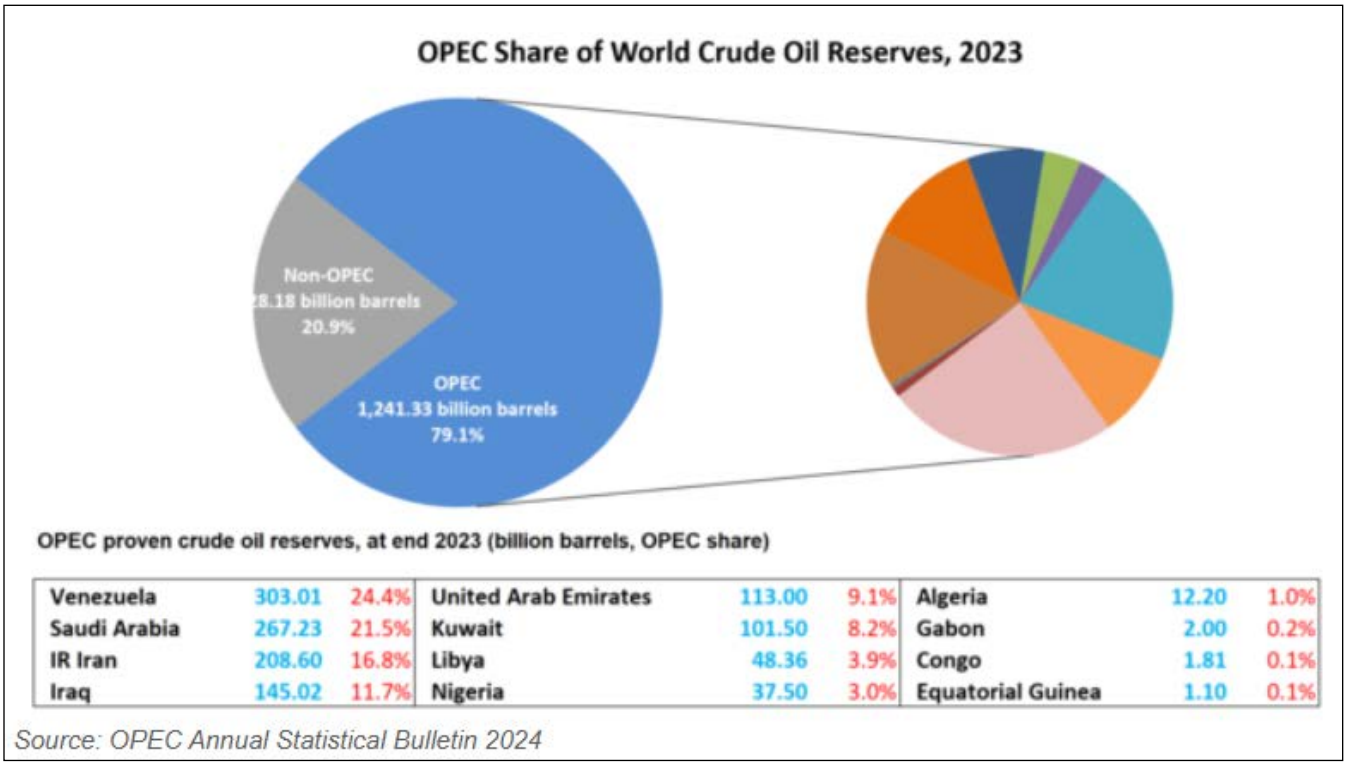



**Figure 1.** World Crude Oil Reserves[1].

It appears that nations lacking a consistent revenue stream from oil and gas sales tend to experience more rapid development compared to those that rely heavily on these resources, with the notable exception of Saudi Arabia, which hosts the largest oil field globally. The influx of wealth may pose challenges rather than solutions. The prevalence of corruption often accompanies substantial financial resources, diverting funds that could have been utilized for national development to other avenues. It raises the question of why the global community should be subjected to the detrimental effects of another nation's corrupt practices. Furthermore, what is equitable for producers may not align with the interests of consumers, highlighting the need for a balanced approach. It is important to acknowledge that there are varying outcomes within the Arab world; while countries like Saudi Arabia, Bahrain, and the UAE have thrived due to oil wealth, others continue to struggle despite their oil revenues. The prevailing belief is that nations abundant in oil resources will experience increased wealth, resulting in a shift in global power dynamics favouring these affluent countries. A transition of power and wealth from oil-importing to oil-exporting nations was anticipated. Nevertheless, India has contradicted these forecasts by demonstrating significant growth, despite its status as an oil importer.

This perspective serves as an encouraging assertion for our ambitions in India, particularly when considering that financially undisciplined nations, despite their wealth in petroleum resources, have failed to achieve significant development. Concurrently, it imposes a rather stringent discipline on countries that are less resource-rich or not affluent but are more reliant on oil consumption. I believe that Ghawar has significantly contributed to the development of Saudi Arabia, and there is no discourse surrounding its decline. Conversely, the Ghawar-like oilfields in Iraq, Nigeria, Iran, and Venezuela continue to yield substantial production, and these nations must advance before these vast oil reserves diminish. Given the trends observed over the past few decades, I hold doubts regarding their potential for development.

## 3.0 Discussion

At the moment India is addicted to energy. Therefore, we are impacted by the oil price volatility. Our infrastructure is under creation. The fundamental notion appears to be that a nation's development is not solely reliant on oil, provided there are sufficient alternative resources to propel the energy sector. The citizenry believes that the government should enable us to maintain this addiction when the reality is that we produce just a tenth of our demand. We are hostages to an ever more hostile world.

The challenges faced by India are unique, and the prescriptions I propose are as follows:

1. We must develop new ways of supplying and using energy. It is essential to innovate in the methods of energy supply and consumption.
2. Establishing and fostering collaborative partnerships among both national and international companies will be crucial for our future progress.
3. Addressing the magnitude of these challenges will necessitate cooperation among companies with varying strengths.
4. Public opposition to projects, stemming from social and environmental concerns, can pose significant obstacles, even when such initiatives align with government policies.
5. For international companies, the focus should be on delivering tangible value locally by providing advanced technologies and capabilities, facilitating access to capital and markets, and making contributions to the community.
6. The optimistic scenario hinges on a widespread global recognition of the importance of data sharing across companies and borders. The Silos approach is not fit for purpose and could leave us behind.
7. Basic understanding of energy resources and their utilisation must be taught at the school level itself for better appreciation by the younger generation.

The general feeling amongst international oil majors is that they are at risk of their assets being captured within the country of operation, as happened in Venezuela. In most cases, companies are not compensated for the confiscated assets.

### 3.1 Advent of Artificial Intelligence (AI)

We must recognize that it is time to move beyond the present debate. We need to concentrate on what is required to use energy more efficiently and develop new energy systems. Experience is the best training that money cannot buy.

AI is swiftly emerging as a crucial asset in the oil and gas sector, similar to its impact in other industries.




**Figure 2.** AI in Oil and Gas Industry: Use Cases[2].

It offers a diverse array of applications that optimize operations, enhance decision-making processes, improve safety measures, derisking, and mitigate environmental effects (Figure 2). Anurag Jain from Oyelabs (2025) provided an insightful overview of the potential applications of AI within the oil and gas domain[2]. As companies aim for more sustainable practices and improved performance, the advancement of AI in this industry is essential for maintaining competitiveness and has become a necessity in contemporary operations. A key aspect of this development is the 'training' with the right kind of historical data. As oil resources diminish, the responsibilities of geoscientists are expected to evolve. With the decline of conventional oil sources, there will be an increased focus on the extraction of substantial reserves of viscous and super-viscous oil. Additionally, gas hydrates and coal-associated resources will be exploited extensively. The techniques required for such exploitation will demand the expertise of geoscientists and engineers. Concurrently, the industry is experiencing significant shifts in business practices as well.

### 3.2 Closing Thoughts

In conclusion, it is accurate to assert that while oil revenue is not essential for a country's development, it can act as a significant catalyst. For nations such as ours, it is imperative to maximize the utilization of our mineral and oil resources and to draw lessons from the developmental experiences of countries like Nigeria and Venezuela, particularly concerning our 2047 goals. A clear and well-structured strategy for future success would involve mandatory investment in geoscience research, always keeping our 2047 target in focus.

## 4.0 References

1. OPEC Annual Statistical Bulletin, 2024. website www.opec.org
2. AI in Oil and Gas Industry- Benefit, Use Cases, and Examples