

Doing Business in the Oil & Gas Sector: Opportunities for German Companies 2018



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Large Pacific Ocean oil rig drilling platform off the southern coast of California, Photo: Bohrsinsel ©2007 Eyeidea

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Introduction

Investment in oil and gas production should grow during the next few years. This, at least, is the urgent hope of the International Energy Agency (IEA). Between 2014 and 2016, upstream oil and gas investment nearly halved, with a probable modest increase in 2017 mainly due to an upswing in US shale investment. Low crude prices have caused private companies to rethink their investment strategies, with state-backed investment losing assets from sovereign wealth funds.

Existing oil fields are depleting, and the sanctioning of new conventional fields has reached its lowest level in more than 70 years. Without further action, the IEA foresees a tightening market in the first years of the coming decade. OECD stocks have already been shrinking steadily since the first quarter of 2017. In order to avoid a crunch and surge in oil prices, according to the IEA, hundreds of billions of dollars of extra investment are needed. After the leading oil producers' late 2016 agreement to limit oil output, prices rose briefly, but have returned to a decline since the middle of 2017.

In oil production, the IEA is seeing US shale oil suppliers as the main source of growth for the coming years. By 2022, they should be adding 1.4m barrels per day even with oil prices around \$60 US, and more than double that production if prices hit \$80 US. Shale oil producers continue cutting costs and improving efficiency, thereby establishing new operations with ever-lower crude prices. US shale costs have nearly halved from 2014-16, reaching \$29 US in the Bakken oil field. In 2017 though, the rapid expansion of shale activities has triggered some cost increase.

Significant production growth is predicted for Brazil, Canada and Kazakhstan, all of whom made big investment decisions before oil prices declined. These three countries combined could add as much oil production as US shale oil drillers do. Mexico is also heading for more investment. Following a long decline in production by state monopoly Pemex, a successful offshore bid round in June 2017 is the first noteworthy success of an energy reform put in place years ago that hopes to attract more private capital. Germany's DEA is part of a winning consortium for one block.

Spending in Russia and the Middle East is still resilient and difficult to predict. Iran, having regained its place behind Saudi Arabia as the region's second largest oil producer, might suffer from sanctions still looming due to US President Trump's hard stance against the country. Investment in Iraq is subject

to political and security development. Chaos-ridden Venezuela, divided Libya and unsafe Nigeria continue to be difficult places for investors.

In the gas sector, the shale revolution is even more evident, as it has triggered a second revolution, this time caused by LNG (Liquefied Natural Gas). US producers seek to profit from better margins overseas, for example as a rival to the Russian pipeline that supplies the European countries. A wave of additional LNG production is coming online, peaking in 2018-19 with installations mainly built in the US and Australia.

Demand remains strong with no "peak oil" scenario existing in consumption. The IEA predicts an annual growth rate for oil of 1.2% by 2022 and of 1.6% for gas.

In oil consumption, the main developing economies are leading the way. China and India alone account for half of the predicted increase, with OECD demand remaining at roughly the same levels as 25 years ago. By far the most oil is still needed for transport, with growth rates outpacing other demand sectors. Transport activities are on the rise globally, especially in the Asia Pacific region. These increases are more than offsetting any technology shifts or economy gains in engine technology. Growth in the electric vehicles fleet, to cite an often discussed example, might be an important issue in the long run, but by 2022 the impact on oil demand will be negligible.

According to Exxon, the chemical industry, heavy industry, and others, which are the second largest oil consumers, will also show dynamic growth rates. However, the demand increase in residential and commercial sectors will phase out in a couple of years. In electricity production, the sector that consumes the most energy, oil already plays a minor role and is in the process of being replaced by other primary energy sources.

As for gas, lower prices strengthened its foothold, especially in Asia. Developing economies account for 90% of demand growth; China alone accounted for 40%. According to the IEA, gas demand growth by 2022 will have moved from power generation to the industrial sector. Exxon sees already nearly half of the world's energy consumption dedicated to industry. While part of this is met via electricity, gas accounts for about 30% of primary energy directly feeding industry. Gas is used as chemical feedstock or fuel to produce heat, among others. Heavy industry, as the largest industrial energy consumer, will shift its mix towards lower emissions energy and

Top Oil Producers & their Gas Production

Country	Oil Production 2016 (1,000 bpd)	Growth rate 2016/2015 (%) (of oil proc.)	Total proved oil reserves at end 2016 (bn barrels)	Natural Gas production 2016 (bn cm)	Growth rate 2016/2015 (%) * (of gas prod.)
USA	12,354	-3.2	48.0	749.2	-2.5
Saudi Arabia	12,349	3.0	266.5	109.4	4.4
Russian Federation	11,227	2.2	109.5	579.4	0.5
Iran	4,600	18.0	158.4	202.4	6.6
Iraq	4,465	10.8	153.0	1.1	12.6
Canada	4,460	1.6	171.5	152.0	1.7
United Arab Emirates	4,073	3.7	97.8	61.9	2.5
China	3,999	-7.2	25.7	138.4	1.4
Kuwait	3,151	2.7	101.5	17.1	1.0
Brazil	2,605	3.2	12.6	23.5	1.2
Mexico	2,456	-5.1	8.0	47.2	-13.0
Venezuela	2,410	-8.9	300.9	34.3	5.5
Nigeria	2,053	-11.9	37.1	44.9	-10.6
Norway	1,995	2.4	7.6	116.6	-0.7
Qatar	1,899	0.5	25.2	181.2	1.3
Total World	92,150	0.5	1,706.7	3,551.6	0.3

Source: BP

* Adjusted for leap years

away from coal. In the dynamically-expanding chemicals industry, the input of gas liquids is still surging, a direct result of the production boom of unconventional oil and gas in the US.

In the long run, investment levels are subject to the way governments are trying to curb CO2 emissions. If states keep climate pledges made in the Paris Agreement, cumulative global investment in oil and gas supply by 2050 will reach about \$35tn US, according to a recent joint publication by the IEA and the International Renewable Energy Agency. If even stricter rules were adopted to limit global temperature rise to less than two degrees, efforts would shift still more to improving end-user efficiency. This would cut the capex for oil and gas supply in half.

Author: Ulrich Binkert, Germany Trade & Invest

Mexico

Mexico as a business destination

Mexico as a business destination stands out due to its political and economic stability. With an economic growth of 2.3 % in 2016, Mexico's gross domestic product (GDP) reached a volume of 1.144 billion US Dollars. In the past years the country evolved into a competitive contract processing location for exports to the United States, which, at the same time, is its most important trading partner. However, Mexico is endeavoring to diversify its foreign trade structure while concluding the Pacific Alliance with Colombia, Peru, and Chile as well as consolidating business relations with China. Aside from duty-free access to the US and Canada (North American Free Trade Agreement NAFTA), Mexico has a wide network of free trade agreements with 46 countries and is a member of the Organisation for Economic Cooperation and Development (OECD). Furthermore, Mexico possesses a geostrategic position between North and South America and offers a large and strong market including a growing number of German enterprises (approx. 1,900 companies with 130,000 employees). Germany is the most important European trading partner of Mexico with bilateral commerce amounting to 16.2 billion euros (2016). At the same time, the investment of German companies in Mexico reached a volume of 30 billion euros in 2016.

Mexico is heavily dependent on petroleum, as the petroleum sector comprised approximately one-fifth of the country's revenues (2016). Despite the petrol price decrease, international petroleum enterprises are highly interested in the Mexican market, which plays an important role in the global oil and gas sector. The country is a major non-OPEC oil producer as well as a major source for US oil and gas imports. Producing 2.6 million barrels per day of petroleum in 2015, Mexico ranked 10th when compared to other countries.

Overview of the Mexican Oil & Gas Sector

Mexico's Energy Reform (2013) set in motion a series of changes that continue to revolutionize the country's oil and gas industry. This reform ended with Petróleos Mexicanos (PEMEX)'s near 80-year monopoly over the country's hydrocarbon reserves and continues with its transition into a productive state enterprise that has resulted in far-reaching consequences for every part of the oil and gas value chain. With a vast untapped

hydrocarbon reserve, increasing demand from a growing population and economy, and a new regulatory framework, Mexico is quickly becoming one of the most exciting markets for oil and gas companies along the entire supply chain. New private actors and international companies are entering Mexico's upstream market through the National Hydrocarbons Commission's licensing rounds, while others have started to capitalize on midstream infrastructure and downstream gasoline distribution opportunities.

To ensure an efficient organization of the bidding processes and the regulation of the energy sector, public institutions were created, while others gained more competences. The institutions and their respective functions according to the regulatory framework are listed in the Contracts for the exploration and production of hydrocarbons are awarded through bidding rounds (round 0-5 between 2015 and 2019). Recently, the *DEA Deutsche Erdoel AG* has obtained two exploration licenses in Mexico. The company has been awarded with a 30% exploration license in the basin of Tampico-Misantla and a 50% license share and operatorship of the onshore oil field in the State of Tabasco.

In July 2017 a consortium comprising *Sierra Oil and Gas*, *Talos Energy*, and *Premier Oil* discovered the fifth-largest deposit of light oil worldwide in the last five years. The maximum amount of resources totals 2.3 million barrels per day and is to be increased up to 3.5 million barrels per day by 2025. So far, almost 800 fields of raw material occurrence have been identified.

Mexico has the worldwide ninth-highest gas demand, which cannot be covered by national production. For that reason,

Table 1: Regulators and their function in the Mexican hydrocarbon market

Regulator	Function
National Hydrocarbons Commission (CNH)	Regulates upstream activities and determines winners of upstream bids
Energy Regulatory Commission (CRE)	Regulates electricity as well as mid- and downstream for hydrocarbons
Agency for Safety, Energy and Environment (ASEA)	Guarantees environmental protection and industrial security in the hydrocarbon sector

the country is a net importer of natural gas with an average of more than 3 billion cubic feet per day from the United States in 2016, which constitutes 80% of Mexico's natural gas imports. Due to an increased demand for natural gas through 2030, the expansion of the gas pipeline systems is crucial. Currently, the Mexican gas pipeline system, managed by the regulatory authority for natural gas, CENAGAS, covers 14,000 km with a capacity of 6.3 million cubic feet; however, it is expected to be expanded by an amount of 75% by 2018.

Within the scope of holding periods, oil and gas transport, distribution, and storage are opened up for third parties who are able to apply for an operating license in various biddings. In addition, the construction and the modernization of facilities for the storage of natural gas reserves are primary goals for the sector. In particular, the Mexican energy ministry aims to strengthen the country's energy security through a gradual increase in the minimum level of inventories with immediate availability to move from the current 3 days of storage to 5 days of sale by 2019, 10 days by 2021, and from 15 days by 2025.

PEMEX operates nine natural gas processing plants and six refineries with a capacity of 1,640 million barrel per day; however the utilization rate is only 66%. For this reason, Pemex is planning the modernization and transformation of its six refineries as well as the existing petrochemical installations for gas treatment. National production alone is insufficient to cover Mexico's national plastic consumption of 5.3 million tons per year; therefore, the best-practice model "Etileno XXI" was implemented within the Mexican-Brazilian joint venture "Braskem Idesa" in 2016. The model includes the construction of an ethane cracker and three polyethylene plants and is expected to contribute to the renewal of the petrochemical infrastructure. In addition, the German company BASF has made investments in the petrochemical sector amounting to 5.6 million US Dollars. In summary, it is clear that a high potential for German companies in the downstream sector exists.

Business Opportunities for German companies

German companies should view Mexican energy reform as an opportunity to position themselves at an early stage with the help of their technological expertise and knowledge of the market. In the upstream sector, German companies are seen as important operators, while in the mid- and downstream sectors they have the leading market competence as providers of technology, equipment, and services. Companies can tender on their own initiative or as a consortium. The latter is

recommended for German firms that do not have experience in the market. Suitable entry strategies could be the establishment of joint ventures, either with Mexican technology or service companies. Furthermore, firms can enter the Mexican hydrocarbon market by doing business directly with Pemex. The company is able to contract and/or subcontract third parties by means of standard remunerated integrated service-agreements, farm-out agreements, and other standard forms. These agreements allow a foreign company to take a stake in exploration or production projects as happened with the *DEA Deutsche Erdöl AG*.

In the following chart the possible business fields for German companies by sector are listed:

Table 2

Upstream
<ul style="list-style-type: none"> • Perforation technology vertical/horizontal • Implementation of 2D and 3D seismic, electromagnetic and geological studies (Seismic Imaging and Data Processing) • Splitting processes of the raw material storage • Offshore drilling • Hydraulic fracking and horizontal drilling • Progressive cavity pump systems
Midstream
<ul style="list-style-type: none"> • Expansion of the gas pipeline network (German companies as investors) • Expansion of the gas storage system
Downstream
<ul style="list-style-type: none"> • Cutting-edge technology for tertiary oil production (IOR and EOR) • Energy efficiency for refineries, especially in petrochemical production • Infrastructure projects • Processes of oil recovery • Optimization of desulfurization processes for heavy oils • Wastewater treatment • Process engineering for the removal of nitrogen from moist oxygen gas • Cogeneration in refineries and gas treatment centers

German companies that consider investing in the Mexican hydrocarbon sector are able to implement their technology, products, and services. The high-quality benchmarks of their products will help to establish a strong and profitable market position as well as to gain competitive advantage in the long term.

Best Practice: Samson AG

Best Practice:

“A lot of patience and dedication”

Héctor Domínguez, CEO

Samson Mexico

Products	Manufacturer and provider of reliable linear and rotary valves for wellheads and oil and gas processing, sensors and thermostats, automation systems; service expertise in topside modules for FPSO, FSRU, FLNG and platforms; valve design to handle high pressure drops, sour gas, multiphase flows and high velocities.
Samson in Mexico	Samson has over 23 years of experience in the Mexican market. At the end of the 1980s, the company entered the market by sending representatives to Mexico. In 1994 the first subsidiary in Cuernavaca, State of Morelos, was founded, followed by the opening of a plant in Altamira, State of Tamaulipas, and the relocation of the company to Lerma, State of Mexico, in 2009.
Market attractiveness	Due to the liberalization of the energy sector, market access is now possible to foreign companies. This leads to a further development of additional markets such as mining, the chemical industry, and pharmacy. Products and services “made in Germany” are highly regarded in Mexico. For that reason, the potential of the oil and gas sector opens up a variety of opportunities especially for German companies to enter the Mexican market with their expertise and technology.
Challenges	According to our experience, one of the challenges for market entry is the market positioning itself. Due to the high impact and the close business relations with the USA, it takes time to sensitize the Mexican market to new products and brands. Uncertainty remains regarding the timeline for EPC companies to actually implement their production plans, which makes adjustment to the changes even more difficult. Furthermore, the exchange rate has a significant influence on the price structure and should be taken into account.
Advices for newcomers	For a successful positioning in the Mexican market, it is advisable to have intercultural skills and a sense of different corporate cultures. In addition, I recommend considering the time needed to become familiar with the Mexican way of doing business, which requires a lot of patience.

SAMSON CONTROL S.A. de CV was founded on October 25, 1994, in Mexico. The head office is currently located in Lerma, State of Mexico, which coordinates equipment importation, distribution, and sales. In order to offer a more efficient and faster service, Samson has seven subsidiaries. The most prominent being: in Tampico (State of Tamaulipas), in Monterrey (State of Nuevo León) and in Coatzacoalcos (State of Veracruz).

The warehouse offers an immediate delivery time and thus satisfies the most demanding customers. Its field ranges from heating and air conditioning to large chemical and petrochemical industry applications. SAMSON is active virtually everywhere that fluids, vapors, gases, chemicals, etc., circulate.

A close collaboration continues to exist between the German chemical industry and Mexico. The establishment by Samson of the plant in Altamira (Tamaulipas) was an important step in consolidating their relationship with the German company BASF.

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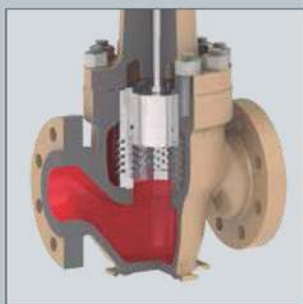
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We pride ourselves in knowing what drives key industry sectors and are able to provide on a daily basis, the best creative and cost-effective business solutions beforehand. Our clients are medium-size, as well as leading global companies of numerous nationalities and economic sectors.

We ensure that our clients are competently represented wherever their businesses take them. This is why we hold a network of correspondents across the country.

We are the 5th generation of equity partners with a clear vision as to the highest standards of service, competitiveness, efficiency and productivity. The soundness of the firm together with the entrepreneurial approach of our generation has proven to be the best combination to assist companies in the forthcoming economic boom resulting from Mexico's structural reforms.

Professional ethics and effective team work, leading to solid solutions and constant innovation are embedded throughout our firm. In addition to sponsoring training programs for our lawyers, both, nationally and internationally, we encourage the participation of our partners as part time lecturers and research fellows in high ranking law schools in Mexico.

Goodrich actively participates in trade associations, local and international bars. Some of our members are frequently invited to speak at both, domestic and foreign conferences, as well as to hold leadership positions in sections of bar associations and industry organizations. Last but not least, sustainability, corporate social responsibility, pro bono work and gender equality are also essential elements of our existence.

SOME REPRESENTATIVE CLIENTS: A MULTI-SECTOR FLAVOR

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SOME RECENT EDITORIAL REVIEWS

"Goodrich, Riquelme y Asociados successfully blends the tradition and experience that come from being in existence for nearly eight decades with a modern approach that has seen it embark on a generational transition in recent years". *Latin Lawyer*.

"They demonstrate strong industry awareness and commercial acumen. They are always keen to find appropriate solutions for the client". "They have shown strength in their proactive approach and ability to negotiate". *Chambers Latin America*.

"Goodrich, Riquelme y Asociados stands out for rapid responses grounded in deep knowledge of the sector and its legal framework". *Legal 500*.

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OUR APPROACH TO THE GERMAN MARKET

The German business community has a primary role in the Mexican market. Its longstanding presence covers practically all economic sectors, including automotive, pharmaceuticals, chemical, electromechanical and electronics. We are proud to assist large and mid-size German companies in achieving their business plans for Mexico. We are devoted to provide efficient services at competitive rates to potential new players to the Mexican market.



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Brazil

A Window of Opportunity for the World

By the Brazilian Petroleum, Gas and Biofuels Institute (IBP)

The modern world is undergoing intense transformations and the energy industry is no exception. New technologies have given rise to real revolutions, such as production in unconventional reservoirs in the United States, which reduced their oil import dependence and had a deep impact on global geopolitics and oil prices.

In light of this scenario, it is crucial to take advantage of the window of opportunity in the industry by exploring promising reserves. In this regard, Brazil stands out due to the potential of its basins, particularly those of the pre-salt. Today, the Brazilian pre-salt is commercially competitive and represents one of the regions with the highest potential for exploration and growth of oil and gas production in the country.

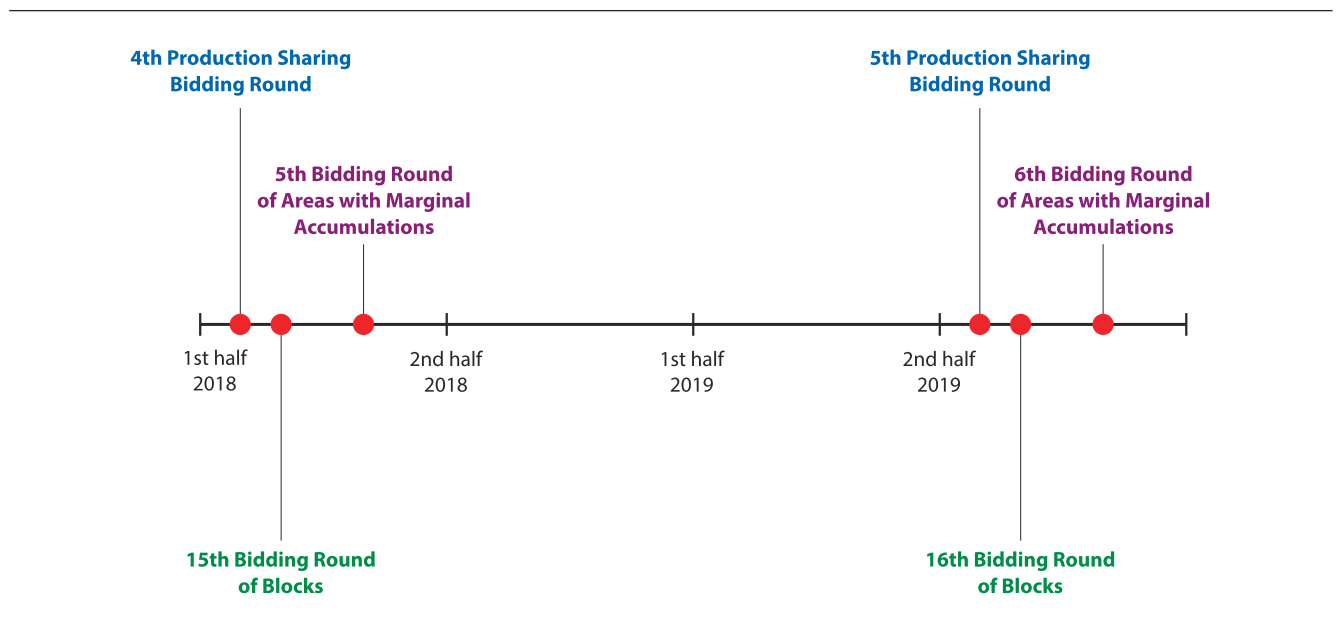
The area already draws global attention due to its high production index and low risk, with great accuracy in wells drill-

ing. Proof of the foreign interest in the region is the last two pre-salt bidding rounds held in 2017 by the National Agency of Oil, Natural Gas and Biofuels (ANP), in which companies from Europe, United States and China, some of them state-owned, participated. This also established the debut of operators such as Qatar Petroleum in the country.

Bidding rounds held in 2017 by the ANP marked the return of investors' confidence in the new cycle of the oil and gas industry in Brazil. The new moment is a reflection of important regulatory advances made by the current government, which unlocked important issues that have paralyzed the industry. The advances include the end of the single operator rule, which now allows more competition in the pre-salt area, the extension of Repetro's fiscal regime until 2040 and the loosening of local content requirements.

Another extremely important aspect for the establishment of a more favorable environment was the definition of a permanent bidding rounds schedule through 2019. The schedule provides predictability to investors in an industry that always plans for the long term.

Figure 1: Planning bidding rounds



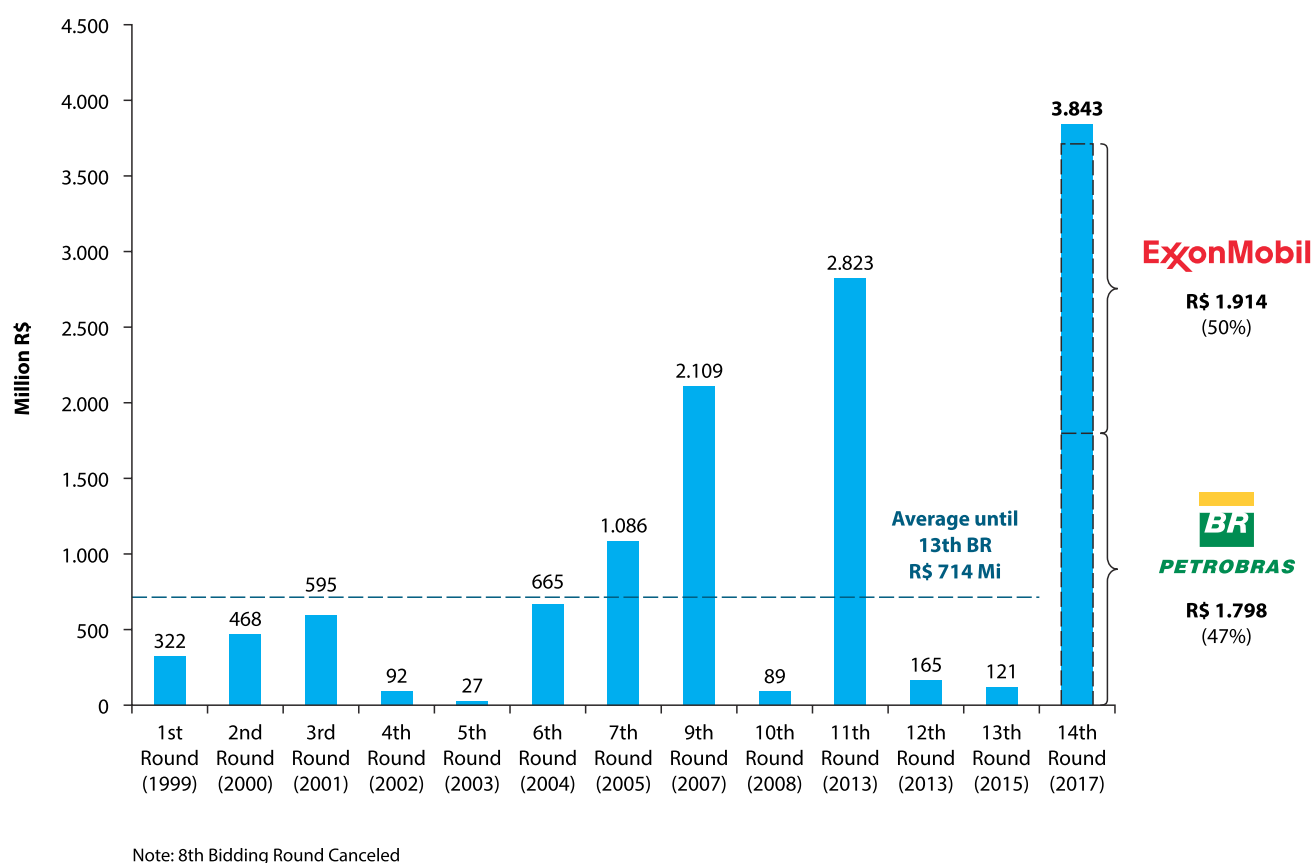
Source: Industry Observatory - IBP with data retrieved from ANP

According to ANP, the next nine bidding rounds¹ to be held in Brazil may yield over US\$ 80 billion in new investments in more than 300 new offshore wells. That means over 10 billion barrels of recoverable oil (Bbbbl). According to ANP, US\$ 30 billion will be invested in Rio de Janeiro state alone from 2017 to 2019. In addition, Abespetro, an entity representing service providers in the oil industry, estimates the resumption of the production chain will generate 500,000 new direct and indirect jobs in many different fields.

To unlock all this potential, the Brazilian oil industry needs to recover and maintain foreign interest. The result of the last auctions illustrated the appetite of international oil companies for the world-class Brazilian reserves.

Another positive indication was German DEA Deutsche Erdoel AG's interest in strengthening its presence in Latin America. The company is already assessing opportunities in Brazil. At the Offshore Technology Conference (OTC) held in Brazil, Lord John Browne, Chairman of DEA's Supervisory Board, stated that the company is looking at both production and development asset acquisition opportunities and exploratory blocks.

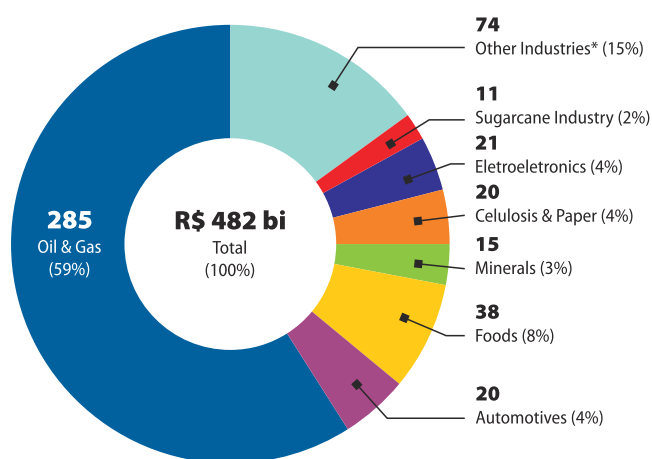
Figure 2: Signature bonus by bidding rounds



Source: Industry Observatory - IBP with data retrieved from ANP

¹ Including the three rounds that occurred in 2017

Figure 3: Brazilian industry investment outlook



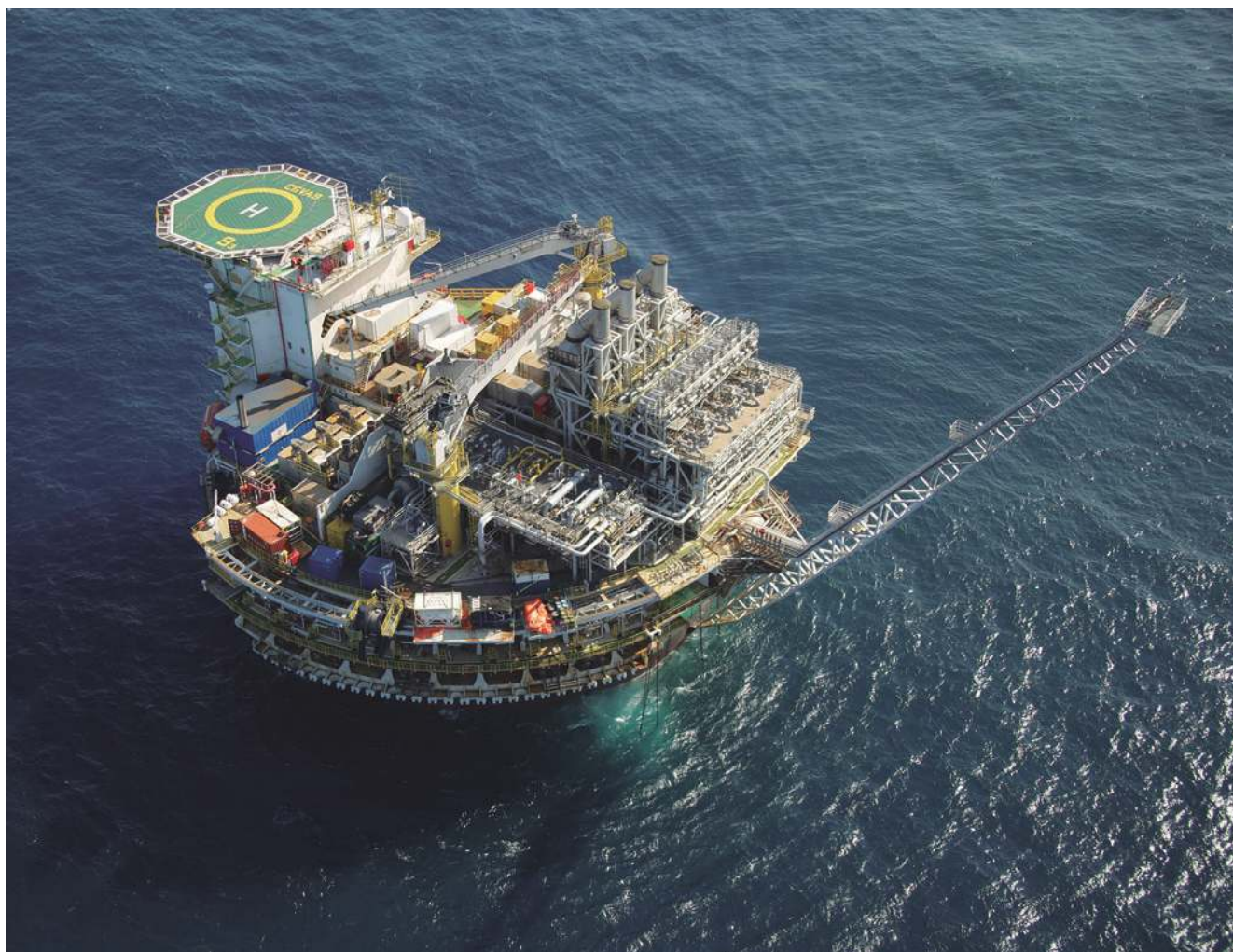
* Includes Beverages, Chemical Industry, Health Industry, Aerospace & Defense and Steel
Updated - november 2017

Source: Industry Observatory - IBP with data retrieved from ANP

There are huge technological challenges to overcome, and the Brazilian supply chain has much to gain from knowledge exchange with and the experience of German companies, such as an advanced and the "industry 4.0" pioneer. Some examples of fields of expertise offered by German companies are data acquisition and well construction, projection, manufacture and installation of equipment and removal of facilities, and execution of required repairs.

The modern world and the energy industry are going through intense and rapid transformations. Therefore cooperation between industry links in Brazil and abroad is vital for industry growth by leveraging production and the entire supply chain. In this sense, Brazil and Germany have the ability to build together an even more competitive industry.

Pré-sal, Photo: Canal do Youtube Revista ISTOÉ



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Brazil is going through the most profound transformation of its oil and gas sector ever. We can finally see clear signs of recovery and strong indications of an imminent turning point. The Brazilian oil and gas sector will end up with a more competitive, diverse and agile market. MAN Diesel & Turbo Brasil is perfectly prepared to face these upcoming challenges and to serve the new market player, from state-of-the-art new equipment up to high quality after sales solutions Made in Brazil over the complete life time of the equipment.

After difficult years in the oil and gas sector around the globe, and especially in Brazil, there is finally light at the end of the tunnel. There are signs of recovery in 2017/2018. Petrobras' divestment and partnerships program for instance, is seeking to secure some US\$19.5 billion by the end of 2018. The initiative, which includes assets from the upstream to the downstream and petrochemicals, if successful, will definitively change the competitive landscape in the country by bringing more agents to the market, thus creating more diversity and reducing the country's dependency on mainly one single major player. The successful 14th auction conducted on September 27th is a testament as to how the industry is positively reacting to the new regulatory framework.

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MAN Diesel & Turbo SE, based in Augsburg, Germany, is the world's leading provider of large-bore diesel engines and turbomachinery for a broad range of applications. The range of goods includes complete marine propulsion systems, turbomachinery units for the oil & gas as well as the process industries and complete power plant solutions. For the offshore oil and gas exploration state-of-the-art compression solutions for topside applications on FPSOs, emergency diesel gensets, offshore power modules or gas turbines form our portfolio. Furthermore the world's first subsea gas compression facility features two MAN HOFIM™ hermetically-sealed motor-compressor units.

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Customers receive worldwide after-sales services marketed under the MAN PrimeServ brand. In Brazil, the company has been in operation for decades. With the main office in Rio de Janeiro, the local entity hires more than 300 employees across 5 locations. With over 15 years of experience in offshore operation and maintenance in Brazil facing the complex tax and labor regulations MAN PrimeServ Brasil is well positioned and prepared for future challenges of additional services.

Local in-house capability

Building on our outstanding technical capabilities as a world leading OEM for turbomachinery, MAN PrimeServ Brasil offers reliable, efficient and extensive repairs and rebuilds for all kind of rotating equipment like compressors, turbines, engines, gearboxes or pumps. Our fully fledged high-tech repair center located in Petropolis/RJ – the only one among major suppliers in Rio – disposes of broad machining capabilities, advanced welding and material overlay services, progressive stacking, balancing and inspection techniques. In case there is no adequate local OEM support for your equipment MAN PrimeServ Brasil is the solution. Our comprehensive portfolio also comprises non-OEM equipment repair services. Unknown design can be manufactured using 3D measurement and reverse engineering. Our experienced highly qualified field service staff grants innovative customized high quality solutions 24/7.

Training at its best

Professional qualification offered and conducted by PrimeServ Academies around the globe is a strategic target of our company. We strongly believe that the best satisfaction of our products can be achieved only if the technical personnel of our customers are well trained. MAN PrimeServ Academy Brasil offers a wide range of turbomachinery and diesel engine courses. To optimize customer benefits we offer generic, specially tailored and on-site training courses in several languages.

Offshore Operation and Maintenance

Since 2002 oil major Petrobras has been entrusting to MAN's comprehensive service of 20 gas turbines and compressors on four platforms located in the Atlantic Campos Basin. Under the contract MAN PrimeServ ensures maximum efficiency and availability of the turbomachinery. The service scope comprises scheduled and unscheduled maintenance, offshore operations, remote monitoring, spare parts management and logistics. Through continuous investment in qualification and knowledge transfer from Germany to Brazil performance KPIs of the equipment could be improved tremendously.

We are here, we are prepared, we are your MAN in Brazil.

United States

United States Economic overview

According to key economic indicators, the U.S. economic outlook is healthy. The GDP growth rate is expected to remain between 2 and 3 %. Unemployment is projected to continue at the natural rate. Inflation and deflation are also at healthy levels.

Despite facing challenges both domestically and on a global level, the U.S. economy is still the largest and arguably most important in the world. It represents about 20% of total global output and features a highly developed and technologically advanced services sector, which accounts for about 78% of its output. The industrial sector comes in second with about 20% followed by agriculture with 1.6% of GDP. Services-oriented companies in areas such as technology, financial services, healthcare and retail dominate the U.S. economy. Large U.S. corporations also play a major role on the global stage, with more than a fifth of companies on the Fortune Global 500.

After the slowdown in growth of the American economy in 2016, mainly due to lower exports and investments, improvement is projected for 2017. In particular the increase in consumer spending as well as the supporting environment of the financial markets and the trend reversals on the real estate market help to improve the budgetary balance and strengthen the overall economy. U.S. GDP growth is expected to rise to 2.4 % in 2017. This increase is a slight improvement from the 2.1 % growth in 2016. However, it falls short of 2015's growth rate of 2.6 %. The September 2017 forecasts by the Federal Open Market Committee predict that gains in gross domestic product will drop to 2.1 % in 2018 and 2.0 % in 2019. This forecast begins to take into account the impact of President Trump's policies.

U.S. manufacturing is projected to increase faster than the general economy. Production will grow about 3% in 2017, and 2.8% in 2018. Growth is projected to slow down to 2.6% in 2019 and 2% in 2020.

According to the latest projections, the unemployment rate will drop to 4.3% in 2017 and 4.1% in 2018. A notable improvement from the 4.7% rate in 2016.

Oil & Gas industry

Oil production in the U.S. could reach record levels in 2018. Despite the temporary slowdown caused by some major hurricanes, the outlook remains very positive in upcoming years.

A similar situation can be observed for the country's gas production. Here, the boom is mainly due to the increased focus on shale gas.

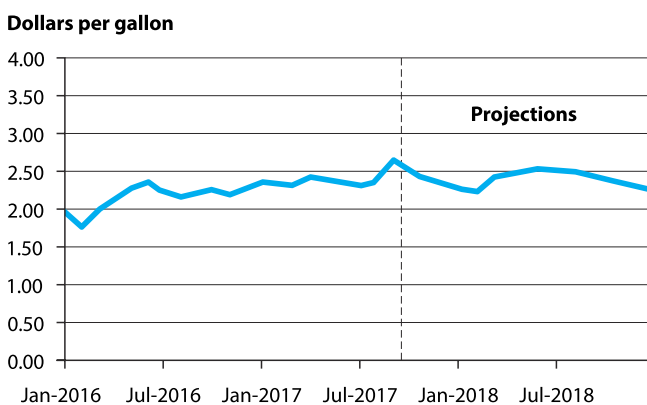
In August 2017, Hurricane Harvey hit the Gulf Coast, causing a decrease of production of just under 190,000 barrels a day. Tropical storm Nate also slowed down production in the Gulf of Mexico earlier the same year.

In terms of technology, the country has been a pioneer and innovator in oil drilling and refining, which has encouraged the development and settlement of energy-related industries for decades. A multitude of companies are engaged in the domestic oil and gas processing industries, enabling them to meet the petroleum industry's needs and maintaining advantages against international competitors. Due to technical innovations over the past decade, U.S. production has increased the extraction of shale oil and gas, thereby decreasing the country's dependence on imports. In May 2017 the U.S. government reported record exports of 1.3 million barrels of crude oil per day.

The new administration has reconfirmed its commitment to offshore development and expansion and is on a mission to unlock a new wave of heavy investment for oil and gas production in the United States.

Compared with the sometimes tumultuous price instability during 2015 and 2016, the U.S. oil and gas industry appears to have settled into a more stable pattern in 2017 and 2018, as shown by the average monthly retail prices below.

Average U.S. Gasoline Retail Prices incl. taxes in USD



Source: U.S. Energy Information Administration, Short-Term Energy Outlook, October 2017

Crude oil production is at an all-time high. Forecasts from the U.S. Energy Information Administration (EIA) see total U.S. crude oil production averaging 9.2 million barrels/day (b/d) in 2017 and 9.9 million b/d in 2018, which would put 2018 ahead of the previous record of 9.6 million b/d in 1970 and mark a new record in annual U.S. crude oil production.

A similar trend can be observed in the U.S. dry natural gas production, which is projected to average 73.6 billion cubic feet per day (Bcf/d) in 2017, a 0.8 Bcf/d increase from the 2016 numbers. This trend is expected to continue through 2018, with a projected increase of 4.9 Bcf/d compared to 2017.

Gulf coast significance

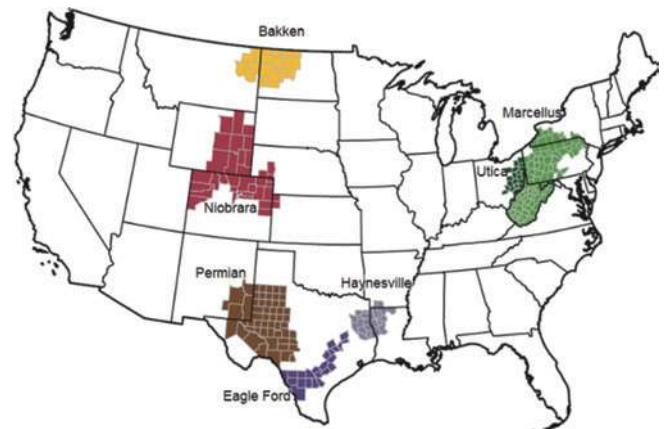
The area along the Gulf of Mexico, both onshore and offshore, is one of the most important regions for energy resources and infrastructure. The Gulf of Mexico offshore oil production accounts for 17% of total U.S. crude oil production, and federal offshore natural gas production in the Gulf accounts for 5% of total U.S. dry production. Over 45% of total U.S. petroleum refining capacity is located along the Gulf coast, as well as 51% of total U.S. natural gas processing plant capacity.

The U.S. government pursues the expansion of the offshore sector as a high priority. The focus of new field exploitation focuses especially on the Gulf Coast where the country's oil and gas industry finds its main cluster. The Bureau of Energy Management (BOEM) announced in October 2017 a proposed development of over 76 million acres of the Gulf for oil and gas exploration. The proposed oil and gas lease sale includes areas off the coasts of Mississippi, Alabama, and Florida. This is the largest single offering of oil and gas leases ever held in the United States. The sale is scheduled to take place at the end of Q1 2018 and is subject to changes that would be announced in the Final Notice of Sale.

In addition to the huge offshore potential, the shale industry has seen tremendous growth in 2017 as well - with two of the most important regions located in Texas, along the Gulf coast, namely the Permian basin and Eagle Ford. After two years of significant declines in upstream oil investments, the sector is finally facing a rebound in 2017 and it all comes down to one thing: a sharp jump in money flowing into U.S. shale oil projects.

The EIA has designated six formations responsible for the bulk of recent production growth in domestic shale (Fig. 1).

Fig. 1



Source: U.S. Energy Information Administration: Drilling Productivity Report (2017)

Fig. 2



Source: U.S. Energy Information Administration: U.S. Energy Mapping System

The above illustration (Fig. 2) by the EIA shows the accumulation of crude oil pipelines as well as natural gas inter/intrastate pipelines. The state of Texas contains the most extensive network of intrastate gas pipelines. Crude oil is produced in 31 U.S. states and in U.S. coastal waters. In 2016, about 18% of U.S. crude oil was produced from wells located offshore in the waters of the Gulf of Mexico. About 64% of U.S. crude oil production came from five states:

- Texas (36.3%)
- North Dakota (11.7%)
- California (5.8%)
- Alaska (5.5%)
- Oklahoma (4.7%)

The construction of pipelines has also underpinned industry revenue growth over the past years since new pipeline construction relies heavily on valves and related parts. Ongoing maintenance and repair of existing piping systems has further supported revenue. This is particularly true for the private sector where maintaining existing systems has become the primary focus.

Opportunities for German companies

The U.S. oil and gas industry has been struggling with the heavy drop in oil prices for a while. This forces many companies to set a new focus on efficiency, reducing overcapacities and applying stricter criteria when choosing exploration areas. This development has led to harmful consequences such as a high number of lay-offs or holds on investment projects. On the other hand, it boosts advantages for all oil consuming industries, such as chemical and petrochemical. Furthermore, the paradigm shift among oil producers delivers market entry chances and new opportunities for supplier companies capable of meeting the new needs of companies struggling with low oil prices. Now project decisions tend to be made more based on long-term benefits rather than the quick increase of plain oil production. There is a shift from quantity- to quality-thinking. Operational excellence, efficiency and lean production receive more emphasis. These changes provide opportunities for German companies offering high-quality specialized solutions that offer pay offs over the long run. Products and services that promise improvements in operational costs receive more attention and consideration. The stamp “made in Germany” enjoys a good reputation in the U.S., positively associated with reliability, competitiveness and quality.

The changing business landscape will also see new business models and forms of partnership emerge. One of the recent trends is that the procurement process is moving online and becoming more centralized, which in turn also offers smaller companies a chance to get exposure for their products.

New construction projects also offer great opportunities for German companies entering the market. A recent example is the planned 650-mile natural gas pipeline in Texas. The pipeline will link natural gas liquids (NGL) reserves in the Permian and Eagle Ford to Gulf Coast refiners, petrochemical companies, and export markets.

Additionally, in an October 2017 statement, West Texas LPG Pipeline LP, a joint venture between Oneok and Martin Midstream Partners LP, announced its plans to invest about \$200 million in expanding its NGL system into the Delaware Basin.

The Oil and Gas industry is also very open to new technologies and digital innovation. This creates opportunities for companies offering digital solutions – especially when it comes to big data. Modern offshore drilling platforms have roughly 80,000 sensors, which are estimated to generate about 15 petabytes (15 million gigabytes) of data during an asset’s lifetime. This field will continue to grow and create opportunities for new companies looking to enter the market.

It is important to note for German companies looking to enter the U.S. market that a local presence is not only vital, but is becoming a necessity. President Trump’s policy of “Buy American, Hire American” is a message that has resonated with many people in the United States. By establishing a local U.S. presence, German companies can demonstrate their commitment to the market and put themselves in a favorable position for future development.

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United Arab Emirates

Overview of the UAE Oil and Gas Market

The UAE Oil Market

The United Arab Emirates has the world's sixth largest oil reserves. Each of the seven emirates is responsible for regulating the oil industry within its borders, creating a mix of production-sharing arrangements and service contracts. In Abu Dhabi, the Supreme Petroleum Council (SPC), chaired by His Highness Sheikh Khalifa Bin Zayed Al-Nahyan, President of the UAE sets Abu Dhabi's petroleum-related objectives and policies. 95% of the UAE's oil reserves are in the Emirate of Abu Dhabi with a volume of about 2850 billion m³, both offshore and onshore. The UAE holds 10% of the OPEC production. The oil sector holds 30% of the GDP. The fluid quantity amounts to 2.8 million barrel per day (bpd) and should increase up to 3.5 million bpd in 2020.¹

The fall in oil prices also had an impact on project development in the UAE. A number of projects have been delayed or canceled; however, the market seems to be recovering. As of the 3rd quarter of 2017, engineering, procurement and construction (EPC) contracts have been awarded with a total of 2.265 Million USD for the oil gas and petrochemical sector. This is an increase from 2016, and 2017 is expected to become the best year for the oil and gas contract awards in the UAE since 2014. Currently bids in the hydrocarbon project market are estimated at more than 10 billion USD. Among them are the Bab Integrated Facilities Project Expansion and the Haliba Oil Field Development, including the development of an offshore concession block and two onshore concession blocks. There is also a possibility that the EPC contract for Procession Offshore Crude Project at Ruwais Refinery could be awarded by the end of 2017.²

The low oil price was also a reason to restructure and centralize the procurement system of Abu Dhabi National Oil Company (ADNOC), the main player in the oil and gas sector in the UAE. ADNOC is one of the largest oil companies in the

world with a production of around 3 million bpd, employing over 65,000 people. The government-owned corporation was founded in 1971 with headquarters located in Abu Dhabi.³ The product range extends from crude oil and condensates to petroleum products to gas, Sulphur, and petrochemicals and is sold on six continents. The ADNOC 2030 strategy aims to increase crude oil production to 3.5m bpd in 2018, increase gasoline production to 10.2 mtpa by 2020, and increase petrochemical production to 11.4 mtpa by 2025.⁴

ADNOC⁵ reached one milestone for improved efficiency in October 2017 with the unification of the company's subsidiary brands and development of a procurement program with centralized registration and pre-qualification. This makes ADNOC Group more dynamic and progressive.

By educating the Emirati people and supporting the UAE in becoming a knowledge-based society, ADNOC continues to contribute through established ADNOC Schools and the ADNOC Technical Institute (ATI), preparing students for the Oil and Gas Industry. A recently established merger between the Petroleum Institute, Khalifa Institute, and Masdar Institute, which is partly in cooperation with the US-based MIT, aims to combine resource and exchange knowledge.

ADNOC Group is active in a range of product areas:

- ADNOC Onshore, the leading onshore producer within ADNOC Group, manages 11 oil and gas fields in Abu Dhabi and also invests in reducing CO₂ emissions.
- ADNOC Offshore contributes more than 40% (1.4 million bpd) to ADNOC's current daily production and plans to contribute 1.6 million bpd by 2018.
- ADNOC Drilling, the first venture under full ADNOC ownership, provides drilling rigs, equipment rental or rig moves to ADNOC Group companies and has drilled over 7,200 wells since 1973.
- Al Yasat Petroleum is a joint venture between ADNOC and China National Petroleum Corporation, expecting production of oil in 2018. The venture is currently exploring new offshore

¹ <https://www.gtai.de/GTAI/Navigation/DE/Trade/Maerkte/Branchen/produktmaerkte,t=produktmaerkte-in-den-vereinigten-arabischen-emiraten-vae-2017,did=1665264.html#l-und-Gas-Niedrige-lpreise-bremsen-Investitionen-> (27.08.17)

² MEED Oil and Gas Contract awards rebound (17.10.2017)

³ <https://adnoc.ae/en/about-us/our-history> (29.10.2017)

⁴ <https://adnoc.ae/en/strategy2030>

⁵ <https://adnoc.ae/en/doing-business-with-us/procurement>

and onshore areas around Abu Dhabi and has a strong focus on health and safety.

- Elixier was founded in 2007 by the Linde Group and ADNOC. After unifying ADNOC's brands in October 2017, it was renamed: ADNOC Industrial Gas.
- Al Dhafra Petroleum is also an exploratory branch of ADNOC and aims to have automated and unmanned oilfields at the Haliba field. The Korea National Oil Corporation and GS Energy own 40% of the company.
- ADNOC's Gas Processing company has a capacity of 8 billion standard cubic feet/d and was established in 1978 through a 30-year joint venture between Shell, Total, and Partex. The venture was renewed in 2008 for an additional 20 years.
- ADNOC Sour Gas is a joint venture with Occidental Petroleum and ADNOC. The venture produces 1 billion standard cubic feet of gas per day and accounts for 10% of the UAE's gas production.
- ADNOC LNG, established in 1973 as one of the first LNG producer in the region, mainly supplies LNG and LPG to the Japanese power company TEPCO, but also feeds the UAE. Its aim is to reduce flaming and emissions in the future.
- ADNOC Refining operates at the Ruwais and Abu Dhabi refineries and has a total processing capacity of 922,000 bpd and a 1,900 km pipeline network in Abu Dhabi. It contributes to global and UAE oil markets and transports jet fuel to AUH and DWC airports.
- ADNOC Fertilizers has two plants, FERTIL-1 and -2, and manufactures urea fertilizer and granulated urea for agricultural use. The plants have a CO₂ recovery unit that increases the production by 30% and reduces CO₂ emissions by 20%. ADNOC Fertilizers also innovates in De-NO_x mediums (called AdGreen) which reduces NO_x emissions and can be used in diesel engines or others.

The UAE Gas Market

The United Arab Emirates has the world's seventh largest gas reserves. Abu Dhabi was the first Emirate to produce liquefied natural gas (LNG). The fluid quantity amounted to 54.2 billion cubic meters (bcm) of natural gas in 2014, representing a 5.8% growth year-to-year.⁶ In 2016, 50.2 million tonnes

of oil equivalent (Mtoe) were produced. The purpose is to increase gas production in order to be less dependent on imports. However, equally to the oil market development, many gas projects have also been canceled or postponed. After the retreat of Shell from the Bab Sour Gas Project (15 billion USD), the project has been delayed. At the beginning of 2017, ADNOC terminated the FEED (Front End Engineering and Design) Tender of the Hail and Gasha Sour Gas Project valued at 15 billion USD. The ADCO North East Bab Field Development (2 billion USD) has been re-retendered at the beginning of 2017. Nevertheless some projects have been continued or re-tendered in the second half of 2017.⁷ In the fourth quarter of 2017 the tender of the Habshan Offshore Pipeline (Package 2) (410 Million USD) is expected to be tendered.⁸

In order to cater to the high UAE gas demand, the Dolphin pipeline (owned 51% by Mubadala Investment and 24.5% each by Total and Occidental) supplies up to 2 billion cubic feet/day from Qatar's North Field to the UAE and Oman.

Petrochemical Market

The founding in 2002 of ADNOC daughter company Borouge, a joint venture between ADNOC and the Austrian-based provider for Polyolefins, base chemicals and fertilizers, Borealis A, was a milestone in the development of the UAE petrochemical industry. With the joint venture, a pillar outside of the general oil and gas market has been created. "Borouge provides innovative and sustainable plastics solutions for infrastructure that create value [...], automotive and advanced packaging applications that address global challenges, such as climate change, food protection, access to fresh water, energy conservation, healthcare and waste management."⁹ In the years up to 2015, Borouge expanded its plants at Ruwais, located 250 km away from Abu Dhabi, in three different expansions (called Borouge 1, Borouge 2, Borouge 3) with a value of about 10 billion USD. Production capacity doubled to 4.5 million tonnes with a target of 10 million tonnes per year. The company is also interested in recycling plastics and started the Free Waste campaign in cooperation with Takreer. With the inauguration of a 70 million USD Innovation Centre for Research and Innovation in Abu Dhabi in 2015, Borealis continues to improve its products. In July 2017 ADNOC and Borealis signed an agreement to extend and expand joint pet-

⁶ <https://www.worldenergy.org/data/resources/country/united-arab-emirates/gas/> (27.08.2017)

⁷ <https://www.gtai.de/GTAI/Navigation/DE/Trade/Maerkte/Branchen/produktmaerkte,t=produktmaerkte-in-den-vereinigten-arabischen-emiraten-vae-2017,did=1665264.html#l-und-Gas-Niedrige-lpreise-bremsen-Investitionen-> (27.08.17)

⁸ <https://www.meed.com/exclusive-companies-prepare-to-bid-on-abu-dhabi-gas-development/> (27.08.17)

⁹ <http://www.borouge.com/aboutus/default.aspx> (27.08.17)

rochemical activities such as polypropylene plants in Ruwais. This signing is part of ADNOC's procurement and "2030 Strategy" expansion program, which aims at 11.4 million tonnes of petrochemical production by 2025.¹⁰

In 2016 Takreer, the owner of the Ruwais refinery, announced two major contracts to enlarge their refined-products output in the next five years. As part of the 10 billion USD expansion project, Takreer doubled their refining processing capacity to 900,000 bpd in order to feed the Borouge petrochemicals plant and enlarge the variety and volume of their products.¹¹

Another upcoming project is the Fujairah Refinery. The Mubadala Investment Company has put the UAE's Indian Ocean port of Fujairah refinery back on the agenda more than a year after the project was shelved.¹² The refinery will

be designed to process a mixture of UAE crudes such as Murban, Upper Zakum, and Dubai, as well as other regional and opportunity crude oils, and will have a processing capacity of about 200,000 barrels per day. It will produce middle distillates primarily for the Northern Emirates of the UAE, for both export and bunker fuel, to meet strong demand in the Emirate of Fujairah, which is a major regional hub for bunkering and the second largest bunkering port in the world after Singapore. The project was put on hold partly because the responsible legacy company, International Petroleum Investment Co (IPIC), was being merged with Mubadala Development Company over the past year. The oil price slump also put some investments by the UAE Government's investment companies under review. The original estimate for the 200,000 barrels per day (bpd) plant in Fujairah was \$3.5 bn.¹³

Table 1: The UAE Oil Market

Project	Value	Status
Fujairah Refinery - Process Units (EPC 1) Project	3.5 billion \$	Back on agenda
Fujairah Oil Field Development	All in all 5 billion \$	
ENOC: Jebel Ali Refinery Expansion	900 million \$	Transaction
ZADCO: Umm Al Dalkh Full Field Development	600 million \$	Transaction finished
Sharafco Group - Hamriyah Free Zone: Storage Terminal	100 million \$	Transaction finished
ADMA-OPCO - Replacement of Infield Pipelines (Umm Shaif Field)	500 million \$	Main Contract Bid
Bab Integrated Facilities Project Expansion	1.5 – 2 billion \$	Finalized and ready to be awarded
Haliba Oil Field Development	550 million \$	Expected to be awarded in 2017
Processing Offshore Crude Project at Ruwais Refinery	3 billion \$	Bid appraisal, expected to be awarded in 2017

¹⁰ <http://www.dayofdubai.com/news/adnoc-and-borealis-sign-agreement-extend-and-expand-joint-petrochemical-activities-ruwais> (22.7.2017)

¹¹ <https://www.thenational.ae/business/takreer-makes-progress-on-expansion-as-year-ends-1.181405> (12.10.2017)

¹² <https://www.thenational.ae/business/mubadala-puts-fujairah-refinery-plan-back-on-the-agenda-1.92495> (24.06.2017)

¹³ <http://www.oilandgasnewswworldwide.com/ArticleMG/627> (30.10.2017)

Table 2: The UAE Gas Market

Project	Value	Status
ADNOC: FEED Tender for the Hail and Ghasha Sour Gas Project	15 billion \$	Canceled
Bab Sour Gas Project	10 billion \$	Delayed
Emirates LNG - Fujairah New Liquefied Natural Gas Regasification Facility	350 million \$	Delayed
AD-GAS: IGD Expansion: Gas Treatment Plant: High Pressure (Package 1)	491 million \$	Transaction
DUGAS-Pressurized Propane Storage Facility (P / DUGAS / 055 / 2014)	35 million \$	Transaction
ADPC - Kizad Area: Gas Distribution Network Phase 1	65 million \$	Transaction finished – start of phase 2
Gasco - Abu Dhabi Industrial City: Sulfur Treatment Facility	200 million \$	Main Contract Completion
Shah Gas Development : Sour Gas Plant	1 billion \$	FEED

Sources for tables 1 and 2:

<http://www.meedprojects.com/docs/default-source/default-document-library/key-uae-projects-to-be-awarded-in-the-next-6-months.pdf?sfvrsn=0> (27.08.17)

<http://metenders.com/AbuDhabi/AbuDhabi-UAE-Dubai-Oil-Gas-Offshore-Onshore-Tenders-and-Projects.asp> (27.08.17)

<https://www.meed.com/exclusive-companies-prepare-to-bid-on-abu-dhabi-gas-development/> (27.08.17)

<https://www.meed.com/uae-oil-gas-contract-awards-rebound/> (17.10.2017)

German Companies

German companies enjoy a good reputation in the UAE market. In 2012 Wintershall took over the technical evaluation of the sour gas and condensate field Shuwaihat together with ADNOC and Austria's OMV. Following the successful completion of two appraisal wells in 2015 and 2017, further development of the field is being discussed. At the same time, BASF developed a new gas-cleaning technology that produces gas utilizing an efficient method for hydrogen sulfide removal. After the cleaning process, the methane produced can be fed into the national pipeline network. The hydrogen sulfide is transformed into sulfur dioxide and then into pure sulfur, which is sold as a raw material for the chemical industry.

Also Linde has a long standing relationship with ADNOC. A joint venture was formed in 2007 between the Linde Group and ADNOC, originally named Elixier. After unifying ADNOC's brands in October 2017, it has been renamed ADNOC Industrial Gas.¹⁴

A number of German companies are active in the region. Siemens enjoys an excellent reputation in the gasturbine business and automated pipeline solutions. Furthermore, medium-sized businesses are represented in the UAE, for example

Maximator, Bauer Kompressoren, Endress + Hauser, Fiennemann Torpede etc.

For a successful market entry, regular visits to the region and a supportive strong local partner or presence in the market are the prerequisites.

The German Emirati Joint Council for Industry and Commerce is offering services to support German companies to enter the market and find a local partner.

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¹⁴ <https://adnoc.ae/en/adnoc-industrial-gas> (29.10.2017)

Saudi Arabia

Doing Business in the Oil & Gas Sector: Opportunities for German companies

Overview

Because of the drop in oil prices since April 2014, the Kingdom of Saudi Arabia is currently facing many economic challenges. Nevertheless the Kingdom is still in a very comfortable financial position. The Oil & Gas sector is still and will continue to be the main economic pillar of the Kingdom in the future. According to the Annual Statistical Bulletin 2017, the Kingdom of Saudi Arabia has the second largest crude oil reserves worldwide (266.2 bn) and is currently the second largest producer of crude oil (10 mln. bpd). Almost 70% is exported and 30% is consumed domestically. The oil and gas sector have a share of about 50% of GDP and nearly 85% of export revenues. However the Saudi Vision 2030 reforms launched in April 2016 aim to diversify the economy. Despite the above-named challenges, the economic outlook of Saudi Arabia is still stable according to S&P, a major ratings agency based in the United States.

Privatization of state oil companies

The privatization of Saudi Aramco, the government owned Oil Company, has gained considerable attention in the financial markets worldwide. Saudi Aramco is the biggest Oil Company in the world and manages Saudi Arabia's oil and gas reserves. It has an estimated value of 1 – 2 trillion USD; however concerns of the true value still exist. Riyadh is planning an initial public offering (IPO) of five percent in 2018. The leading financial centers in the world New York and London are considered as locations for the IPO. However no final decision has been made yet. The privatization of government-owned oil companies show Saudi Arabia's commitment to reform its economic model. With the IPO the Kingdom plans to raise money that will be reinvested without changing the ownership status - the government remains in control. Additional state-controlled companies from the Oil & Gas sector and other sectors of the economy could follow.

Current Projects

During the World Petroleum Congress 2017, the CEO of Aramco Amin Nasser stated that the Kingdom will invest 300 billion USD over the next decade in the Oil & Gas sector. This



An Aerial View of Industries in Jubail Industrial City, Photo: GESALO

includes maintenance and new projects. In 2016 Aramco awarded contracts for the Fadhili gas project. The project's overall value is 13 billion USD. The project will be finished by 2019 and will process gas from onshore and offshore fields. Saudi Aramco is also further expanding its international operations. The plan is to build a 60 million ton refinery complex with the Indian Oil Company in Maharashtra on India's west coast. By 2040 the demand for oil in India will almost double to 10 million barrels a day, while the demand for gas will triple. Saudi Aramco also opened an office in India to market its products and engineering services.

Saudi Aramco and Saudi Basic Industries Corp (SABIC) launched the bidding process for the Crude Oil to Chemicals projects also known as COTC, which has an overall value of 20 billion USD. COTC is located in Yanbu and will be a fully integrated facility for processing crude oil into chemicals. The plant is expected to be commissioned by 2024. The investment in the petrochemical processing sector will continue over the coming decades. However the focus will shift to renewable energies, such as Solar and Wind. Hereby Saudi Aramco will invest and play an active role.

German Business Opportunities

Due to the Vision 2030 and the National Transformation Plan 2020, Saudi Arabia is trying to reform its economy in almost every sector. In Saudi Arabia in particular, the "Made in Germany" brand enjoys an outstanding image. Large companies

such as thyssenkrupp, BASF, S.A. Talke, LINDE, Evonik and many more are already successfully operating in the Kingdom.

As a prime example BASF, the world's leading chemical company, has been operating in the Kingdom since 1984 in the oil rich Eastern Province in Al Khobar and offering a vast range of oil field solutions (drilling, cementing, stimulation, production and enhanced oil recovery), as well as solutions for gas treatment (natural gas, synthetic gas and biogas). "The continuously rising demand for energy and resources requires us to develop energy solutions that are more sustainable and address the need for energy efficiency and conservation," explains BASF Managing Director BASF Saudi Arabia LLC, Basim Tawfeeq. With its expertise and knowledge in chemistry for oilfields, refineries, mining, water, wind and solar energy, BASF is committed to serving its Saudi customers and playing an active part in achieving Saudi Vision 2030.

Nevertheless highly specialized German small- and medium-sized enterprises (SMEs) have numerous opportunities in the Kingdom. Due to the large number of launched projects, there is also a high demand for logistics providers. In the view of the upcoming „Saudization“ of the labor market, German excellence in education and training is highly requested. For example, the German-Saudi joint venture S.A. TALKE, which provides high-quality logistic services for the chemical and petrochemical manufacturers in Saudi Arabia, was honored by the Human Resource Development Fund (HRDF) for its talent strategy. The honor recognized the cooperative training program (COOP), which includes on-going training, leadership training, and safety training for core workers, and will supply the demand for qualified local employees. German companies provide high quality solutions in not only the petrochemical sector but also the renewable energy field.

Legal framework

Activities in the region require long-term, intensive commitment. A local representation is almost always beneficial and even a necessity in most cases. Besides being able to find a local partner for the distribution of their products, German companies can form a joint venture with a local company to invest in the Kingdom or to sell their products directly. Typically, the local companies serve as financial and administrative partners, while the international companies operate mainly as technology suppliers. It is also possible to act locally as a consortium, which would eventually offer a full service solution.

From a Saudi Arabian perspective, a European, and especially German, capital investment in the Kingdom is in principle desirable particularly in the manufacturing industries. The Saudi Arabian General Investment Authority (SAGIA) acts here as a full service provider.

King Fahd Industrial City, Photo: GESALO





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Iran

Development of the Oil & Gas Sector in Iran since the end of the sanctions

Iran's oil and gas sector is among the World's biggest

Iran as a regional power in the Middle East is one of the big players concerning both oil and gas production and reserves. Located next to countries like Turkmenistan, Azerbaijan and Iraq on the mainland and Kuwait, Saudi Arabia, Bahrain, Qatar, the United Arab Emirates and Oman by sea, Iran is centrally situated for the oil and gas exporting industry, placing the country in close proximity to many of its main competitors, politically and economically. For this reason, there is a high interest in developing increasingly efficient methods to extract oil from its soil, as well as from the sea.

In 2016, Iran had the fourth biggest oil reserves in the World. Only Venezuela, Saudi Arabia and Canada have larger reserves. Iran's proved natural gas reserves are even more remarkable, being surpassed only by Russia. Consequently, the natural resources are favorable for development of the Iranian oil & gas sector. Furthermore, the country's geographic location between the Caspian Sea and the Persian Gulf, which connects Central Asia with the Caucasus, Turkey and the Arabic countries, facilitates the global transportation of the Iran's oil and gas production.

Geographically, the oil reserves are not equally distributed within the Iranian territory. The majority of the oil industry is located in the west of the country near the Persian Gulf. The Iranian oil industry center on the largest oil fields, which are concentrated near the cities of Ahvaz, Marun, Aghajari, Gachsaran and Karanj in the provinces of Kermanshah and Fars. In the northern, central and eastern sections of Iran, there are no significant oil fields and, thus, no oil production.

The primary natural gas reservoirs are fewer and located quite similarly to the oil fields. Those in the Persian Gulf are much larger than those on the Mainland. While most of the largest oil fields are between Kermanshah and Shiraz, the majority of the gas fields are located south of Shiraz and next to Bandar Abbas. Iran's largest gas reservoir is the South Pars gas field in the Persian Gulf at the border of Iran and Qatar.

Nevertheless, considering the numbers of real oil and gas production, the position of the Iranian oil & gas sector is

different. Iran was only ranked seventh in oil production in 2016 with 4215 barrels per day. Many states with smaller reserves have a higher ranking. For example, the United States had the top ranking with 14855k barrels per day, followed by Russia (Rank 3, 11240k barrels per day), China (Rank 4, 4868k barrels per day) and Iraq (Rank 6, 4448 barrels per day). The ranking of gas reserves is not as dramatic but still pretty different. Iran gas reserves were ranked third with 3,6162bn cubic meters, producing far less gas than the United States (Rank 1, 25890bn cubic meters) and Russia (Rank 2, 21225bn cubic meters), despite the fact that the United States clearly have fewer reserves to draw from.

There are several reasons for these differences. The situation of the Iranian oil and gas sector is by no means easy to describe. Exploiting Iran's oil and gas and earning profits is complicated. However, the high potential of Iran's oil and gas reserves is a certainty, especially for German companies who have a reputation for quality in Iran. Competition is strong; therefore, German companies are urged to seek opportunities for entering the Iranian oil and gas sector in order to profit from the big deals following the end of the sanction.

The Complicated History of Iran's Petrol Industry

To understand the situation in Iran after the Iran nuclear deal lifted sanctions, it is necessary to become familiar with Iranian history. The oil and gas reserves in Iranian soil have always been curse and blessing for the Iranian society. On one side the reserves promised a successful future and wealth from oil and gas exports, which can be seen in Dubai or Qatar. On the other, the Iranian people witnessed a long time of political and economic insecurity and instability due to the U.S.-initiated coup against Prime Minister Mohammad Mossaddeq in 1953 and installation of the western-friendly Shah Mohammad Reza Pahlavi, followed by the Islamic Revolution in 1979 and a prolonged Iran-Iraq-War (1980 to 1988). The unrest prompted foreign countries to call for sanctions against Iran and as a consequence against their oil and gas industry.

The country exported millions and millions of barrels of oil per day during the Shah era, mainly to western countries in fact. After the revolution, the export of oil dropped dramatically and has not recovered to this day. Although oil production

has experienced fairly steady growth since 1980, they have failed to attain Shah-era levels.

The regime of sanctions against Iran were one of the main factors hampering growth of the Iranian oil and gas industry. The sanctions were imposed because of the alleged ambitions of the Iranian President Ahmadinejad to pursue a nuclear program for the purpose of developing nuclear weapons. The 2012 oil embargo by the European Union hit the Iranian industry especially hard. The export of Iranian oil fell from US \$118 bn in 2011-2012, to US \$63 bn in 2012-2013, a drop of 47%.

The political and economic situation in Iran stagnated on several levels, which had also a huge impact on the oil and gas sector. Experts reported that the state of the oil and gas plants in Iran worsened during the sanctions. Iranian oil and gas companies extracted these natural resources inefficiently, which reduced profits for the oil and gas sector. For obvious reasons the newly elected government of Hassan Rouhani is highly interested in modernizing the Iranian oil and gas sector. Therefore, an important consideration of Tehran is to support the process of the nuclear agreement between the five permanent members of the United Nations Security Council: The United States of America, China, United Kingdom, France and Russia, the European Union and Germany.

The Comprehensive Plan of Action (JCPOA), commonly known as Iran Nuclear Deal, was reached in Vienna on July 14, 2015. When the government of Iran agreed to end its nuclear program by gradual retreat, the sanctions against Iran were lifted in many areas, including the oil and gas sector.

The Iran Nuclear Deal not only opens up the possibility to export natural resources, but also enables the modernization of the oil and gas sector with the help of foreign companies, focusing on the renovation of old, dilapidated plants in the oil and gas industry in order to increase efficiency and profitability.

Improvements Since JCPOA: Less Than Expected

The governments of the western hemisphere and the European Union have noted the high expectations of the Iranian government. The former German Minister for Economy and Energy, Sigmar Gabriel, and the management team of the German-Iranian Chamber of Commerce and Industry clearly anticipated a considerable interest in German technology during Mr. Gabriel's trip to Tehran in July 2015, especially for the modernization requirement in the oil and gas sector. The Iranian side is highly interested in machinery technologies

and knowledge exchange. In particular German companies in supply industries have a high profit potential.

However, the upswing of the Iranian economy long-expected by the Iranian government as a result of massive demand for Iranian oil and gas has so far failed to materialize. For European entrepreneurs and investors, Iran is still seen as an investment risk. The present German foreign minister, Sigmar Gabriel is concerned about the viability of the Iran Nuclear Deal, among other issues. This does not make for an encouraging investment atmosphere. The Iranian market remains a complicated area for an economic engagement. One example of the difficulty is the fact that it is impossible to transfer money into or out of Iran, as potential investors could in other countries.

As long as the Iran Nuclear Deal exists, the demand for goods necessary for modernization of the Iranian oil and gas sector will continue. German companies should definitively focus on this aspect and explore the possibilities for engaging in this important issue with the potential for huge commissions.

Engagement of German Companies

German companies in the refining and petrochemical industries already have access to the Iranian Market. This presence can be seen in the German Pavilion at the IRAN OIL SHOW in May 2017, where 111 German companies demonstrated their expertise, as well as their high-quality products bearing the "Made in Germany" stamp.

Two large German companies in two different branches of the oil and gas sector illustrate the opportunities for foreign companies through their activities in the Iranian oil and gas sector.

Germany's biggest oil and gas company, Wintershall, is interested in exploring gas fields in Iran. Wintershall wants to participate in three major projects located in Farzad B, North Pars and on Kish Island. Due to the number of Russian competitors in Iran, Wintershall is seeking a cooperation with the Russian company Gazprom, a worldwide player in the oil and gas sector. Furthermore, Wintershall has signed a memorandum of understanding with the National Iranian Oil Company (NIOC) for the sake of a future cooperation. Wintershall is an impressive example of how one of the biggest German companies has prepared to engage and make significant investments in Iran. Yet they also will wait to see the result of the Iran Nuclear Deal in the upcoming months, or even years.

The second example is the German company Dräger Safety, a provider of medical and safety solutions. Dräger Safety makes

Iran crude oil production



Source: tradingeconomics.com - Organization of the Petroleum Exporting Countries

clear that it is not only can petrochemical companies who can profit from the modernization of the oil and gas sector in Iran. Iranian oil and gas companies have a high interest in both modernizing their oil and gas plants and improving the working conditions for their employees through improved workflow security standards. Dräger Safety offers among other things protection and gas detection technology, safety systems for the industry, and solutions for fire prevention. Moreover, the company was represented at this year's 22nd International Oil, Gas, Refining and Petrochemical Exhibition in Tehran, which indicates their success.

Success for German companies is far from guaranteed. Investment and engagement in the Iranian oil industry can also be bad for business, despite positive interactions between business partners and contract agreements. The German energy company RWE-DEA faced threats from U.S. authorities after it signed an agreement with the Libyan National Oil Corporation (NOC). This is an important example for Iran relations due to the U.S. "Iran Libya Sanctions Act," which prohibits investments by foreign companies higher than US \$20mm per year. Whether this law still applies today or not, it emphasizes the critical importance for companies who wish to invest in Iran to understand the unique restrictions and conditions for doing business in the country. They should know exactly what to expect before committing resources. However, if innovative, high-standard companies and their partners, such as the local German-Iranian Chamber of Com-

merce and Industry, choose to invest in Iran, they will find a dynamic market with huge opportunities, especially in the growing oil and gas sector.

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Azerbaijan

Azerbaijan in the wake of falling oil prices

The negative impact of sustained low oil prices in 2016 has hit oil-exporting countries, such as Azerbaijan, especially hard. Amid an economic downturn of 3.8% in 2016 (the first negative growth in the two decades), the national currency depreciated by an additional 12.5%, following an almost 50% devaluation of the national currency vis-à-vis the USD and Euro in 2015. The year 2016 thus witnessed a number of strategic reforms in Azerbaijan, aimed at stabilizing the financial sector, fostering the non-oil industry, and creating a basis for economic growth led by the private sector. Some progress has already been made in shifting the focus from oil-based economic growth to non-oil-based sustainable growth. Following a 5.6% reduction in 2016, the non-oil GDP grew by 2.5% in the first nine months of 2017 compared to the same period of 2016 and accounted for 62.6% of the total GDP.

Against the background of strengthening oil prices, recovery has gained a relative momentum among commodity exporters in the region. However, vulnerabilities in the banking sector, as well as tight monetary and fiscal policies, continued to slow GDP growth in Azerbaijan in 2017. In fact, the State Statistical Committee of the Republic of Azerbaijan reported a 0.6% decline in GDP in the first nine months of 2017 compared to the same period of 2016, mainly due to country's declining oil production and oil exports. However, the economy is projected to stabilize in 2018 with a gradual increase of the non-oil private sector and the beginning of extraction from the Shah Deniz gas fields. The World Bank predicts GDP growth to be 0.9% in 2018.

Oil and Gas industry remains the main growth driver of the economy

Following the collapse of the Soviet Union, Azerbaijan underwent severe economic recession, which was further aggravated by military aggression and political traumas. The rapid economic transformation and development of Azerbaijan since then is mainly attributed to the signing of the Production Sharing Agreements (PSAs) between SOCAR (State Oil Company of the Republic of Azerbaijan) and the international oil giants in 1994. The construction of the Baku-Tbilisi-Ceyhan oil pipeline, as well as favorable investment conditions and important

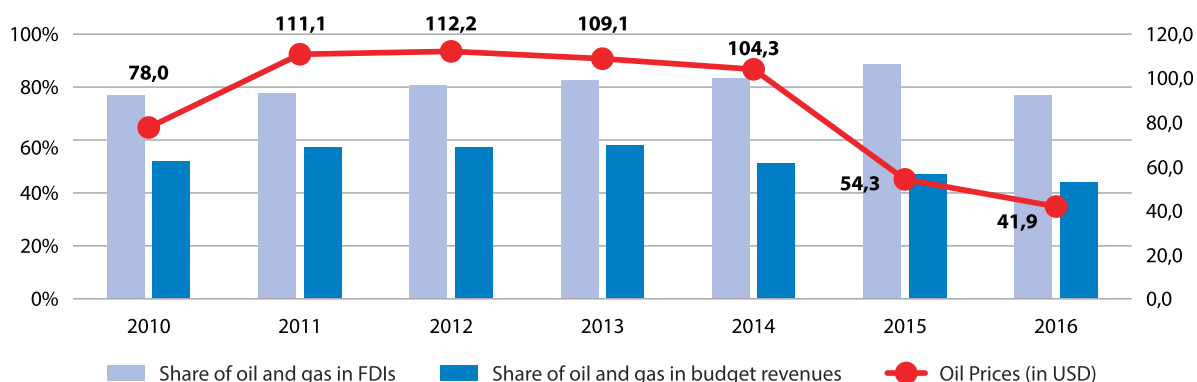


*Oil platform moored near the shore of the Caspian Sea, Baku, Azerbaijan,
Photo: Shutterstock Alexmama*

tax exemptions, have been instrumental in stimulating a huge amount of foreign direct investment (FDI) flows into the sector. Out of the 10.7 billion USD dollars invested in Azerbaijan by 2004, 97% was directed to the oil and gas industry and, in 2016, the sector accounted for 76.7% of 7.3 billion worth of FDIs.

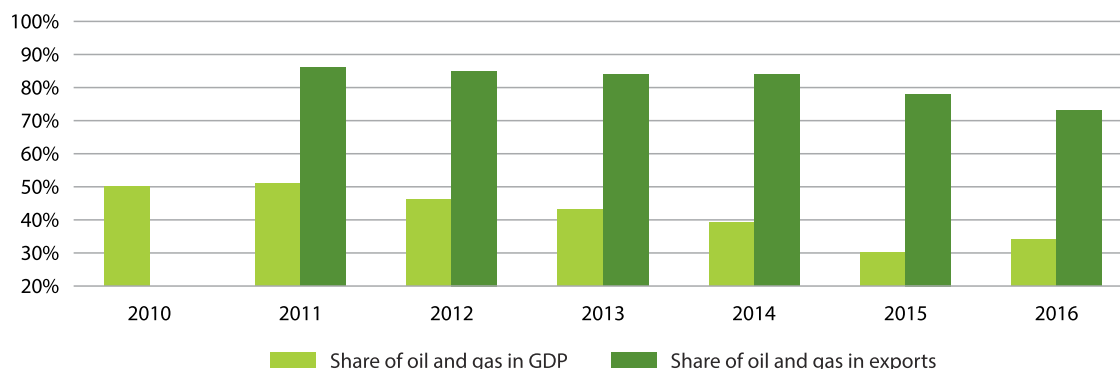
To guarantee the saving and effective management of the revenues generated from implementation of oil and gas agreements, the State Oil Fund of Azerbaijan (SOFAZ) was established by a Presidential decree dated December 1999. The SOFAZ, which has been the main source of transfers to the state budget, constituted over 50% of the budgetary revenues during 2010-2014. When the oil prices plunged by 50% in 2015, the SOFAZ revenues dropped significantly from \$16.2 billion in 2014 to \$7.7 billion in 2015 and further declined to \$5.9 billion in 2016. The transfers thus were decreased to account for 37.5 % of the approved state budget of 2017. In 2018, however, the SOFAZ transfers are expected to increase again to constitute 45.7% of

Graph 1. Oil and gas sector is the major component of the Azerbaijani economy



Source: SOFAZ Annual Report 2016; The Central Bank of the Republic of Azerbaijan

Graph 2. Oil and gas sector is the major component of the Azerbaijani economy



Source: State Statistical Committee of the Republic of Azerbaijan; State Customs Committee

the estimated state budget. Although economic diversification is an overriding government priority, the oil and gas industry is still the main powerhouse of the economy: It respectively accounted for 34% and 73% of total GDP and total exports in 2016.

The proven oil and gas reserves of Azerbaijan remained unchanged in 2017 and stood at respectively 7 billion barrels (0.4% of the world proved oil reserves) and 1.1 trillion cubic meters (0.6% of the world proved gas reserves).¹ This year marked the restatement and extension of the most prominent project of the Azerbaijani oil sector. The new PSAs deal signed between the government of Azerbaijan, AzACG SOCAR (25%), operator BP (30.37%), Chevron (9.57%), INPEX

(9.31%), Statoil (7.27%), ExxonMobil (6.79%), TP (5.73%), ITOCHU (3.65%) and ONGC Videsh Limited (2.31%) targets expanding the Azeri- Chiragli-Gunashli (ACG) block fields and envisages \$40 billion of investment during the next 32 years.

Additionally, in 2014 Azerbaijan initiated the Southern Gas Corridor (SGC), another \$40 billion project connecting the Caspian gas resources to the European markets for the first time, in order to compensate for gradually decreasing oil production, which decreased by 10% in the first quarter of 2017. The Southern Gas Corridor Closed Joint Stock Company was established to consolidate, manage, and finance the interests of Azerbaijan in the full-field development of the Shah Deniz

¹ BP Statistical Review of World Energy, June 2017

gas-condensate field. 51% of SGC's equity is owned by the Republic of Azerbaijan through the Ministry of Economy and the remaining 49% is held by the SOCAR, which is also entitled to the operational management of the entire value chain on behalf of SGC. The SGC consists of three main phases: expansion of the existing South Caucasus pipeline, TANAP (The Trans Anatolian Pipeline) transporting Shah Deniz gas to Turkey, and TAP (The Trans Adriatic Pipeline) bringing the Caspian gas to Italy through Greece and Albania. The project is believed to be one of the most significant undertakings in the industry and will initially deliver over 10 billion cubic meters of natural gas a year in the next 25 years to nine European utility companies. Germany's E.ON will purchase a total of 40 billion cubic meters of gas through its gas business operator Uniper. The cooperation contract signed between the Azerbaijan's energy giant SOCAR and Uniper is valid until 2044 and includes strategic partnership in technology, exploration, management training, and exchange programs. The first shipment of Azerbaijani gas to Europe is scheduled for 2020.

German companies stand for the best quality in the Azerbaijani market

Despite the diminishing trade volume between the two countries in the last two years, Azerbaijan continues to be Germany's principal economic partner in the South Caucasus region. Azerbaijan is Germany's sixth largest supplier of crude oil and, with the recent launch of the SGC, it is also a key strategic partner of Germany and Europe in diversifying sources of energy supplies.

The "Made in Germany" brand, in turn, stands for high quality and enjoys an excellent reputation in the Azerbaijani market. When financial circumstances permit, Azerbaijani companies and producers prefer machinery and equipment, as well as chemical products and raw materials, produced by German manufacturers. The machinery, plants, and equipment remain the largest group of imported goods with a share of 22% in total imports in the first eight months of 2017, and the demand is likely to increase even further. The government's ongoing strategy of diversifying the economy and stimulating local production in Azerbaijan paves the way for the German machinery suppliers and engineers. Siemens, BASF, Uniper, and Econ Industries are global German players already operating in the oil and gas industry of Azerbaijan and are positively associated with high expertise and quality, matching the current market demand.

EKOL Engineering Services CJSC owned by SOCAR (51%) and a German Lancer Services S.A. (49%) have successfully established a cooperation with a range of German manufacturers

of plants and equipment. Similarly, based on a contract signed between SOCAR and Econ Industries GmbH in 2016, two VacuDry® 12.000 vacuum distillation plants were purchased and installed at the Waste Management Centre of Ecology Department to provide treatment of drill cuttings and oily cuttings formed during oil and gas operations. FACET Separation System was contracted to supply an industrial waste water treatment plant while Börger, NETZSCH, and VX provided the company with oily sludge transportation pumps, which are currently being operated on the sites.

Besides its above-mentioned activities in the energy sector of Azerbaijan, Uniper created a Joint Venture (JV) with SOCAR on May 2016 for production of steam and energy. A 51% share of the JV belongs to SOCAR and Uniper holds the rest. SOCAR reports that the cost of the project on the establishment of SOCAR-Uniper JV is estimated at €26 million. Some €22 million for the project will be drawn from a Bavarian bank with a period of 10 years at an annual rate of one percent. The initial capital of the JV will amount to €4 million, which is to be invested by Uniper. SOCAR, on the other hand, is to provide equipment worth €4 million. Moreover, a preliminary project agreement on the construction of a steam turbine generator unit at the steam generating plant Ethylene-Polyethylene operated by SOCAR aims to increase economic efficiency and the production volume of the complex. The production of additional power is envisaged to start in 2019.

The launch of the Shah Deniz 2 project and extension of the PSAs, as well as modernization of regional transport routes to position Azerbaijan as a transit hub between Asia and Europe, offer further opportunities for German companies in the oil and gas and construction sectors in Azerbaijan. It is, therefore, not surprising that 85% of total FDIs during the first half of 2017 were directed to the oil and gas industry.

Shah Deniz 2 is a \$28 billion project that will add an additional 16 bcma per year of gas production to the approximately 9 bcma produced by Shah Deniz Stage 1. BP Azerbaijan reports that the project, which includes a large-scale drilling program, underwater infrastructure, construction of two connected platforms, and expansion of the Sangachal terminal and South Caucasus Pipeline with the construction of two compressor stations in Georgia, is now over 97% complete in terms of engineering, procurement, and construction. It remains on target for first gas from Shah Deniz Stage 2 in 2018. Development of a chain of new pipelines within the SGC project is also in progress with the majority of long leads contracts to be awarded in 2018. A number of German companies are already actively involved in the project by providing services, machinery, and key pipeline materials.

Table 1. Overview of contracts awarded to the German companies

Scope	Contractor	Award date	Owner
Project Management and owner's engineering services	ILF Beratende Ingenieure GmbH	07.11.2012	TANAP/TAP
Main line pipe and hot bends	Baosteel Europe GmbH	14.10.2014	TANAP
RMA KEHL GmbH & Co. KG	Large diameter valves	07.2015	TAP
6 Gas turbine turbo compressors units	Siemens A.G.	02.09.2015	TAP
Onshore line pipes & bends (297km)	Salzgitter Mannesman International GmbH	10.2015	TAP
Offshore line pipes (110km)	Salzgitter Mannesman International GmbH	04.2016	TAP

Source: TAP, TANAP

Current Projects: Downstream industry offers new opportunities for German companies

Given the recently launched huge extraction and production projects (the ACG and SGC), the upstream industry remains the main strength of Azerbaijan's oil and gas sector. However, within the diversification policy of the government, the current focus of the development strategy is maximizing integration of Azerbaijan's upstream-midstream-downstream oil and gas value chain. Hereby the main objective is to expand and upgrade the petrochemical industry of the country, which is predominantly based on the continued processing of oil and gas.

In 2015, Azerneftiyag oil refinery was liquidated and merged with Baku Oil Refinery to optimize the operating costs and improve business process by consolidating the refineries under the integrated management structure. Within the framework of the modernization and expansion program of the Heydar Aliyev Baku Oil Refinery, SOCAR awarded the Austrian Pörner Group with an engineering, procurement, construction, and management (EPCM) contract for the construction of the new Bitumen Blowing Unit at the refinery that is planned for commission in the second half of 2018. One of the two tenders to select EPC contractor for construction of new units was completed in December 2017 and a contract was signed with Spanish Tecnicas Reunidas. The second tender is close to completion and is planned to be signed in the first quarter of 2018. The upgrading process will be completed by 2020, increasing the quality of the production and capacity of the refinery from 6 million to 7.5 million tons of oil per year. According to SOCAR, the reconstruction plan is fully financed by the state including the funds recently allocated by SOFAZ. The cost of the modernization program currently amounts to nearly \$1.5 billion.

Following the transfer of the state owned Azerikimya to SOCAR in 2010, the plant was stopped for overhaul in August

2017. With 180,000 and 120,000 of production capacity respectively, the Polypropylene (PP) and High Density Polyethylene (HDPE) plants will start operations in 2018 in the Sumgait Chemical and Industrial Park (SCIP). The SCIP is the first large industrial park that is planned to integrate 43 industrial plots. SOCAR Polymer, the subsidiary of SOCAR, will be one of the first companies to operate at the site. The site offers attractive 7-year tax holidays, full infrastructure support and single window approach for investors to support the growth of high-tech industrial fields in Azerbaijan.

To implement the project, SOCAR Polymer has engaged an Italian engineering company Tecnimont as an EPC contractor whereas the US based engineering company, Fluor, has been engaged as a PMC (Project Management Consultant) contractor to supervise the EPC contractor's performance. The company reports that the procurement orders are now 99% complete and the overall cost for the construction of the complex is expected to reach \$750 million. After completion of the plant, 30% of the manufactured products will be enough to cover domestic demand. The company plans to export the remainder to Turkey, CIS, and Europe.

The SOCAR's Gas Processing and Petrochemicals Complex (GPC) project was launched in 2016 at Garadagh district, 15 km south of Baku. It is believed to mark the beginning of a new era in development of Azerbaijan's downstream industry, which will strengthen the position of the country in the global petrochemical market. The new complex will include a gasoline-powered ethylene pyrolysis plant with a capacity of 610,000 tons, a propylene plant with a capacity of 130,000 tons, and a polyethylene plant with a capacity of 600,000 tons, among other facilities.

France's Technip was awarded a service contract for the engineering design of a new gas processing plant with a capacity of 10 billion cubic meters per year and a new petrochemical plant including a steam cracker. Another French company, Axens, was selected by SOCAR to provide advanced technol-

Table 2. Overview of the ongoing projects in the downstream industry

Project	Developer	Contractors	Planned completion date
Modernization and expansion of Heydar Aliyev Oil Refinery in Baku	SOCAR	Pörner Group, Axens, UOP LLC, KT-Kinetics Technology	by 2020
A high-density polyethylene (HDPE) plant and a polypropylene (PP) plant within the SCIP	SOCAR Polymer and a joint venture (JV) of SOCAR, Pasha Holding, Azersun Holding and Gilan Holding	Technimont, Fluor	By 2018 (PP) By 2018 (HDPE)
SOCAR Oil and Gas Processing and Petrochemical Complex (OGPC) in Baku	SOCAR SOCAR GPC	Technip, Axens Univation Technologies, Sinopec Tech	By 2022

Source: SOCAR, SOCAR Polymer

ogies, catalysts, and adsorbents for its GPC complex. Technology licensing and associated design work for a polyethylene plant at the complex is to be completed by a Univation Technologies LLC. Based on the agreement between Univation and a German Linde AG, Linde Engineering will complete the basic engineering design package for the plant.

According to media reports, after the completion of the HDPE and PP plant in 2018, SOCAR Polymer is planning to build a biaxial-oriented polypropylene (BOPP) film production plant in the SCIP. The production of the plant is scheduled at 38,000 tons per year and is estimated to cost \$32 million.

Ongoing and planned projects pave the way for German companies to ensure their presence in the new markets in Azerbaijan by setting up a local representation and/or JV with SOCAR. SOCAR has established a number of JVs with international and

local companies across the different sectors including the German Uniper.² The government is interested in strengthening international cooperation, enhancing application of international standards, and ensuring the transfer of innovative technologies. Therefore, the current and planned projects in the oil and gas industry offer lucrative market entry potential and new investment opportunities for German companies. All procurement announcements of goods and services falling under the requirements of conducting tenders are published on SOCAR's website.³

With its well-established network and local expertise, the German-Azerbaijani Chamber of Commerce is ready to actively support German companies in finding a local partner in Azerbaijan or in entering the market.

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Construction of the PP and HDPE Plants, Sumgait, Azerbaijan, Photo: SOCAR Polymer



² <http://www.socar.az/socar/en/company/joint-ventures/ateshgah-insurance-company-cjsc>

³ <http://www.socar.az/socar/en/company/procurement-supply-chain-management/procurement-notices>

Russia

Economic Overview

Russia has overcome the economic turmoil that was caused by a combination of low oil and gas prices, as well as by the sanctions imposed by Western countries, and is coming out of recession. Forecasts by various domestic and foreign institutions are a sure indication of this; they suggest a growth rate between 1.5 to 2% in 2018. Moreover, Russia's inflation rate dropped well below 3% in September 2017, the lowest percentage since the collapse of the Soviet Union. In addition, the Russian Federation continues to rebuild its foreign currency reserves. In autumn 2017, these reserves already amounted to \$400 B. US. Although public debt has been rising steadily over the last years, the figures for the Russian Federation are currently estimated at 15% in relation to the GDP. This makes the Russian Federation the country with the 6th lowest public debt and the 6th highest foreign exchange reserves.

Although these figures are promising, Russia is nevertheless encountering many structural obstacles. For example, Russia continues to fail to develop a robust and diverse supply industry and is, therefore, dependent on imports of intermediate products for its manufacturing industries. Moreover, the governmental influence and monopolies in the transport and energy sectors are hindering competition and innovation in Russia's largest industries. What is more, Russia's economy is heavily dependent on exports from the oil & gas sector. However, the service sector is growing in importance and reducing the dependency on this industry. The restructuring of the economy is likely to continue, and the 2018 elections could pave the way for reconstruction and modernization of the government, administration, and judicial system.

Western Sanctions and New Opportunities

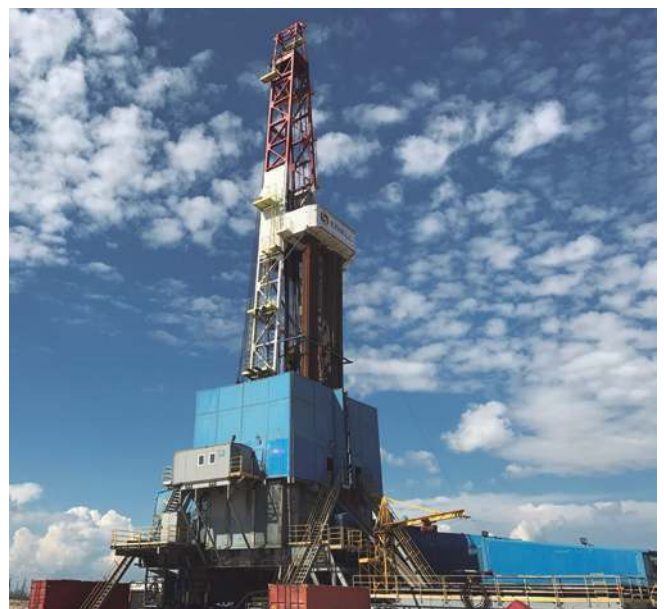
First of all, it is important to note that the sanctions do not forbid cooperation. The collective aim of these measures is to limit access to capital markets for certain Russian state-owned financial institutions; to place embargoes on the provision of arms and dual use goods for military end use; and to restrict access to certain sensitive technologies – particularly in the oil sector – to persons, entities, or bodies in Russia or for use in Russia. These restrictions are specified in Appendix

No. 2 of the Council Regulation (EU) No. 833/2014 and are renewed every six months by special decision of Europe's foreign ministers.

The financial restrictions targets are the biggest state-owned financial institutions, such as Sberbank and VTB; majority state-owned oil & gas companies, such as Rosneft, Gazprom and Transneft; and the arms & defence industry, namely companies such as OPK Oboronprom and the United Aircraft Corporation (OAK). Restrictions or bans on buying and selling shares and on expenditure-related services are imposed upon these companies and institutions. Moreover, financial services, such as loans with a credit period of over 30 days, are restricted. However, all these restrictions are only applied to European financial institutions and banks under European financial supervision. Nevertheless, the sanctions on Russia's financial institutions have created the danger of a credit crunch for Russian companies. As a result, the availability of loans has declined significantly and interest rates have surged.

The restrictions on dual-use goods are specified in the appendix to the Council Regulation (EC) No. 428/2009 and ban the import and provision of goods and technologies that are – or can be intended – for military use to any entity or body in Russia, or for use on Russian territory. These restrictions often cause problems for industries manufacturing products for civilian use and hindering possible growth.

Photo: Wladimir Nikitenko



In the oil & gas sector, the importation of western technological equipment is not permitted when said equipment is used for offshore oil exploration and production under 150 meters, for use in areas north of the polar circle, or for oil production from clay or shale formations by means of slick water hydrofracking. However, the regulations do not forbid the exploration and production of oil from deposits underneath these formations. In addition, certain services regarding financing projects, drilling, drill hole examination, and complementary services, as well as the importation of floating platforms are forbidden or restricted. These regulations do not affect contracts concluded prior to 01/09/2014 for goods, and prior to 12/09/2014 for services.

The western sanctions have caused an enormous shift in demand and enabled new opportunities for investments. "Localization" has become a key solution for foreign companies in various industries, including the localization of facilities producing intermediate goods in key industries, to overcome importation restrictions imposed by the sanctions. The focus of these endeavours lies on sectors such as the energy, automobile, oil & gas, chemical, agricultural, and ship building industries. To encourage this trend, the Russian government has started to reduce the import ratio for public projects and provides incentives for domestic production by giving access to public tenders and to large state-owned shipyards to promote knowledge and technology transfer. Consequently, many foreign companies continue to move parts of their production to Russia, thus completing the value chain and helping Russia to further diversify its economy.

Oil and Gas Industry in Russia

The oil and gas industry in Russia directly accounts for around 15% of GDP production (without accounting for various support and related industries) and is thus by far the biggest industry of the economy. According to the statistics agency Rosstat, oil production in Russia reached a new record in 2016. In numbers, the industry produced 548.6 mil tons of crude oil condensate, which is 2.9% more in comparison to the 2015 figures. The available figures for the first half of 2017 show that this trend continues. In comparison to the first half of 2016, oil production rose by 1.8% or 273 million tons, and the production of gas rose by 12.9% or 300 million cubic meters. Accordingly, oil refinery also rose by 1.8% on 140 million tons in the first half of 2017.

As the revenue of this sector accounts for 40-50% of total public revenue, Russia's economy is heavily dependent on this industry, and consequently, also on the oil price and foreign exchange rates. It is not surprising, therefore, that the Russian government plays a significant role in the oil and gas sector. Even the two biggest companies in the industry, Gazprom and Rosneft, are heavily intertwined and influenced by the government. This also holds true for other important companies in the industry, such as Lukoil, Surgutneftgas, Tatneft, Slavneft and Rusneft.

In the oil and gas industry two long-term trends can be demarcated. First, the production volume of energy resources is going down in Norway, the United Kingdom and the Netherlands. These countries accounted for around one third of

Photo: Wladimir Nikitenko



Europe's total energy production in previous decades. On the other hand, Asian countries such as China and India are stepping up their gas output and are expected to enhance the output of liquefied natural gas (LNG) in the near future. In order to counter the influence of Asian countries on the oil and gas market, and to secure Russia's future position, the Russian Federation initiated large-scale infrastructural projects, such as TurkStream and Nord Stream 2. The benefits of these enormous pipeline projects are evident: in comparison to LNG, gas from pipelines is much more cost-efficient and can therefore be offered at competitive prices.

Current Pipeline Projects

Turk Stream

In May 2017 Gazprom started the construction of a gas pipeline under the Black Sea, laying pipes from the Russian shore of the Black Sea to Turkey. Starting at the Russian coast near the town of Anapa, TurkStream will run over 900 km through the Black Sea to the Thrace region of Turkey, creating a reliable source of energy. In addition, a feeder line to Greece is planned. This line will bring gas to South and South-East Europe and will consist of two lines with an annual capacity of 15.75 billion cubic meters each. Although the Russian Federation is already Turkey's largest gas provider, the pipeline will reduce the dependence on transit countries, such as Ukraine, Bulgaria, and Moldavia, thus cutting costs and improving reliability. This project further highlights Russia's dominance in the European gas market. However, Turkey also stands to benefit, as the pipeline will allow the country to further develop into a regional oil and gas hub for the Caucasus region, Central Asia, the Middle East, as well as the Eastern Mediterranean area. As a result, the pipeline will not only provide a reliable oil and gas grid for the region, but also improve Turkey's geo-strategic importance.

Photo: Deutsch-Russische Auslandshandelskammer



Photo: Deutsch-Russische Auslandshandelskammer

North Stream 2

The North Stream 2 project is planned to complement already existing pipelines from Russia to Europe. The background for this project is that existing pipelines already run at full capacity and cannot fully satisfy market demand. The resulting import gap is estimated to amount to 120 billion cubic meters in the next 20 years and will be closed through the additional pipelines of the North Stream 2 project. What is more, the modern and highly efficient pipeline will also contribute to continued energy reliability in Europe by establishing a direct connection to vast, already tapped gas reserves in Russia's north. The North Stream 2 project can also be seen as an improvement in terms of energy reliability, as it reduces transit-related risks and costs. The privately funded project is estimated to give an economic boost to various European industries, as over 200 companies from over 17 countries are involved in the project's development. The biggest beneficiaries are steel construction, mechanical engineering, construction, pipe installing, logistical, as well as environmental survey and monitoring related industries.

The investment volume of the project is estimated to be approximately €8 billion. With €4 billion already invested and bound, even persisting political tensions between the Russian Federation and the European Union are unlikely to have an impact on the feasibility and completion of the project. On the other hand, the recent sanctions imposed by the US could become a considerable obstacle to the completion of the project. How Europe and the Russian Federation will react remains to be seen.

Power of Siberia

The Power of Siberia pipeline is planned to be over 4,000 km long and will connect the gas fields Kovyktinskoye and Chayadinskoye in the eastern part of Siberia with Blagoveshchensk in the Amur region. The investments for this project amount to over \$55 billion US and will be provided by Gazprom on one hand and the China National Petroleum Corporation (CNPC) on the other; they have agreed to collaborate on this project for the next 30 years. The Amur region forms a gas hub from which the unprocessed gas is directly transferred to Khabarovsk near the Amur River at the border of China, or to China's Changling region. Additionally, Gazprom is building a gas processing plant for purification and the extraction of helium in Blagoveshchensk. In the near future, the creation of a large-scale gas chemicals facility has been planned to further process the gas to polyethylene.

Photo: Wladimir Nikitenko



Other Projects and Investments

The investments in the oil & gas industry in Russia are currently focused on quality improvement and the development of additional processing stages in order to extend the value chain both up- and downstream. Therefore, the focus lies on liquefying gas to LNG and to improve the fuel quality to Euro-5 and Euro-6 norm. In order to achieve this, the modernization of worn-out refineries is key, as 20% of Russia's machineries can be considered as nearly worn-out. While the average age of facilities and plants in western countries is approximately seven years, Russia's plants have already been in use for approximately 14 years. Thus, considerable investments in new plants and modernization are necessary.

- Rosneft plans to build an LNG plant in Pechora, which will release methanol and urea as by-products. As part of the Sakhalin 1 project, another LNG plant has been planned by Rosneft and Exxon Mobile. The investments are estimated to amount to €7.4 billion, if not affected by the sanctions.
- Rosneft and ChemChina are building a petrochemical complex in Amursk, which is scheduled to be finished in 2022. In the special development zone (TOR) Priamurskaya, Energy Amur is planning to build an oil processing plant that will cost €1.8 billion by 2020.
- Xincheng Power has shown interest in investing €4 billion in the construction of an oil processing plant in the Vladivostok area.
- Gazprom plans to invest €10.6 billion in the Baltisky LNG-plant in Ust-Luga. Shell is currently conducting a feasibility study for this project.
- The private holding Novatek is currently building an LNG-plant on the Yamal Peninsula and plans to invest €9.2 billion in the construction of the Arctic-LNG-2 plant on the neighbouring Gydan Peninsula.
- The Yamal Nenets Region plans to invest over €84 million in infrastructure projects, oil terminals and a logistical hub by 2025, so that LNG tankers can use the shorter north-east passage.
- The Japanese Mitsui Corporation has shown interest in constructing an LNG-hub in Kholmsk on Sakhalin Island.
- In the special economic zone Alabuga-2 in Tatarstan, a petrochemical cluster is being built for €4.2 billion. NKNK (part of the TAIF Holding) plans to build an ethylene plant there. Other projects (for example from Tatneft) have already been announced.

Chances for German Suppliers

German companies enjoy an excellent reputation in the Russian market and the label “Made in Germany” stands for reliability and quality. Regardless of the current political tensions, the history of cooperation and doing business between the Russian Federation and Germany is a success story. Apart from large foreign companies such as Winterstall, Linde, Bayer, BASF, many German small- and medium-sized enterprises (SMEs) are actively shaping the local value-chain. For example, Bentec, KCA Deutag, Maximator, Bauer Kompressoren, Endress + Hauser, and so on, are main contributors to the success of the energy industry.

For SME newcomers, there are several market entry strategies that can be used to enter the Russian market, with no one-size-fits-all solution. First, exporting through a Russian distribution network is a good opportunity to gather initial experiences of the market and build relationships with local partners for further cooperation. Due to the excellent reputation of German companies in Russia, franchising and licensing also offers a good chance for entering the market.

Partnerships, Joint Ventures and Greenfield Investments, such as wholly-owned subsidiaries and local production plants, provide an opportunity to use the favourable local production and legal conditions. In this context, it is important to note that the new policy of the Russian Trade and Industry Ministry offers incentives for joint ventures and greenfield investments through individually negotiated special investment contracts with foreign companies, which not only consider local-value-added, but also metrics such as technology transfer.

As all market entry strategies bear a certain degree of risk, finding the right local partners, experts and staff is key to minimizing risk and increasing the chance of success. In this regard, the Russian-German Chamber of Commerce, with its experience and excellent network, can actively assist you in the search for local partners, experts and staff, maximizing the success of your endeavour.

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Norway

Present Situation

Following the rapid decline in the price of oil in 2014, the Norwegian offshore market entered a transition phase in order to remain competitive. In the wake of severe cost cutting measures in some instances along the entire value-added chain, the industry is expected to grow again during 2018-2021.

Large oil and gas reserves still in production promise a high level of activity on the Norwegian continental shelf (NCS) over the coming 50 years. A major part of the future of the NCS lies in the north of the country, in the Barents Sea, where the largest existing oil and gas resources are presumed to be. In recent years, the Norwegian Ministry of Oil and Energy has released other areas in the Barents Sea for exploration; interest in these by Norwegian and foreign operators is significant.

One of the world's largest oil fields, *Johan Sverdrup*, is currently being brought on stream in the North Sea. The decision to develop was a major factor in dampening the decline in investment. It is expected that this discovery will account for about 25% of Norway's oil production in ten years' time. The first phase of the development project has already begun, and production can commence at the end of 2019. A final investment decision for the second phase is to be taken in autumn 2017. Development projects of this kind are of immense importance to Norwegian value creation and have a high impact on employment, as well as the development of technology and of the supply industry.

At the end of the year 2016 and in early 2017, 80 fields were in production of which 62 were in the North Sea, 16 in the Norwegian Sea and two in the Barents Sea. In 2016, 236.6 million Bm³ of oil equivalent (OE) were produced. This corresponds to an increase of 1% compared to the previous year (2015: 228.0 million Bm³ OE) and a reduction of 13% compared to the record year 2004 (264.2 Bm³ OE).

Over the past two years, cost reductions across the Norwegian continental shelf have led to a 30-50% reduction in the break-even price. For many projects, the current break-even price is at \$30-40 USD per barrel. This continues to make the NCS an attractive location for investment.

Currently, development of 80 discoveries is under discussion. Most of these are relatively small and are linked as «satellite fields» to existing fields, so that the infrastructure is used ef-

ficiently. Independent development projects are planned for the largest discoveries, while at the same time a new infrastructure is created by linking several small discoveries.

A series of new discoveries are currently in a development phase. Over the next ten years, production on the Norwegian shelf is expected to remain relatively stable and may increase slightly, as new fields commence production. Furthermore, the industry has introduced a number of efficiency measures, especially in regard to drilling wells and upgrading to increase the recovery rate of older fields.

Photo: Eyeidea





Photo: Fotolia

Economic Structure

The oil and gas industry is the largest industry in the country and also a strong driver of the economy as a whole. The oil and gas sector accounts for 12% of Norwegian GDP as well as 13% of total state revenue. To manage this revenue so that it benefits future generations in the long term, the government has set up a state pension fund. Oil and gas resources have also created a cluster of companies in Norway specializing in goods and services for that sector, including advanced technology, transportation, seismic surveys, engineering, testing and analysis, and safety and maintenance. Norway has thus developed its own proficient supplier industry for this sector.

In 2016, the number of workers employed by operator and supplier companies was at around 110,000. However, a total of just under 180,000 people (2016) work in companies that are directly or indirectly linked to the oil and gas industry. This is equivalent to 6.7% of all employees in Norway.

Export of Oil & Gas

Norway is the third largest net exporter of natural gas worldwide and the eighth largest exporter of crude oil. Oil, gas and condensate account for approximately 47% of all Norwegian commodities export. In 2016, this amounted to € 37.6 billion. The export of crude oil alone had a product value of approximately € 20 billion and amounted to 116 million Bm³ OE, which is roughly equivalent to 25% of Norwegian commodities exports that year. Gas exports during this period amounted to 115 billion Bm³, the highest ever. It was valued at € 17.6 billion, with gas accounting for 22% of the country's total exports.

Since 2010, more gas than crude oil has been produced on the Norwegian shelf. Almost all Norwegian gas was sold on the European market. A well developed and effective infrastructure as well as good transport distances, ensure Norwegian gas is competitive. The majority of exports go to Germany, the United Kingdom, Belgium and France, where Norwegian gas accounts for 20% to 40% of total consumption.

Businesses active in the industry

There are 46 exploration, production and infrastructure companies on the Norwegian continental shelf. In terms of production volume, Statoil is the largest company on the Norwegian continental shelf. With a share of 67%, the Norwegian state is the largest shareholder of Statoil. Other major companies on the Norwegian continental shelf are Exxon-Mobil, Total, Shell, ConocoPhillips and ENI. German operators such as Wintershall DEA, VNG and Bayerngas are also active on the Norwegian shelf.

The supply industry is Norway's second largest industry in terms of turnover, after oil and gas. The turnover of the Norwegian supplier industry in 2015 amounted to approximately € 51 billion. Of these, 40% were in international markets. The supplier segment currently consists of hundreds of companies along the entire value chain – from seismics, engineering and equipment for offshore platforms, such as nuts, valves and hoses for the shipyards, to advanced offshore supply and service vessels, as well as subsea technologies.

At the same time, suppliers have entered a period of consolidation, characterized by acquisitions and mergers, and increased collaboration to develop technologies that can meet the needs of operators. After the cost-cutting measures in recent years, the focus is once again on growth and investment, despite ongoing pressure on costs and efficiency in production.

Planned investment projects and potential

Large remaining oil resources promise a high level of activity on the continental shelf over the next 50 years. *Although here too, about 715,000 km² have not yet been released for exploration activities. The majority of that area is located in the Barents Sea and in the northeastern part of the European North Sea. The amount of undiscovered resources is estimated at 2.9 billion Bm³ OE in total.* It is also assumed that most future gas resources are located in the Barents Sea. Based on these positive estimates and forecasts for the northern areas, in 2016 the Norwegian government signaled a willingness to consider investigating completely new exploration areas in the Barents Sea for the first time in over 20 years. In 2017, a record number of exploration areas were released with the intention of granting new production licenses for them in the first half of 2018. At present, seven new production fields with a total investment volume of € 25 billion are planned on the Norwegian continental shelf.

The most important project for the future is the development of one of the largest deposits on the NCS, the Johan Sverdrup field of around 200 square kilometers. Participating licensees are Statoil, Lundin Norway, Petoro, Det Norske Oljeselskap and Total. Johan Sverdrup is the fifth largest discovery on the Norwegian continental shelf and is expected to account for about a quarter of all Norwegian oil production in ten years' time. This field holds reserves of between 1.9 and 3.0 billion barrels of oil equivalent and has an estimated lifecycle of 50 years. The field will be developed in several phases. The first development phase with investments totaling approximately € 12.6 billion plans for production to commence in 2019. In autumn 2017, an investment decision is to be taken regarding Development Phase 2, with production to commence in 2022. The investment level for Phase 2 is estimated at NOK 40-55 billion (approximately € 4.3 - 6 billion).

Market entry potential for German companies

Companies in EU member states play a fundamental role in the Norwegian oil and gas industry. Products and services are either delivered directly by the manufacturing plant from the country of origin or by a Norwegian subsidiary. A range of manufacturers of component parts or equipment also work with commercial agencies or agencies that represent manufacturers for Norwegian system suppliers or other clients, and are responsible for quality assurance and documentation. In some cases, the foreign producer operates their own organization with their own service organization in Norway.

Given the current challenges in the oil and gas industry, suppliers should be ready to adapt and break new ground in solving tasks to generate orders. Forms of cooperation between customers and suppliers are changing at present. In the past, small- and medium-sized suppliers have frequently concluded maintenance and modification contracts for EPC contractors. Since 2015, Statoil has been buying directly from product specialists on a larger scale. Suppliers should, therefore, join forces to deliver larger, integrated co-op packages and make themselves more attractive to operators. The combination of low oil prices and high costs has led to an increased focus on standardization measures in recent years. Tailor-made solutions are no longer optimal for operators; 'one size fits all' solutions that keep costs down and simplify processes, are in high demand instead.

In the coming years, more than 80 fields will be operating on the Norwegian continental shelf. In order to operate in a manner that is efficient, both in terms of costs and resources, topics of particular strategic importance are energy-efficient,

eco-friendly and sustainable technologies, exploration and increased production, cost-effective drilling and intervention, and future technologies in production, processing and transportation. The industry is clearly following the trend towards automation and digitization. The potential for new and cost-efficient labor and production methods by implementing Industry 4.0 concepts is vast, and the industry has launched several ambitious digitization projects. Developmental advances in artificial intelligence technologies and robotics provide a range of opportunities for companies developing niche products for use on the ocean floor.

Challenges and trends

Exploration and production on the Norwegian shelf is becoming increasingly demanding due to the geographical location of the untapped resources. Furthermore, a need for saving on costs still exists in a market characterized by an abundance of fossil fuel at low prices and a focus on the reduction of greenhouse gas emissions to make the industry more climate friendly. This depends on the widespread introduction of new and innovative technologies. Industrialization and standardization processes in particular bring with them a high potential for improvement. The industry is underdeveloped in this respect compared to other industries. Further cost-cutting and efficiency-enhancing options are found in the use of new, innovative technologies, especially with the assistance of digitization and automation.

In addition, there is a growing interest in the exploitation of deep-sea resources that are estimated to exist also in Norwegian territory. A strategy formulated by the Norwegian government regarding this clarifies that there are still technological challenges to overcome in terms of exploration, extraction and production or processing before primary resource recovery on the seabed becomes profitable. There continues to be a need for further development of extraction and processing technologies, as well as for environmental impact analyses and safety preparations in order for any development of this sector to be done on a sustainable basis.

The industry continues to focus on increasing efficiency to keep the break-even price as low as possible. Standardization and industrialization through digitization are also high on the agenda. After two years of restructuring and cost reduction, operators and suppliers can only continue to reduce costs by using new technologies. Without the digitization of processes such as exploration, production, logistics and maintenance, the industry is unlikely to remain competitive. Various operators have therefore launched ambitious digitization projects.

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Photo: Ilja C. Hendel



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