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OIL AND GAS: A GLOBAL LEGACY

ASIA

Asia, with its rapid population growth and increasing energy demand, is changing the energy dynamics of the world. The resulting supply/demand gap has made the hunt for oil and gas ever more crucial. The last decade has influenced major overseas asset acquisitions by Asian oil and gas companies. Billion-dollar deals have been struck for the energy security of their respective nations. It is clear that the legacy has overcome all odds to put India and China firmly on the world hydrocarbon map. There is much to say when we talk about the petroleum industry legacy in Asia, including basic theories, professional knowledge, industry technologies, etc. But the first thing that comes to mind is the hard-working spirit, which is the most important legacy we can inherit as young people.

Asia belongs to the pioneers of the world’s petroleum industry, with a history going back over 150 years. Among the first oil wells were Xihai (1835) in China’s Sichuan Basin, Bibiheybat (1848) in Russia, and Pennsylvania (1859) in the USA. Nevertheless, the petroleum industry developed slowly in Asia. The basic theories were imported from Russia and the USA, the professional knowledge and industry technologies were also learned from other continents. Thanks to Asia’s hard-working spirit, the continent has made huge discoveries. The discoveries include the Daqing oil field in the Songliao Basin of China, Mumbai High in the Bombay Basin of India, and Natuna D-Alpha in the East Natuna Basin of Indonesia. Hence, we can say that it is their natural assiduousness that helped Asians make those achievements.

While knowledge and technology evolve over time, China’s hard-working spirit remains the constant which will power China’s progress in the industry of the future. For instance, the exploration area changed from uplifts to sags, from structural traps to lithology-stratigraphic traps. The technologies of seismic acquisition, well drilling, and hydrocarbon development have also changed dramatically. But the hard-working spirit remains unchanged. In the past, this spirit was reflected in field work: workers such as the “Iron Man”, the nickname given to a petroleum engineer at Daqing oil field in China, who jumped into mud sumps to mix the mud with his own body during the drilling of a well at Daqing. Today, it is more often reflected



Drilling rig at the Daqing field in China: home to the legendary "Iron Man"

in the research field, where researchers may work for several days in a row without rest, in order to obtain the results of their experiments. The Chinese youth have inherited the same hard-working spirit from their predecessors.

The legacy of the petroleum industry in India has been largely about the hegemony of the country's National Oil Companies (NOCs). This has affected the petroleum industry in India in both a positive as well as a negative way. The transfer of knowledge and expertise has been a boon in terms of legacy, which has resulted in major discoveries like the Mumbai High field in the country. Later on, the liberalisation of the petroleum sector in the 1990s, which allowed 100% Foreign Direct Investment (FDI) in India, opened the market to foreign companies. The New Exploration Licensing Policy (NELP), was a major milestone that enabled massive exploration in the country, especially in deep-water areas. The negative aspect of the legacy is its academia-industry gap and the perception of the industry amongst ordinary people. The courses at Indian universities were not on a par with the industry's requirements and the Indian public never recognised the importance of the energy industry. Thus, the attractiveness of the hydrocarbon sector to young people was quite low compared to other sectors, for example software and IT. The NOCs, along with private companies, are now solving the problem of 'crew change' in India and leaving no stone unturned in their efforts to meet the nation's energy needs.

NORTH AMERICA

In North America, the region strives not only to maintain its array of natural resources and pristine landscapes, but also to achieve a relatively successful balance between both. The abundance of domestic oil and natural gas supplies have contributed to economic prosperity across multiple generations, and will continue to provide promise for future generations.

Energy demand in North America spans end-uses from heating and cooling homes to enabling travel and entertainment on this vast continent. Energy also facilitates technological advances and innovations in the region. The region's high standard of living is, in part, attributed to the array of domestic energy sources.

To the north, Canada's oil sands contain billions of barrels of oil reserves. The high-viscosity oil, or bitumen, is contained in the shallow surface rock, and is predominantly recovered using in-situ liquefaction technology. Conventional reserves are found throughout the Prairie Provinces, and comprise the industry's light oil and natural gas supplies. The United States has added to its conventional reserves by deploying technology to economically produce unconventional oil and natural gas from shale formations. America's energy sources continue to grow with additional deepwater discoveries in the Gulf of Mexico.

Fossil fuels are relatively low-cost, energy-dense, abundant, and reliable. These fuels serve as the building blocks for plastics and as inputs for

electricity generation, among a variety of other uses. As a significant consumer of carbon-based fuels, the region is working on strategies to manage climate change risks. Pro-actively addressing emissions from fossil fuels is a joint step in a positive direction. While both nuclear and renewable energy sources are expected to grow as a percentage of the region's energy supply, natural gas remains a significant and growing source of energy.

As global energy demand continues to grow, gains in energy efficiency are needed and expected to curb the ever-increasing energy consumption of the developed world. Developed regions have a responsibility to forge the path to efficiency, and to introduce a new way of considering energy that will contribute to sustainable growth and environmental preservation for all regions. The need to manage climate change risk is intensifying as developing regions continue to improve their standard of living and begin to reflect North America's habits of energy consumption.

EUROPE

The European oil and gas industry: A diversified legacy

Two centuries of oil and gas production in Europe have provided the old continent with an extensive experience in exploring, producing, transporting, refining and distributing oil and gas across its boundaries. For example, Russia (which produced 520 million tonnes (Mt) of oil in 2013) produces only slightly less than Saudi Arabia (544 Mt of oil in 2013) in the ranking of the main producing countries of the world, while the pipelines of Turkey are transporting 200 million tonnes of oil per year.

The European industry is diversified, with major producing countries (Russia, Norway, the United Kingdom), major consumers (Germany, Spain, France), and a major corridor between the main producers and consumers of the world (Turkey). In addition, the oil and gas industry has been impacted by national political decisions: while the Norwegian growth model is based on the sustainability of its sovereign wealth fund, France has reduced its dependency on oil and gas by developing an efficient nuclear industry. Most of them have developed integrated oil and gas majors: BP in the United

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Kingdom, Statoil in Norway, Gazprom and Rosneft in Russia, Repsol in Spain, TPAO in Turkey.

After years of successful discoveries and growth in their production capacities, many of the European countries have reached a plateau and started declining. From the brown fields of the Norwegian Continental Shelf to the post-USSR planned production, oil and gas production has been decreasing (due to reserve availability in Western Europe, and the collapse of the USSR in the case of Russia), offset by alternative sources of energy such as nuclear power in France and hydroelectricity in Norway (which accounts for 98% of the country's electricity). However, countries such as Spain maintain a dynamic refinery industry and are developing a sustainable energy model, wherein gasoline is exported, generating wealth for future generations.

The industry has also played a significant role on the diplomatic scene, and in particular European economic integration. In Spain, oil dependency is above 99.5%, while oil accounts for more than 50% of the country's overall primary energy consumption. Conversely, 60% of the Russian national budget is funded by oil and gas exports, with 75% of production destined for customers in the European market. These interdependencies have driven European diplomacy through successive crises between the EU and Russia. This has posed a series of geopolitical questions as to whether the stability of European energy supply is sustainable in the long run, as highlighted by earlier gas disputes between Ukraine and the Russian Federation. It is in neither party's interest that any disruption should occur, and hopefully this view will prevail.

The legacy of the European oil and gas industry is also marked by the negative image of the industry's activities. Major catastrophes such as the Prestige



Conoco Phillips platform, Ekofisk field, offshore Norway

disaster in 2002 (Spain) and Erika in 1999 (France) have turned public opinion against the industry. With the current economic crisis, the visible financial wealth of the industry is reinforcing the citizens' criticism towards one of the major contributors to European employment and growth models.

The future of the oil and gas industry will see some similarities between European nations. The European upstream industry will have to go beyond new frontiers. With the growing development of offshore technologies, and rises in price, new fields are being discovered on the Norwegian Continental Shelf, in the United Kingdom and in Russia. They will contribute directly to offsetting, and even reversing, the decrease in oil and gas production. At the same time, Turkey (in the Black Sea) and Spain (in the Canary and Balearic Islands) are betting on new technologies to support exploration and future discoveries. In addition, the American shale gas revolution is attracting Europeans. Although France prohibited the exploration and production of shale gas by law, and initial estimates in Spain were too optimistic, the United Kingdom and Russia have opened their territory to hydraulic fracturing, while Poland looks set to be the first European country to start production, in 2014.

The diversification of the energy mix is also part of the future of the continent. It will be driven by geopolitics and regulatory factors. The western European countries expect to decrease their dependency on producing countries which affects their national energy security (74.4 % of the EU's imports of natural gas in 2010 came from Russia, Norway or Algeria). In addition, the European parliament passed a binding regulation on the EU's energy mix. By 2030, European countries are expected to increase their production of renewables,

decrease their emissions (a 40% cut in greenhouse gases) and increase their energy efficiency, according to the European Commission's 2030 framework for climate and energy policies.

SOUTH AMERICA

Energy has always been, and still is, a hot topic in South America, especially in its main producing and consuming countries, Brazil, Venezuela and Argentina. In the former, for the last 60 years, energy supply has been mainly associated with the country's natural oil company, Petrobras, which has long been a pioneer in the development of deepwater oil fields and the value chain associated with them. From 1997 onwards, international companies joined the fray, bringing more dynamism to the sector. Among the impacts have been upgrades in infrastructure (terminals, pipelines), investments in R&D and education, the creation of thousands of jobs in the shipbuilding, refining, chemical, and manufacturing

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sectors, not to mention indirect benefits, such as social and environmental programmes and cultural incentives. Nowadays, the oil and gas industry in Brazil represents 12% of GDP, and is expected to reach 20% by 2020, making it the key engine driving the country forward.

Venezuela has had a similar history, with its NOC, PDVSA playing a major role in the local economy, responsible for the development of the oil industry and indirectly for the development of the country. Petroleum is at the heart of the country, where reserves are among the largest in the world. The country's history reflects this, since for more than 100 years there has been crude exploration, production, refining and marketing, thus creating a huge legacy for the present generation. Therefore, young professionals are not only fortunate to have this great heritage, but have also inherited a wealth of knowledge that these generations took years to develop, allowing them to face the myriad challenges ahead. However, for young professionals it is extremely worrying to see a trend towards increasing political influence and decisions in the industry, which is perceived as the root cause of many problems in Venezuela. The best thing for the country would be to separate both.

As for Argentina, the first thing to mention is the country's high expenditure on energy imports, in particular natural gas, which is often cause for debate. Also an oil producer for over 100

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years, it is not by chance that Argentina has an 86% hydrocarbon-dependent energy matrix. This legacy makes it a national imperative to increase hydrocarbon production. This is complicated by the negative perception of the industry in recent years, especially among the younger generations. Locally, the industry inherits the image of one with a short future. This can be attributed to the lack of investment in the sector over the past 10 years, leading to production decline of both oil and gas. Some young professionals in the STEM subjects, however, see the industry as an opportunity to have high salaries and worldwide career perspectives. But that should not be the only reason for joining the industry. This perception needs to be changed immediately if the country wants to overcome its energy crisis in the near future.

THE MIDDLE EAST

The Gulf oil and gas legacy

Award-winning architectural masterpieces pierce the star-studded skies mentioned in the tales of the 1001 Arabian nights, rising from what were once the unforgiving sand dunes that symbolised the struggles of our ancestors. A rainbow of lights colour the waters of the Arabian Gulf, where tourists now enjoy the breathtaking views from dhows once used to dive for pearls.

Oil and Gas have played the largest role in unifying a once tribal community into one that shares a common interest in economic development and self-dependency. This article will discuss the transformation of the 6 sister nations of the Gulf Cooperation Council (GCC), and the future that lies in the hands of an overwhelming population of youth below the age of 35.

The Transformation

The Kingdom of Bahrain was the first of the GCC nations (consisting of Saudi Arabia, Qatar, Oman, The United Arab Emirates, Kuwait, and Bahrain) to discover Oil in 1931, after which the rest of the GCC followed suit. The region now holds approximately 30% of global oil reserves and 20% of global gas reserves. These statistics have acted as a catalyst for the GCC nations to pursue the diversification of their economies, quadrupling the average GDP shared by the GCC since 2001.



Oil refinery, Bahrain: the Kingdom was the first GCC nation to discover oil, in 1931

Yet, it is noteworthy to state that the discovery of “black gold” came to a highly uneducated population, allowing global corporations to enter the market and develop these resources for profit. During the oil price surges of the mid-1970s and early 1980s, most of the GCC states were newly founded and lacked the institutional infrastructure that could absorb a six-fold increase in revenue. Therefore, the pivotal role of the skilled expatriate workforce in developing the region’s infrastructure and economy over the past decades is noteworthy, and has come at a cost.

The nations of the GCC have unified around a vision to reduce their reliance on an educated expatriate workforce by diversifying their economies, and using the surplus in petroleum revenues to educate their nationals in all fields of benefit to their respective economies.

Nationalisation – supporting the Youth

‘Nationalisation’, the practice of increasing the percentage of professional nationals within the economy, has been a priority for all governments within the GCC. However, statistics regarding the severity of nationalisation needed differ throughout. At one end of the spectrum, Oman and Bahrain currently have a high percentage of nationals within their energy sector, whereas Saudi Arabia has introduced the “Nitaqat” programme to increase the employment of Saudi Nationals, this programme encourages the Saudi Youth to enter the workforce as skilled professionals by offering lucrative contracts and on-job training. Furthermore, it is noteworthy that Saudi Arabia leads the GCC, with 61% of the Kingdom’s population being under 25 years of age. This signifies an economy that can be refreshed and nourished by an influx of newly-educated Saudi Nationals.

Kuwait, as part of its ambitious plan introduced

in 2010, aims to reduce the expatriate population by 100,000 over the next 10 years. Therefore, to attract the elite of Kuwaiti nationals into the energy sector, the government offers a salary premium of 132% more than the general market.

Qatar Petroleum, Qatar’s NOC, has taken the initiative to wean themselves off their dependency on trained expatriates by adding a clause in all expatriate contracts that states their pivotal role in “on-job coaching” to young nationals, in addition to their work mandate. This implies that all expatriate professionals are legally obligated to help nationals with any expertise that they need, creating an “open door policy” between young national professionals and their experienced expatriate counterparts. This policy is not unique to Qatar, and is mirrored in oil and gas companies across the GCC.

Other corporations such as ADNOC (Abu Dhabi National Oil Company) have signed long-term contracts with universities to design custom curriculums and provide vocational training to hone the skills of local talent. Furthermore, well respected and highly ranked Western universities have been contracted to open campuses that provide curriculums tailored towards the economy that hosts them. Texas A&M University, situated in Qatar Foundation’s Education City, offers a wide array of degrees within the field of engineering. Other universities are similarly offering the highest ranking courses within their campuses, including Georgetown Economics, Weill-Cornell Medical, Carnegie Mellon Business, et al.

Although the sister nations of the GCC address the reduction of reliance on expatriates differently, what is common amongst them is the theme of re-investment of petroleum revenues into human capital, thereby creating a plan of self-reliance based on the current Youth. ■