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LEADERSHIP, INNOVATION & SUSTAINABILITY
Contents

Foreword
Integration and sustainability
Dr Pierce Riemer, Director General, World Petroleum Council

Minister’s Welcome
Transformation in Bahrain
HE Sheikh Mohamed bin Khalifa bin Ahmed Al Khalifa, Minister of Oil, Kingdom of Bahrain

Global Perspectives
Safeguarding the interests of future consumers
Mohammad Sanusi Barkindo, Secretary General, Organisation of the Petroleum Exporting Countries (OPEC)

The future of energy investment
Dr Sun Xiansheng, International Energy Forum (IEF)

Challenges in the era of energy transition
Alok Sinha, Global Head, Oil & Gas and Chemicals, Global Industries Group Standard Chartered Bank, Singapore

Energy transformation: A catalyst for change?
Andy Brogan, Sector Leader, Oil & Gas, EY Global

Is future oil demand being overstated and with what implications?
Professor Paul Stevens, Distinguished Fellow, Chatham House

Downstream Refining & Petrochemicals
Increasing the downstream sector in Kuwait
Hatem Al Awadi, Acting CEO and Deputy CEO for Petrochemicals Kuwait Integrated Petroleum Industries Company (KIPIC)

Regional Perspectives
Leading Latin America’s strong above-ground risk landscape
Jimena Blanco, Research Director, Head of Americas, Verisk Maplecroft

Towards a more competitive and sustainable oil sector in Africa
Gaspar Martins, Chairman of the Board, Sonangol

Sustainable Development & Renewables
Trends in renewable energy production and trade
Yonov Frederick Agah, Deputy Director-General, World Trade Organisation (WTO)

Should oil and gas invest in what it knows or what it thinks will be?
By Paul Bogenrieder, Global Oil and Gas Senior Analyst, EY

WPC Vision, Mission & Values
WPC Vision, Mission and Values
This year’s Strategic Review has been launched at the first WPC Downstream Conference, under the Patronage of the HRH Prince Khalifa bin Salman Al Khalifa, Prime Minister of the Kingdom of Bahrain. We are also privileged to be able to host our committee meetings in Bahrain, alongside the conference.

The Oil and Gas industry is facing many complex issues in the new global context; the major challenge being the provision of Energy Security in a world with increasing challenges and uncertainties.

The UN Population Models indicate that the world’s population could exceed 16 billion by the end of the century. More conservative assumptions estimate a global population of around 9 billion by 2050, growing to 11 billion by 2100. Economic expansion and population growth will continue to drive increased global oil demand, with the main regions of growth being non-OECD countries in Asia, the Middle East and Africa. This alone will ensure the long-term future of the oil and gas industry.

Non-OPEC supply from unconventional sources has increased significantly in recent years, often encouraged by government policy directives and various incentives. However, there is little agreement on where this future supply may peak or start to decline. To meet long term demand growth, OPEC will continue to provide a key role in the global oil supply.

The World Petroleum Council fully supports these Global Goals, which are addressed in our triennial Congresses, alongside the various technical and managerial programmes. Every Goal involves the energy industry in some way. The Oil and Gas industry has embraced these initiatives and, today, many privately funded sustainability projects are being developed in many developing countries.

Many analysts look at the future picture of the current investment landscape across fuels, technologies and countries, demonstrating that the energy system is undergoing a gradual re-orientation towards low carbon energy and efficiency, and that investment in key clean carbon technologies requires further ramping up to put the world economy on track for climate stabilisation.

Against the certain background of increasing global population growth, energy intensity, and the need to bring vast populations out of poverty, the outlook for the Oil and Gas industry seems assured. However, in the new global context, the range and impact of uncertainties are taking risk management to a new level and to the top of managements’ agendas. Apart from the effects of continued sluggish global economic growth, such uncertainties include: heightened geopolitical risks, volatile energy commodity prices, and complex geological and technical challenges. In recent years, these uncertainties have intensified in unexpected ways. Such uncertainties are outside the direct control of management, requiring new approaches to industry management.

We cannot escape the subject of potentially volatile energy commodity prices, which continue to generate uncertainty in risk and financial management. What the press say demonstrates the volatility over the past decades. During the past 50 years the oil price has been highly volatile compared to the steady increase in production. The correlation between demand and supply is not straightforward and is influenced mainly by market sentiment and geo-political issues.

In the past twenty years, demand for natural gas has increased as countries switch from sources such as coal and oil to fuel their economies. For most of this period, gas prices in the various regions of the world were highly correlated and prices generally moved in unison reflecting regional demand and supply.

Regarding future management of the Oil and Gas industry, it is imperative that it attracts and develops the highest quality professional skills that will be needed in the new global context.

We have recently completed an important gender study of our industry and WPC executives will take part in the LEWAS conference also being held in Bahrain. The World Petroleum Council has been active in organising events for young professionals, male and female, around the world. We have an international Young Professionals Committee, which has been active over the past 15 years in organising conferences, seminars and leadership programmes, including active participation in our triennial Congresses, greatly stimulating the interest of young professionals in the industry and helping to ensure that we attract the best qualified people to meet the challenges of the new Global Context.

Dr Pierce Riemer
Director General, World Petroleum Council

Integration and sustainability
By Dr Pierce Riemer
Director General, World Petroleum Council
Transformation in Bahrain

Interview with HE Sheikh Mohamed bin Khalifa bin Ahmed Al Khalifa
Minister of Oil, Kingdom of Bahrain

How important is the WPC Downstream Conference?
The WPC with its long history is very important and we were extremely supportive when they proposed this new concept for a Downstream Conference. It was their idea to come up with this concept and we were extremely supportive. Petrochemicals are a big part of refining. Today nobody thinks of building a refinery without the full configuration of a petrochemical plant to it, as these are the economics of today. Good refineries make money most of the time but if you are fully integrated you will make money all of the time and that is why petrochemicals are essential. Both we and the WPC see this as the path from where growth is going to come from in the future. You will know that Saudi Aramco and SABIC are collaborating on a fuels-to-chemicals process, which is an extremely ambitious project. We hope that we can build our own petrochemical industry here in Bahrain, and in this regard have designed the aromatics plant as part of the future expansion of BAPCO, which is very timely.

What is the progress in developing the Khalij Al Bahrain basin?
We have a discovery well from which we have flowed oil. We have been doing some seismic shooting and we have completed a number of core analyses. Currently, we are beginning to flow a test well and we will keep that on a long production timeline to study the characteristics of the resource. That will take a few months and in the meantime we are in contact with interested parties to keep them informed of developments. We are building a virtual database to eventually make data accessible in the hope that we can make it attractive for companies to invest.

And the state of the LNG facility?
The LNG import facility is about to be commissioned. We have the commissioning cargo ready and about to be mobilised to start the test protocols in the next few weeks. By the end of the year it should be fully commissioned and on standby for whenever we are in need of imports. For the time being we do not have any need for the import of LNG, it is now purely for security of supply. It is an important asset and there are many things that we can do with it in the future. I am talking to our GCC neighbours for the extension of a gas grid similar to what we have done on the electricity side, plus a more robust network to connect them.

When will Eni begin drilling?
Eni signed a concession earlier this year. They have a prospect which they identified before getting the concession. They are mobilising a rig so it should be in position by the end of this year or the beginning of next year - it all depends on logistics.
Are there likely to be further block signatures?
We have just finalised a seismic shoot of the other blocks. Those will need a couple of months of processing and we will probably make them available as the data comes through and decide when would be the best time to go to the market with the other remaining blocks.

How confident are you for the Bahraini economy in the medium term?
We are very optimistic as we have several mega projects being completed or under construction. One of the biggest is the mega refinery extension which is extremely timely. We will have state of the art equipment and up to spec refined product by 2021-22 when we should see the refinery fully operational. We have also designed a petrochemical plant as part of the future expansion. We have many things happening now in the upstream and in the downstream. We had the pipeline with Saudi Arabia completed, then we commissioned the Banagas gas plant. We have the LNG terminal and to top it all out, the refinery is now in its second year of construction. We have in total US$8 billion invested in projects in the mid and the downstream sector. The focus currently is on the upstream. We are trying to unlock oil resources, whether tight or using enhanced oil recovery. We are also trying to expand our gas reserves. We are working on what we used to call the deep gas. So I think that we are in a better position to understand how many resources there are and we have brought down the cost of extraction considerably, all thanks to the development of technologies via the shale revolution.

How does oil and gas fit into Bahrain’s economic diversification?
The economy is already relatively well diversified; the oil sector is now not more than 20 per cent. But the government revenues are not, so there is a diversification drive for that. As you know VAT was recently introduced in the GCC countries and that has a direct impact on increasing the non-oil government revenues, so diversification of government revenues is the bigger challenge.

Technologies such as Fintech are important in Bahrain, but you now have artificial intelligence moving into the oil industry as well. Refineries and petrochemical plants have what is called predictive maintenance which prolongs the life of the facility and delays the time between maintenance and ultimately adds up the profitability of these assets. So the technology is not just in the finance, it is also coming into the oil and gas industry in a big way. It is adding availability and it is increasing profitability and hopefully we will see it applied in all new projects as we seek to install the latest technology.

What is the main challenge of the future?
The challenge being faced by oil companies today is price volatility and calculating the right level of investment. The break-even cost of incremental oil globally today is debatable, but we have seen more than a trillion dollars in investment wiped-out since the crash of oil prices in 2015. I think it is important to really highlight how much investment we may be missing to make sure that there is no supply challenge to meet the demand in the future. Demand is still increasing and while the extent of growth demand is open to question, nobody is talking about demand destruction. On the contrary the world needs more oil which is still the main energy source.
Safeguarding the interests of future consumers

By Mohammad Sanusi Barkindo
Secretary General, Organisation of the Petroleum Exporting Countries (OPEC)

OPEC is acutely conscious of its responsibility to consumers. We continuously seek to promote multi-stakeholder dialogue and take account of the welfare of the international community and global economy in the actions we take. This remains core to our raison d’être and is clearly articulated in our Organisation’s Statute. It has also been front and centre of the ‘Declaration of Cooperation’ process, whereby OPEC and 10 non-OPEC producing countries have committed themselves to working together to contribute to oil market stability.

Spurring the ‘Declaration of Cooperation’ partners has been the fact that oil market stability is vital across all time frames. The interlinkages connecting the short-, medium- and long-terms are clearly made apparent by the fact that stability today begets stability tomorrow. Our current actions must be informed by the long-term trajectory with regard to demand and consumption patterns.

For this reason, OPEC sincerely hopes that our flagship publication, the World Oil Outlook (WOO), continues to remain essential reading for policy makers whose decisions affect the future of the energy market. The WOO offers a thorough review and assessment of the medium- and long-term prospects to 2040 for the global oil industry, as well as analysis of various sensitivities that have the potential to impact the petroleum industry in the years ahead.

Two characteristics of the forecasts for the future of global energy demand are particularly apparent from the WOO:
- Firstly, the oil industry remains a growth business, with oil continuing to be a fuel of choice for the foreseeable future.
- Demand for energy in the coming decades is forecast to pivot to Asia, especially China and India. This is reflective of the fact that China and India will be key engines of economic growth in the forecast period.

OPEC’s projections with regard to the future of energy demand are consistent and correlate with those of a diverse range of reporting agencies. The WOO forecasts that primary energy demand globally will rise from 274 million barrels of oil equivalent a day (mboe/d) to around 365 mboe/d in 2040. This is a mammoth 33 per cent increase, with developing countries accounting for 95 per cent of this. Clearly all forms of energy are required to meet such a growth in demand; it is not about choosing one over the other. Hence, oil is expected to remain the fuel with the largest share in the energy mix throughout the forecast period to 2040. Global oil demand is projected to see an upsurge of 14 mb/d, rising from 97.2 mb/d in 2017 to 111.7 mb/d in 2040.

There are a number of factors which account for this trajectory in energy demand. The first is world population growth. In line with analysis of the UN, the WOO forecasts that the global population is projected to expand from a level of around 7.5 billion in 2016 to 9.2 billion in 2040. Developing countries will account for the majority of this growth and notably, India’s population is expected to rise from 1.3 billion to 1.6 billion in the forecast period.

To support such growth and feed these additional mouths, there needs to be a high yield per acreage in the agricultural sector – this can only be achieved through the utilisation and deployment of nitrogenous fertilisers and other agricultural products that are produced through hydrocarbons, especially the petrochemical sector. This is reflected in the forecast for world oil demand in the residential/commercial/agricultural sector – this can only be achieved through the utilisation and deployment of nitrogenous fertilisers and other agricultural products that are produced through hydrocarbons, especially the petrochemical sector. This is reflected in the forecast for world oil demand in the residential/commercial/agricultural sectors which is expected to rise by 1.7 mb/d from 2017 to 2040. China and India account for the bulk of this overall growth, increasing by 0.9 mb/d and 0.7 mb/d, respectively.

Another key factor in the prognosis for energy demand is the major regional shifts in the future economic picture. The size of the global economy in 2040 is estimated to more than double that of 2017. China’s weight in the global economy is forecast to surge by around 6 percentage points to 24 per cent and India’s is expected to rise by around 8 percentage points to 15 per cent.

As a result of their economic growth, the proportion of primary energy demand which can be attributed to India and China is very significant. Energy demand in India and China between 2015 and 2040 is forecast to increase by 22 mboe/d and 21 mboe/d, respectively, which is more than 50 per cent of the energy demand growth in developing countries in this period. By 2040, China and India are forecast to account for around a third of primary energy demand globally.

With regard to oil demand, India is projected to have the fastest average demand growth (3.7 per cent p.a.), as well as the largest additional demand of 5.8 mb/d between 2017 and 2040. As a result, India will likely pass the mark of 10 mb/d sometime towards the end of the forecast period. Despite the impressive growth, India’s oil demand is still far below the level of China, where oil demand is forecast to increase by more than 5 mb/d to reach 17.4 mb/d by 2040. China and India combined are expected to account for around a quarter of global oil demand in 2040.

To meet this future demand, the required global oil sector investment is estimated at US$11 trillion. This has been forefront of the concerted efforts of OPEC and its non-OPEC partners through the ‘Declaration of Cooperation’, which,
as previously mentioned, seeks to contribute to a balance between global oil supply and demand in order to mitigate volatility and encourage an enabling environment for attracting these essential investments.

Thankfully, the ‘Declaration of Cooperation’ has supported a greater element of stability being present in the oil market over the last two and half years. OPEC and its partners have built on this progress by endorsing the ‘Charter of Cooperation’, which was signed on 2 July 2019. The ‘Charter of Cooperation’ is a high-level commitment to facilitate dialogue among Participating Countries, aimed at promoting oil market stability, cooperation in technology and other areas, for the benefit of oil producers, consumers, investors and the global economy. It is a means of enabling the long-term use of oil as a key component in the evolving global energy mix, as well as improving the environmental and efficiency credentials of oil. The ‘Charter’ will promote strategies and technologies to advance the global oil industry.

The commitment of OPEC and its partners to further cooperation is reflective of the fact that another trend expected in the decades ahead is that the world will continue to become more interconnected. In such circumstances, our organisation remains unwavering in its dedication to fostering good relations between all stakeholders in the energy industry. ‘Going it alone’ is an ineffective strategy; yet, there are boundless possibilities to what cooperation can achieve. For this reason, OPEC is delighted with its strong friendship and partnership with the WPC and is committed to enhancing this relationship even further in the years to come.

Many OPEC Member Countries and the NOCs are already involved in joint refinery and petrochemical ventures.
The future of energy investment

By Dr Sun Xiansheng
Secretary General, International Energy Forum (IEF)

The past few years have seen tectonic shifts shape a new global energy landscape. We stand at a critical juncture in which government policies on energy investment and trade shall decide the future of energy. Numerous developments with their own unique impacts collectively affect the energy market. The drop in oil prices in summer 2014 has deferred upstream investment in conventional resources but also enabled greater resiliency in unconventional production. Environmental pollution in major urban centers and climate change have sharpened policy focus on energy transition and sustainable development goals. New renewable technologies and innovation in transport, and other sectors, have made considerable advances over the last decade that create even greater expectations for the future.

As the energy dialogue has shifted so has the conversation on energy investment. Renewed commitments to reduce greenhouse gas emissions combined with greater geopolitical risk has substantially lowered investment in the oil and gas sector over the past few years and increased decline rates in existing production. If left unaddressed, this will have major repercussions for global energy stability, orderly transitions and the achievement of the UN sustainable development goals. More inclusive and open dialogue is needed to deepen insight and enhance investor confidence to invest in long-cycle and clean energy investments which can lead to further investments in technology research, training and education.

Demand and supply
Investment in oil and gas is heavily dependent on supply and demand balances. Increased demand has the potential to offset a supply glut and thus maintain a tight demand-supply market. However, the shift in demand from OECD to non-OECD centres means that future demand rests solely on countries such as China and India. While slowing economic growth in non-OECD countries naturally leads to decreased oil demand, import dependencies continue to surge. China’s economy grew 6.6 per cent in 2018 – its slowest pace in almost 30 years. Furthermore, both the IEA and OPEC see a downward trend in economic global growth in 2019 at around 3.7 and 3.5 per cent, respectively. Naturally, a slowing global economy can have potentially damaging effects on energy demand growth which, in turn, further reduces investment in much needed oil and gas exploration.

The advent of shale has had a major impact in terms of oil supply. Supply growth in OECD countries increased by over 2 million barrels in 2018. Within the OECD, Non-OPEC countries have been the primary driver of this growth. According to both the IEA and OPEC, Non-OPEC growth for 2018 reached 2.50 mb/d. Although Non-OPEC supply growth includes Canada and Russia, the real story is in the US, which makes up the large majority at over 2 mb/d due to growth in shale oil. The Permian Basin in Texas itself makes up approximately 1 mb/d of US production growth.

Given these developments, investment is still well below 2014 peaks, with a modest recovery continuing this year. In nominal terms, however, investment is still about 35 per cent below 2014 levels globally. With plays like US shale and other short and medium cycle investments including in renewable energy are more readily available, long-term investment has been put on hold in both the hydrocarbon sector and nuclear.

The energy transition
Structural policy changes are shifting the energy mix towards lower carbon resource solutions, driven by advancements in technology and growing environmental concerns. These are accompanied by energy-saving measures and regulations. It is no surprise that energy efficiency becomes part of the global energy conversation. World economic growth is projected to more than double GDP by 2040 with the global population rising well above 9 billion people, a secure and orderly energy transition is essential to meeting the steadily rising global demand for energy.

The landmark signing of the Paris Climate Agreement and the UN 2030 Agenda for Sustainable Development in 2015 underscores the movement towards transition on one hand and responsible growth on the other. Countries dependent on oil revenues are now incentivised to both diversify their energy portfolios and cut production costs due to population growth and the need to offer future generations equivalent, if not better, living standards while navigating a volatile market and an unpredictable geopolitical environment.

This shift has given rise to alternative developments that pose investment challenges in the hydrocarbon sector. Growth in renewables such as solar and wind continues with costs decreasing at a rapid pace. According to the IEA, renewables are forecast to meet more than 70 per cent of global electricity generation growth, led by solar PV and followed by wind, hydropower, and bioenergy. The rise of electric vehicles is a prime example of advancements in technology. Over 1 million electric cars were sold in 2017 for a global total of slightly over 3 million. The IEA forecasts 125 million electric cars on the road by 2030.
From an investment perspective, the rise of “responsible investing” means many large funds will not invest money into companies unless they demonstrate mitigation of carbon emissions below a certain threshold. As a result, investment is being diverted to clean energy technologies such as Carbon Capture Use and Storage (CCUS), hydrogen, digitalisation, and artificial intelligence technologies that are making operations more efficient. Together, these developments enable policy makers and investors to approach the energy industry and the challenges it needs to meet holistically as a comprehensive system without unduly discriminating against any energy technology.

Adopting energy realism
It is important to note, however, that the impact of deferred investments in conventional production can have adverse outcomes. If investment does not move forward, present oil supply abundance may prove short-lived and surprise consumers when they face a structural shift towards a sellers’ market in the 2020s when shale growth is expected to slow and depletion rates in conventional production have deepened.

We must also remember that fossil fuels will remain relevant in the future. Both IEA and OPEC outlooks still maintain that fossil fuels will continue to provide around 60-74 per cent of energy demand in 2040. In fact, by 2040 our energy mix could become the most diverse the world has ever seen with oil, gas, coal and non-fossil fuels each comprising around a quarter of the energy total mix. This is also where natural gas, often seen as the bridge between oil and renewables, takes on a greater role together with the promise that hydrogen technologies hold. More dialogue is needed to accelerate orderly energy transitions. This inevitably means greater focus on energy efficiency and innovation through the entire energy system.

Moreover, we can see several trends that will require additional investment in oil and gas. In addition to a growing population that will naturally increase oil demand, petrochemicals will see the greatest growth with more than a third of the growth in world oil demand to 2030, and nearly half the growth to 2050. This will add nearly 7 mb/d of oil demand according to the IEA. Aviation and shipping fuels will also see a demand growth of around 3 mb/d. Even with electric vehicles growing rapidly, oil demand from 1 billion internal combustion engine vehicles required worldwide will only be modestly affected. Since existing technologies cannot be replaced anytime soon greater focus on energy efficiency and quality standards for fuel consumption will be more productive. Clean technology is not just limited to renewables. There is a role for new technology and innovation that addresses the question of how to make existing supply and demand patterns, and industry processes more efficient and sustainable through investment in waste to energy and circular systems.

The overall lesson is that while energy investment continues to be dependent on multiple market factors, policy frameworks and technology pathways must remain predictable. This is necessary in order to swiftly unlock the major capital and human resources required for a truly secure, sustainable, and affordable energy future. Energy investment in the future needs to be varied, diversified and focused on sustainable outcomes. In the end, environment sustainability and resource development are not mutually exclusive concepts. More dialogue and openness will help to ensure that sustainability and growth requirements become more mutually reinforcing and that policies and technologies work together in tandem to ensure a balanced, healthy and robust energy future for all.
There’s not a day where the threat of climate change to the planet and the accompanying challenges to the continued survival of all living beings in our ecosystem is not discussed. Unfortunately, the hydrocarbon industry, identified as a key contributor to global warming, is under attack from activists to contribute more vigorously to meeting the goals set under the Paris Climate Change accord. Simultaneously, activists are also lobbying with governments to provide more robust policy support for accelerating the development and commercialisation of green energy technologies.

Energy transition is, therefore, a reality. With the adoption of renewables as the likely primary source of future growth in the power sector and the focus on Electric Vehicles (“EVs”) in the transportation sector, the debate is now to understand the likely pace of its progress in the future and how the current energy industry plans to respond to the challenges posed by the climate change accord.

So what does the future hold for the hydrocarbon industry?

The share of Coal, Oil and Gas in the 2020 global energy basket is projected to be about 83 per cent whereas those of renewable energy sources is about 13 per cent. Given the high growth in renewable power and EVs, the projected global energy mix in 2040 is likely to be 73 per cent contributed to by Coal, Oil and Gas and 22 per cent by renewables. At first look, this hardly sounds alarming, given that despite losing ground to renewables, there is still growth ahead for the hydrocarbon sector in the expanded global energy basket. However, the differing demand saturation horizons for these fuels is a concern, making the industry introspect carefully in reshaping their business.

Why does the threat of energy transition matter?

Energy transition has historically been a key driver in economic development. Coal, as a fuel source, was key to the success of the industrial revolution. The subsequent rise of oil and gas as primary fuels with much higher calorific values provided the platform for a quantum leap in energy efficiency, thereby accelerating exponential growth in the power and transportation sectors. Not only did this usher in an interconnected world, but also energised the creation of a new workforce generation employed by new industries, a better quality of life, and cross-border trade amongst nations to levels never previously imagined.

It may seem very commonplace today in tropical Asia to have the ability to gift fresh tulips from Holland to your friends and family, but not too long ago this was just a vicarious experience for most, gleamed through books, movies and magazines. Such has been the transformative power of the last energy transition from coal to oil and gas.

Unsurprisingly, this increased energy intensity from hydrocarbon sources has come at a price – an additional pressure on the environment accompanied by threats to the continued well-being of our planet. Historically, energy transition has been a multi-decade event. However, given how established players have found their businesses upended by disruptive new technologies, the industry could face a much shorter transition period, and a deeper existential threat, as can be seen from:

**Coal:** Losing its share of global energy basket over the past several decades to oil and gas, the decline is being accelerated by concerns about it being the dirtiest of...
hydrocarbons. Coal is projected to lose its share in the global energy mix not just in percentage terms but in absolute terms, reflecting an actual decline in demand.

**Oil:** It has taken less than a decade for the industry to shift from the talk of “Peak Oil” to “Peak Demand” now. Despite a rapid growth in EVs, oil demand is still projected to grow, triggered by a growth in demand from emerging markets and the petrochemical sector. However, this growth will flatten out around 2035 and go into gradual decline thereafter.

**Gas:** The least carbon-intensive amongst all the hydrocarbons, gas is seen as the transition fuel for meeting the goals of the climate accord since growth in renewables alone will not help meet those targets. Amongst the hydrocarbons, gas probably boasts of both the highest rate of growth and the longest projected growth cycle (until 2040) before demand growth moderates out.

**Key issues to be faced by the industry in the new normal**

The oil and gas industry is characterised by a long lead cycle in discovering and monetising new resources. With large capital commitments involved, businesses will have to help meet the key objectives of the climate change accord, while being focused on their projected demand growth. Consequently, some of the issues which the industry stakeholders are now likely to confront are:

**Restructuring of existing E&P portfolios to reduce carbon footprint:** New operating standards will need to be set for the industry aimed at reducing the carbon footprint. Change in business strategies will result in some opting to go gas-heavy into the future while others will choose to concentrate on oil, aided by investments in newer technologies focused on reducing the carbon intensity of its operations and in end use of products.

**Cost for meeting enhanced environmental scrutiny:** The industry will be faced with increased costs to deliver on the climate accord objectives and management of energy transition risks. These will emanate from key stakeholders such as the regulators, investors and the financial community, all of whom have been aligning themselves much more closely to the recommendations of the Task-Force on Climate-related Financial Disclosures (“TCFD”) framework.

**The challenge of raising equity and debt capital:** Increasingly, with business uncertainty around demand growth and shorter time horizons available for generating satisfactory returns, maintaining continued access to equity and debt capital markets will be a key challenge. It will result in an enormous premium on players who can operate in the top quartile of the cost curve, using not just standard cost discipline but also new technology and practices geared towards delivering enhanced efficiency gains to offset the inevitable increase in costs.

The upstream business will be significantly more agile than it is currently with greater emphasis likely to be placed on reducing lead times to monetisation through smaller, modular but quickly replicable projects with lower initial capital commitments. For the downstream sector, to ensure long-term viability of investments in a peak demand and beyond period, players will have to increasingly invest in ‘Crude-to-Chemicals’ integrated refineries requiring significantly larger capital outlays.

**Role of supportive host governments:** Going forward, the fiscal framework provided by host governments will assume greater significance as players seek to manage conflicting demands of investors, activists and host governments. In an unsupportive economic framework there will be a significant likelihood of unexploited assets being left in the ground.

**How to attract young talent:** This battle will become even more critical as the industry fights the perception battle, both on the reputational front and in projecting its long-term viability as a career option for young talent.

**Future Energy Landscape**

Every change presents opportunities for players who are able to adapt to the new normal. This era of energy transition, even if it’s an accelerated one, will span several decades before Oil and Gas sectors surrender their primary role to new, cleaner energy alternatives. In the interim, new resources will need to be discovered and brought to the market lest we risk wild fluctuation and concomitant price shocks in the global economy. We will see a significant consolidation opportunity in the sector driven by the survival of the fittest, a matter of lasting power and adaptability. Equally, given the financial strength and operational capabilities, expect also to see some of the existing industry players emerge as disruptors and aggregators in the new clean energy sector.

In future, as energy transition unfolds, we can expect to see greater convergence between the old and new energy forms with technology bridging these phenomena. Ultimately, only with the advancement in technology will we be able to deliver on the twin goals of increase in energy efficiency with reduction in energy intensity, a key to reducing the impact of global warming on climate change while enabling continued improvement in living standards globally.
Energy transformation:
A catalyst for change?

By Andy Brogan
Global Oil and Gas Sector Leader, EY

The oil and gas industry is at a turning point. The current dynamic is a shift from resource scarcity to resource abundance, combined with a relentless pressure to decarbonise. Hydrocarbon alternatives are becoming increasingly competitive and governments increasingly focused on environmental impact. As a result, structural adjustment seems inevitable. The nature of energy supply and the energy mix are changing, and the only prediction that can be made with certainty is that change is inevitable, driven by a combination of technology, policy, consumer preference and the appetite of the capital markets.

Where technology is concerned, it will determine key drivers like the increase in energy efficiency and the decrease in cost of renewable energy generation and electric vehicles. Meanwhile, consumers’ preferences will play a key role in the adoption of electric vehicles and the increased use of renewable energy.

Policies formulated and implemented by governments to cut carbon emissions pursuant to the 2017 Paris Agreement will play a critical role in the overall energy mix. Finally, the capital markets’ role is critical for sustainable development: to limit the global temperature rise below 2 degrees – renewables and energy efficiency by end users would require an investment of US$14 trillion and US$20 trillion respectively by 2040.

In response to these external and environmental drivers, key oil and gas players’ strategies will evolve and we will witness considerable change in the competitive landscape. As this evolution unfolds, understanding the specific changes to the competitive landscape can offer a competitive edge in the times to come.

Global oil companies are building portfolio optionality
Historically, the oil majors have followed their integrated model, which paid off during the oil price collapse. While upstream earnings plunged, earnings from downstream increased significantly, providing a buffer to overall profitability. This has helped the majors to focus on streamlining their businesses by:

- Digitalisation to reduce capex and operating costs
- Upgrading their upstream portfolios through acquisition, while divesting some of their profitable non-core downstream assets
- Portfolio optimisation by selling high-cost assets while replacing reserves with lower-cost ones, thereby reducing the overall break-even price of the portfolio.

By continuing to focus on their core competencies, the majors have managed to increase their profitability and efficiency. With natural gas expected to play a critical role in the energy transition as a bridge fuel, several international oil companies have announced plans to increase the share of natural gas in their portfolio. In addition to focusing on their core business, the majors are investing in renewables. Most have announced initiatives to reduce their carbon footprint and are increasing their investments in renewable energy. But these investments need to be put in context. In comparison to overall capex investments, the investments in renewables represent a cautious approach. During the last three years, the majors have spent over US$350 billion capex in oil and gas investments, while total investment in renewables during the same period has been less than 5 per cent of their capex.

These investments are akin to purchasing options into an expanded energy value chain while continuing to focus on the core oil and gas business. We define this as optionality – that is, maintaining a core focus on oil and gas while investing a threshold amount in renewables based on anticipated changes in energy mix. This approach will allow companies to build up experience with renewable energy and increase investments if they have the desired outcome or write off the amounts should the energy mix not change within the anticipated timeframe. In this way, the company can remain agile, focussed and efficient all at once.

National oil companies moving from volume to value
National oil companies are major players in the global oil and gas industry, accounting for 58 per cent of global reserves and 56 per cent of production. However, their role rarely stops there and, depending on the NOC’s home country, it may also be a policy maker, regulator, trader in commercial entities or any combination of these. In many hydrocarbon-driven emerging markets, NOCs also act as engines of economic and social development and have explicit or implicit duties, including national infrastructure development and social welfare.

Low oil prices have triggered fiscal tightening measures in many emerging markets, and countries have/are taking difficult — yet fiscally responsible — measures such as:

- Reducing (sometimes eliminating) subsidies on fuel and energy prices
- Implementing cost reduction programs to increase profitability

Changing market conditions are also forcing more NOCs to internationalise their operations, to grow and to be more efficient in the lower oil price environment. Different NOCs are at different stages in their internationalisation journey, with resource-seeking NOCs active in acquiring reserves, and...
producing NOCs active in securing demand. The common thread is capital - either by attracting investment in home countries’ resources through partnering with international companies, or by making investments in overseas resources that have better returns or serve long-term strategic objectives. At the same time, in their role as drivers of domestic economies, NOCs face heightened pressure to increase investments in both oil and gas and non-core businesses in their domestic markets. These twin obligations require NOCs to pursue clear-cut and selective investment strategies that allow them both to meet the roles expected of them, and to rework their business models to accommodate longer-term goals, i.e. to renegotiate the critical elements of their contract with their respective states, as set out in the framework shown above.

The NOCs that succeed in moving to a new business model to maximise their potential enterprise value, and thus maximise their contribution to the nation, will be those who also succeed at building capital and operational excellence into their culture. These NOCs are taking steps to fundamentally change how they operate to keep providing the much-needed financial support to their home countries. The changes are two-fold:

- Transformation into efficient commercial organisations; and
- Reform of local oil and gas regulations.

The coming years will be defining for the NOCs as they embark on their capital transformation journey to become “commercial.” The changing NOC business model will also have a definitive impact on the overall competitive landscape of the oil and gas industry as well as the broader policy environment.

Oil and gas in an era of transition

The changes in strategies and business models of the IOCs and NOCs will lead to a different landscape for the entire sector. As a result, all players in the sector will have to adapt to a new business and workforce model. Recognising the impact of these changes early on and setting in place business and workforce initiatives will provide a competitive advantage.

To be successful in this changing landscape, companies will have to clearly define their inspirational purpose and business values to transform their business and workforce model. Aligning business and people’s individual goals to the corporate strategy and competencies will enable change to their corporate culture that will maximise both the customer and workforce experience. At the same time, business and operating changes such as the increased use of technology go hand in hand with workforce model changes that foster increased technological engagement to enhance productivity and employee motivation. In turn, as the model enables employees to become early adopters and innovators, using digital technology, this will also enable the development of leaders for the new digital organisation.
A conventional view of future oil demand is coming out of the ‘energy establishment’, which refers to a mixture of international agencies such as the International Energy Agency (IEA), the US Energy Information Administration (EIA), the OPEC Secretariat and the large oil companies. They all continue to show an important role for oil in the future energy mix. Figure 1 below provides a typical view of such thinking from the IEA. Thus their ‘New Policies Scenario’ shows a significant increase in oil demand between 2017 and 2040. Such a view is common amongst others from the ‘energy establishment’.

However, such views would appear to be underestimating the energy transition currently underway. An energy transition is when an economy switches from one main source of energy to another. There is a long history of such transitions ranging from the switch from wood to coal in the USA between 1865 and 1900 or the switch from oil and coal to nuclear in France between 1974 and the 1980s. From the history of such transitions at national level, certain patterns of the process can be identified. It starts with a trigger. Once the trigger has been pulled then a whole series of reinforcing factors come into play revolving around changes in technology that alter relative fuel prices. This process can be driven by market forces or by government policy or by a mixture of both.

The current energy transition, which is global, is from hydrocarbon molecules to electrons and was triggered by environmental concerns. This initially was driven by concerns over climate change and the need to move to much lower carbon intensities in the economy. However, more recently, issues of urban air quality and particulate pollution have joined such concerns. You don’t need a panel of international scientists to tell you this is bad news, just try walking down the street or, even more potently, get your children to walk down the street! As with other transitions, since these environmental triggers have been pulled, reinforcing factors are beginning to speed up the transition. These range from the dramatic fall in the cost of renewable electricity, the rise of electric vehicles and other technical changes associated with the so-called Fourth Industrial Revolution. These include artificial intelligence, big data and block chain operations. To these

Figure 1: IEA future oil demand by sector and scenario (mb/d)

<table>
<thead>
<tr>
<th>Year</th>
<th>Current Policies</th>
<th>New Policies</th>
<th>Sustainable Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>140</td>
<td>120</td>
<td>100</td>
</tr>
<tr>
<td>2017</td>
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<tr>
<td>2040</td>
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</tbody>
</table>

Source: IEA World Energy Outlook 2018
reinforcing factors might be added the prospect of a war in the Middle East leading to a major geopolitically driven oil outage and as a result a major oil price shock forcing consumer governments to adopt policies that will speed up a move away from oil as the oil price shocks of the 1970s did for the OECD countries.

There is much debate over the speed of this transition. The energy establishment appears to be very conservative about the speed as can be seen from Figure 2 with hydrocarbons continuing to make a major contribution to global energy growth between 2015 and 2035. The problem is that there are very strong vested interests working. Large oil companies can hardly say to their shareholders “It’s been nice knowing you but the party is coming to an end!”

However, others, including this author and much of the financial community, would argue they are seriously underestimating the speed with which renewables will replace hydrocarbons. That they are underestimating the speed of the transition appears to be confirmed by their continual upward revisions to renewable and electric vehicle (EV) penetration.

Thus, it is likely that their forecasts for future oil demand are being considerably over-stated. Where they acknowledge potential declines in oil demand they offset it by claiming that petrochemicals will fill much of the void. For example, the IEA projects that one-third of the growth in oil demand by 2030 will come from petrochemicals, rising to almost 50 per cent by 2050. However, plastics are rapidly seen as increasingly toxic and are becoming the new tobacco. There is a growing groundswell of opinion in favour of using much less plastic. This possibility is reinforced when one realises that 40 per cent of plastics are used for

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**Figure 2: Contributions to energy consumption growth 2015-2035**

![Chart showing contributions to energy consumption growth 2015-2035](chart.png)


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**Figure 3: Non-oil fiscal deficit**

![Chart showing non-oil fiscal deficit](chart.png)

Source: IMF, 2012
packaging, much of which might reasonably be deemed a non-essential luxury.

This threat to growing oil demand presents serious problems for the oil exporting countries. Furthermore, the faster the transition, the greater will be the disruption and the less time to adjust. Most oil exporting countries have failed abysmally to diversify their economies away from oil. The reasons for this failure are many and complex. However, at its simplest it is because of the failure to encourage the private sector. The issue goes back to the Soviet Union at the time of President Gorbachev over whether it is possible to have perestroika – economic liberalisation – without glasnost – political liberalisation. In many oil-exporting countries the ruling elites stifle the private sector thereby inhibiting economic diversification. To effectively diversify will take major political reforms.

A good measure of diversification is the non-oil fiscal deficit. This is the proportion of the fiscal balance in the non-oil sector paid for by the fiscal surplus in the oil sector. The higher the proportion is, the higher the dependence. Figure 3 illustrates the situation for a number of countries.

Thus, only Iran, Malaysia and Norway have successfully diversified while Kuwait, Saudi Arabia, Algeria and Azerbaijan have become even more oil dependent between 2007 and 2012. Attempts to diversify away from oil could cause serious political upheavals. Figure 4 shows 16 countries where hydrocarbon exports are at least 50 per cent of merchandise exports. In other words they are highly oil dependent. These countries together represent around 56 per cent of global oil exports and 52 per cent of global proven oil reserves.

However, of these 16, only five are classified as politically stable and of these, Qatar faces potential short term problems because of disputes with immediate neighbours.

Many oil exporters face serious challenges when seeking diversification. At some point, sooner rather than later, oil demand will peak. This will generate growing competition for shares in a future declining oil market and lower government revenues. Greater instability either because of falling revenues or competition for oil market share could well lead to an oil price spike. This would be a significant incentive to consumer governments to speed up the transition, adding even further to disruption.

Figure 4: Vulnerability and political stability of major hydrocarbon exporters 2017

Sources: Fuel exports: World Bank, 2018; Political stability: Global Economy.Com, 2018

![Figure 4: Vulnerability and political stability of major hydrocarbon exporters 2017](image-url)
Increasing the Downstream sector in Kuwait

Interview with Hatem Al Awadi
Acting CEO and Deputy CEO for Petrochemicals, Kuwait Integrated Petroleum Industries Company (KIPIC)

Please provide an overview of KIPIC?
KIPIC was established on 18th October 2016 as a subsidiary of Kuwait Petroleum Corporation (KPC). Bringing together some of the best industry expertise, KIPIC’s mission is to manufacture refined petroleum and petrochemical products and supply LNG in a reliable, efficient, safe and environmentally responsible manner to meet Kuwait’s energy demand, maximise profit through integration, develop a professional and competent workforce, and enable the development of the local economy. To meet its mandate, KIPIC is currently developing three major projects; a refinery and an LNG terminal currently under construction and a petrochemical plant to be fully integrated with the refinery, which is still in the design phase. The three projects are located in the Al-Zour area in the south of Kuwait.

What is KIPIC’s core belief?
KIPIC inspires a core belief: “Make More Possible”. We nurture a culture of collaboration, empowerment, clarity and economic thinking to unlock the potential of our people. We believe that this promotes innovation and competency to reach the highest standards of operational excellence.

How does KIPIC operate?
We strive to become an employer of choice for the young Kuwaiti professionals and continuously work hard to bolster a healthy work environment and a positive corporate culture that cultivates innovation and excellence. We also invest in our people to meet current and future business challenges.

We always rationalise the utilisation of new systems, assets and ideas to ensure optimum deployment as per KIPIC needs and strategic imperatives. We also capitalise on KPC and K-companies legacy of long years of operational presence.

Meanwhile, we work hard on building and maintaining our management systems to standardise and continuously improve our conduct of business.

What is your mission and vision?
Our mission is to operate an integrated entity that manufactures refined petroleum and petrochemical products and supplies LNG in a reliable, efficient, safe and environmentally responsible manner – while maximising profit, developing a professional and competent workforce and enabling the Kuwaiti private sector’s participation in the downstream petroleum industry.

Our vision is to be a leader in integrated refining, LNG and petrochemical operations that maximises shareholder value, achieves operational excellence, commits to the development of our people and contributes to economic development.

What is your brand strategy?
As a young organisation we are always looking for ways to make more possible. Be it from the resources themselves, how we integrate our world-class facilities, how we operate, the people we hire or the returns we give to our shareholders – we strive to make more possible. This is what inspires us, motivates us and is what will differentiate us – it is our philosophy as an organisation. Our Organisational Philosophy is to “Make More Possible.”

The brand marque uses a clean, strong, contemporary word marque for both English and Arabic. This underpins and reinforces the solidity of the company and its commitment to Kuwait.

What are KIPIC’s key projects?
KIPIC’s operations are be based at Al Zour Complex located in the south of Kuwait, consisting of the following:

**Al Zour Refinery:** Processes up to 615,000 bpd of Kuwaiti Crudes to produce high value products and fuel oil and is currently in the construction phase.

**The Liquid Natural Gas as Import (LNGI) Project:** This project is being established to meet Kuwait’s demand for the cleanest fuel (natural gas) to generate electricity, as well as the needs of other natural gas consumers such as oil refineries and petrochemical industries. The terminal has a capacity of 3,000 BBTUD of natural gas supply and is currently in the construction phase.

**Petrochemical - Refinery Integration Al-Zour Project (PRlZe):** The Petrochemicals facility upgrades refinery products to high value bulk petrochemical products. The upcoming facility is under detailed design, with an annual capacity of 2761 KTPA of aromatics and polypropylene and 1700 KTPA of gasoline.

What is KIPIC’s contribution to the State of Kuwait?
As we create the second biggest oil city in Kuwait next to Ahmadi City, we’ll be turning a clear desert into a fully-fledged city, taking extra care to protect Kuwait’s immediate and surrounding environment. Our projects primarily aim at energising the State with a reliable supply of clean fuels for power generation as well as other industrial applications.

We are committed to the development of a competent Kuwaiti work force and enabling the Kuwaiti private sector to participate in downstream petroleum industries.

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**Leadership, Innovation & Sustainability**

17
More than 30 per cent of the world’s remaining oil and gas reserves sit in areas posing a high level of ESG, climate and political risk. The good news for investors in Latin America is that it could offer a relative haven from the spectrum of physical and operational risks that can impact operators when compared to other regions, including sub-Saharan Africa, MENA and South East Asia.

Using our Corporate Exposure Tool (CET), which combines our 150+ risk indices with commercial data on all reserves, companies and assets from our sister company, Wood Mackenzie, we have analysed Latin America’s risk landscape to focus on the region’s prospects for investors.

Despite outliers, the region enjoys strong governance profile

Beyond the headlines of political crisis and economic devastation in Venezuela, our risk data shows that Latin America offers a comparatively benign operating environment from an above-ground risk (AGR) perspective (see map below). Overall, the CET’s above-ground risk score for the Americas shows a region with a medium-risk profile. Crucially, this is still the case even when we remove Canada and the US.

This is good news for investors in the region, home to roughly 20 per cent of proven oil reserves and close to 5 per cent of gas deposits, as it is set to attract long-term, capital intensive investment driven primarily by Brazil’s pre-salt deep offshore deposits, and Argentina’s Vaca Muerta shale formation.

Brazil and Argentina are the strongest performers among the major producers. Venezuela, Colombia and Mexico, on the other hand present a more elevated risk – albeit with major differences in the challenges they present to operators and institutional investors.

Indeed, Latin America provides a generally stable political environment for operators, which is second only to Europe in our Government Stability Index. Leaving Venezuela aside, major challenges to governments stemming from unconstitutional mechanisms, widespread demonstrations, or military interventions are now a rare occurrence across the board.

Our Regulatory Framework and Resource Nationalism indices show that strong government stability has had a positive effect, with the Americas now rated as the second-best performing region on these issues after Europe. The adoption of open government and the promotion of digitalisation by the largest oil and gas producers in Latin America have markedly improved regulatory transparency by allowing investors to understand existing rules and assess potential gaps in enforcement. The region’s main problem relates to the inadequate resourcing of...
In resource nationalism, the region registers sustained improvements following a political shift to the centre-right over the past four years. A reduction in the rate of economic interventionism, and structural reforms in the relationship between governments and the management of NOCs – such as Argentina’s YPF and Brazil’s Petrobras – have increased the reliability of key players as JV partners for IOCs.

However, stagnant or negative economic outlooks in Brazil and Argentina increase the risk of greater political pressure to cap energy prices. In the former, this includes presidential pressure on Petrobras to maintain diesel subsidies, while in the latter it requires the freezing of energy prices until the electoral cycle is resolved in Q4.

Furthermore, Petrobras’s divestment plan is at increasing risk of requiring asset-by-asset legislative and/or judicial approval. Such scrutiny will delay the improvement of the company’s debt position. It will also worsen the country’s score in the Resource Nationalism Index indicator measuring the propensity for external, political intervention in the economy.

**Key players – ‘the good, the bad and the uncertain’**

In Brazil, the oil and gas sector is poised to deliver the big investment inflows that the new government wants to see. O&G tenders include the so-called transfer of rights areas, considered one of the world’s most promising offshore prospects; we expect major investment in the pre-salt 2019-Q4. This will help energise the country’s still weak economic recovery, with signing bonuses for three offshore rounds due in October and November are projected to bring in USD47 billion. Meanwhile, NOC Petrobras is moving ahead with plans to privatise eight refineries. The sale of Petrobras’s refineries could attract a further USD20 billion in funds.

Despite promising to pursue business friendly policies, the Bolsonaro administration has been distracted by internal disagreements and has moved slowly on delivering change. Disagreements within the cabinet are increasing the risk of sub-par macroeconomic management. Notwithstanding these tensions, the administration has made some tepid progress, such as the drafting of an “Economic freedom decree”, a new measure cutting red tape. It removes the requirement for operating licences when the activities concerned are deemed to be “low risk”.

Mexico is an altogether different story. The halt of tenders by President Andrés Manuel López Obrador (AMLO), and his interventionist tendencies in the regulatory sphere continue to fuel investor uncertainty. In terms of resource nationalism, Mexico was the best performer among major Latin American producers in our 2018-Q3 index, AMLO’s interventionism triggered the sharpest downgrade of any other country in the region and it is now the third worst performer among large players, closely behind Argentina in the high-risk category.

Political pressure on the Energy Regulatory Commission (CRE) has triggered internal changes and their independence and effectiveness as a regulator will continue to be challenged. How PEMEX navigates through all these changes will be closely watched by the IOCs.

Argentina, meanwhile, faces a highly volatile election cycle, which is to determine the country’s openness to foreign investment as well as its future macroeconomic stability. Vaca Muerta, the world’s second largest proven shale gas reservoir, needs both foreign players and a stable economic landscape to secure the long-term E&P and infrastructure investment it needs to realise its potential.

We expect the fragmentation of the political opposition and a high level of voter polarisation to give President Macri a fighting chance at securing re-election in Q4. However, the return of a left-wing populist alternative cannot be ruled out, threatening a future decline of the country’s performance in our Resource Nationalism Index as a cash-strapped government could increase interventionism in YPF policy and energy pricing markets.

Regardless of the electoral outcome, regulatory stability will continue to underpin investor interest in Vaca Muerta and in the recently opened offshore basins. We expect the maintenance of the existing regulatory and investment frameworks regardless of the election outcome. With investors viewing recent changes to regulations to stimulate gas production as evidence of more regulatory unpredictability, a second Macri administration almost certainly would steer clear of abrupt change.

**Social and Environmental risks**

While government stability, clear regulatory frameworks, and receding resource nationalism risks ease of IOC entry, these issues are not the only game in town. At a regional level, our Corporate Exposure Tool and in-house qualitative research show that social opposition to the sector, driven by environmental concerns, is the leading emerging threat to operators in the region.

While navigating the political and regulatory environment remains crucial, obtaining and securing social license to operate will be one of the biggest challenges for the O&G sector in Latin America going forward.
Towards a more competitive and sustainable oil sector in Africa

By Gaspar Martins
Chairman of the Board, Sonangol

Angola has introduced several new measures to boost its oil production and improve its attractiveness for international investment. In the summer of 2018, President João Lourenço signed a decree to create an agency that would lease and manage oil blocks, allowing Sonangol to refocus on its core business. Angola also halved the tax rates on the development of oil discoveries with fewer than 300 million barrels of reserves, and cut the oil production tax on so-called marginal fields to 10 percent from the typical 20 percent rate. These tax reforms also halved the oil income tax on marginal fields to 25 percent from 50 percent.

Today, political stability, national policies and Angola’s development demand a wider scope and focus on the future of the country’s economy, considering the global market and the social context. Sonangol aims to increase efficiency and profitability all across its value chain. Considering the importance of Sonangol and its subsidiaries within the oil and gas sector, in Angola as well as abroad, this ongoing change will actively contribute to a more competitive and sustainable national oil sector. Angola is very proud of its history, working very hard on the present and excited about the future.

Sonangol’s regeneration programme is well under way to ‘explore, produce, refine and distribute crude oil and gas to society’

The main objectives, at this moment, are to prepare, guide and develop skills in order to prepare employees for the challenges that await. The government’s goal is to redirect Sonangol to its core business: research, exploration, production, refining, and distribution. For this, Sonangol needs to have competent employees and partners, able to take the group farther by strengthening its role in Africa.

It should be emphasised that the primary objective of this process is to make Sonangol the main oil and gas company operating in the country, while also making it a leading industry player in Africa and the rest of the world.

Much has already been achieved. Sonangol’s ongoing Regeneration Program has reached and, in some cases, exceeded the targets set for this stage. Strategically, solid bases were established for this final phase of the program, leaving the company prepared to meet the challenges and take full advantage of the opportunities on the horizon.

The ongoing change at Sonangol is an essential step towards the much-needed reform of the company and the Angolan oil sector, an initiative that should help make it more attractive for international oil operators to work with and invest in. Sonangol’s key priorities at this time are, of course, to meet all defined strategic objectives and create the conditions to ensure that the firm increases the efficiency and profitability by actively contributing to the Angolan economy, of which the oil and gas is a major part. The priorities are defined and the company’s Regeneration Program guarantees that the core business of the state oil company is “to explore, produce, refine and distribute crude oil and gas to society.”

We must emphasise the importance of the Regeneration Program, noting it aims at Sonangol’s original purpose, and that the successful implementation of the aforementioned Program will contribute to Sonangol focusing on its core business. It must also be stressed that successful implementation of the ongoing program will only be possible if all Sonangol employees contribute to the effort underway.
In 2015, leaders from around the world endorsed the 2030 Agenda for Sustainable Development. Among the Agenda’s 17 goals is SDG 7, which calls for ensuring affordable, reliable, sustainable and modern energy for all. SDG 7 is rooted in the understanding that modern energy systems are key enablers of sustainable and inclusive economic growth, trade and development. Meeting this goal will require sustained and coordinated efforts by governments, companies and civil society at large to accelerate and scale up the supply and use of clean energy, along with the technologies needed to increase energy efficiency. International trade can serve as a powerful tool to support these efforts.

There are many benefits from a global scale-up of clean energy, not least improving access to energy, increasing energy security and facilitating progress in climate change mitigation. Growing political commitment to these goals has driven unprecedented levels of activity in the clean energy sector worldwide, in terms of trade, investment and innovation. Currently 25 per cent of electricity produced is renewable at a global level and this is expected to increase to 33 per cent in 2040 if current energy policies in place continue to be used or rise to 66 per cent under a sustainable development scenario (IEA, 2018). The rise of renewables becomes even more visible when newly installed capacity is being considered. In 2016, for the first time, newly installed renewable energy capacity surpassed fossil fuels and nuclear energy together (Figure 1).

As can be seen in the chart as well, solar and wind energy are among the most prevalent technologies to further increase the share of renewable energy in total electricity production. These technologies have a high degree of efficiency, can be deployed in a vast number of locations and are scalable to local needs. In terms of production cost, solar energy has seen price reductions per MWh since 2012 of up to 70 per cent and has reached parity with wind energy in many parts of the world (Figure 2).

Production of renewable energy equipment is scattered around the globe, leading to substantial trade flows of these products. Trade gives access to renewable technologies to all countries in the world, helps to spur competition, encourages specialisation, economies of scale and hence drives down costs, leading to a wider dispersion and usage of renewable energy (WTO and United Nations Environment Programme, 2018). Figure 3 shows trade in wind components between major trading partners. Germany and the United States are
Figure 2: Levelised costs of electricity by selected technologies and regions, 2012-2017


Figure 3: Balance of trade and trade flows for wind generator sets (nacelle and blades), 2014
among the main exporters, while Canada, the United Kingdom and Mexico are the main importers, but interconnections between many more countries are clearly visible.

In the case of solar energy, China is the biggest exporter of solar photovoltaic modules, while Malaysia and the Republic of Korea are also exporting more than US$1 billion each (Figure 4). Japan, the United States, the United Kingdom and Germany are major importers.

Goods most relevant for renewable energy are silicon, carbon, glass fibres, plastic sheets, metal towers, turbines, mechanical parts, water heaters, transmissions and electrical parts. The World Tariff Profiles 2019 (WTO, ITC and UNCTAD) classifies these products as related to SDG 7: Ensure access to affordable, reliable, sustainable and modern energy for all. Imports of these SDG 7-goods amounts to more than US$400 billion globally in 2017. These numbers nonetheless have to be seen as an upper limit of renewable goods trade since tariff lines often cover many more products apart from goods directly related to renewable energy. Figure 5 shows the top-20 importers of SDG7-goods whereas the United States, China the European Union and the Republic of Korea have the highest import values. Interestingly, in per cent of total imports, the Republic of Korea, Chinese Taipei, and Norway have significantly higher import shares, displaying their strong involvement in the renewable energy sector. Trade weighted MFN Tariffs applied on solar and wind power related goods range from zero for 8 WTO Members to a maximum of 42.2 per cent and a median value of 5.4 per cent (Figure 6). The simple median MFN tariff for goods related to solar and wind power of 5.1 per cent is almost three percentage points below the simple median MFN tariff of non-agricultural goods of 7.9 per cent. Maximum tariffs for these goods nonetheless reach more than 30 per cent in several cases.

Efforts to reduce these and other barriers to trade in renewable energy goods can be part of a broader approach to access the best environmental solutions available in the global market at lowest cost. In recognition of this, a group of 46 WTO members started negotiations in 2014 on an Environmental Goods Agreement (EGA), which would cut tariffs on environmental goods. EGA participants account for around 85 per cent of exports of environmental goods. The goods being considered in these negotiations perform a variety of functions that are critically important for sustainability and the environment, including clean and renewable energy generation.

![Figure 4: Balance of trade and trade flows for solar photovoltaic (PV) modules, 2014](source: CEMAC (2017))
negotiations, they were not in a position to close existing gaps in December 2016. Negotiations have not yet resumed.

It has become clear that deeper and more effective cooperation is needed to better align trade, energy and sustainable development in a way that helps build prosperous, inclusive and resilient economies around the world. In this vein, the Agenda for Sustainable Development calls for global partnerships and cooperation for sustainable development, complemented by multi-stakeholder partnerships that mobilise and share knowledge, expertise, technology and financial resources to support the achievement of the SDGs in all countries, particularly those less developed. For the trade and energy policy communities, this means working in greater concert with each other and with other stakeholders to tap into the numerous trade opportunities to help fulfil the promise of affordable, reliable, sustainable and modern energy for all.

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Evidence of climate change continues to accumulate and notwithstanding the tension between the rhetoric, the ambition, and the reality of the facts on the ground, we foresee increasing pressure on governments, consumers and the energy industry to decarbonise the production and use of energy. As that pressure mounts, companies need to deal with the uncertainties concerning climate policy and what will constitute good corporate citizenship and good business practice.

EY has looked at energy transition through the lens of asset returns. Firstly, because it’s important to companies making decisions today. Investment in an LNG plant or a refinery requires a view on returns dependent upon commodity prices that without a doubt will be impacted by the transition away from fossil fuels. The question is: how much? Secondly, it’s our view that the movement of capital, and the speed of energy transition, depends on returns. An oil and gas industry that continues to return value to investors is unlikely to shrink.

There are no small number of uncertainties. We’ve reduced the variables that will drive oil and gas’s role in the energy mix to five:

- Consumer acceptance of Electric Vehicles (EVs) – EVs are increasingly cost and performance competitive, but inertia matters and there is risk that EV market share may grow less quickly than we all expect. If that happens, oil demand may grow for a while.
- Energy efficiency – between 2005 and 2015, the number of vehicles in the world increased by about 6 per cent while the demand for oil increased by about 1.2 per cent. Efficiency was a big part of the difference. That trend will continue, but we don’t know the details.
- Relative attractiveness of renewable electricity – eventually, the cost of renewables will stabilise but when and at what level? That will affect the power generation mix and the transition to renewables.
- Future of nuclear and coal – coal has been the fuel of choice to meet growing power demand in developing countries. If the world stands any chance of meeting its climate change goals, this cannot continue. Nuclear is a low-carbon alternative, but the cost of making it safe and palatable to the public appears to be prohibitive.
- Concentration of economic growth – petrochemical, industrial and aviation oil and gas demand are far more sensitive to economic growth in developing countries than in developed countries.

We’ve combined these variables into four scenarios that encapsulate how we think the energy transition might unfold. Two of them (The Long Goodbye and Meet Me In Paris) are movement to an electric, renewable future at different speeds. The other two (Slow Peak and Critical Gas) recognise that there are risks specific to oil and gas and that those fuels might take different paths.

**Returns on oil and gas assets**

As we said, the focal point of developing the scenarios is returns on assets. The oil and gas business means many things, starting with the oilfield moving down the pipelines to the refineries, LNG plants and petrochemical plants. We’ve gathered the data on the cost of building and operating those assets, modeled the sensitivity of commodity markets to demand shifts and calculated the cash flows under each of our scenarios.

The key takeaway is that returns are, for the most part, appropriate in the context of the cost of capital deployed in every scenario. The intuition around this is two-fold. First, for most asset classes most of the impact on demand is currently projected to occur at a time when the effects of discounting overwhelm the price impact. Second, under any demand scenario, the industry will have to attract capital and offer competitive returns.

**The no-regrets strategy**

Today’s oil companies have choices to make. They allocate capital; they recruit, train and organise staff; they deploy technology to respond to customer needs; and they operate their businesses as efficiently as possible. Let’s assume oil and gas demand and returns follow the paths that we’ve laid out. In every scenario the ‘winners’ will be those which achieve excellence in executing their portfolio and operating strategies. So, what are the elements of winning execution? We see these as:

- Recognising the impact of these changes early and setting in place business and workforce initiatives – as mapped out below – will provide a competitive advantage.
- Maintaining a licence to operate. Health & Safety excellence remains critical here but so does engaging with the wider stakeholder community including investors, whose objectives are changing/evolving.
- Recognising the early signals that will tell us if and when returns will be at their highest, and putting together financing structures to reduce capital cost and calibrate risk.
- High grading portfolios. Taking a hard look at how much things cost and how quickly they pay back. Our intuition is that the trend of dedicating more capital to projects with more rapid (but possibly smaller) returns will continue.
**Optimising cost and capital efficiency.** Companies have always wanted to be on the low side of the cost curve and tapering demand highlights that imperative. Heavy investment in digital technologies is a “no regret” move and winners will make the required investment to achieve improved efficiency and effectiveness.

**Optimising the profit from the molecules that move through the value chain.** This will require a strong competency in trading, since no one has access to the best feedstock and product mix all the time. Effective and properly risk-managed trading requires investment in market intelligence gathering, process design and enabling systems.

**Recruiting, retaining and motivating a workforce with the appropriate core competencies during structural change.**

**Making innovation work in a corporate environment.**

The footprint of the energy industry will change, and those changes will present opportunities for oil and gas companies to move their portfolio into new areas. Even so, returns will continue to be available in the traditional oil and gas business and a continued focus on operational excellence can deliver a ‘no regret’ response no matter what future unfolds. Oil and gas companies can continue to invest in what they know, instead of what they think might be.

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The Four Scenarios

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Slow Peak</th>
<th>The Long Goodbye</th>
<th>Critical Gas</th>
<th>Meet Me in Paris</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumer acceptance of EVs</td>
<td>↑</td>
<td>↑↑</td>
<td>↑↑</td>
<td>↑↑↑</td>
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<tr>
<td>Efficiency</td>
<td>↑</td>
<td>↑↑</td>
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<td>↑↑↑↑</td>
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<tr>
<td>Competition between gas and renewables</td>
<td>↑↑↑</td>
<td>↑↑</td>
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<tr>
<td>The future of Nuclear/Coal</td>
<td>→</td>
<td>↑</td>
<td>↓</td>
<td>Nuclear ↑ Coal</td>
</tr>
<tr>
<td>Concentration of economic growth</td>
<td>Developing countries</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Developed countries</td>
</tr>
</tbody>
</table>

_Slow Peak. Business as usual:_ transportation demand in developing countries surges and defaults to the incumbent technology (ICE), while consumer perceptions about performance slows EV adoption. Growing economies in developing countries drive demand for petrochemicals, energy intense industrial usage and aviation. Peak oil eventually happens, but not soon.

_The Long Goodbye. A renewable (r) evolution:_ EVs, distributed generation, renewable generation and battery storage take a place in the market suggested by falling costs. Oil demand peaks, but stock effects, consumer inertia and continued growth in segments other than road transportation (aviation, petrochemicals) keep oil from falling off a cliff.

_Critical Gas. Petroleum lives on, but it’s gas and oil now:_ oil demand peaks and tails off quickly as consumers migrate from gasoline-powered cars to EVs. Power demand surges as EV charging takes off and developing economies electrify. Carbon-free technologies progress as expected, but capital markets fail to respond. Regulators don’t allow coal and nuclear to grow, leaving the market open for natural gas-fired generation.

_Meet Me In Paris. The future is now:_ technology improves rapidly. Alternative energy becomes cheap enough quickly enough to displace existing infrastructure. Climate change becomes a top priority for governments across the world. Carbon trading with caps and bans on internal combustion engines consistent with the goals of the Paris Accord are agreed to internationally and implemented quickly. Consumers lead the way with environmental awareness driving dramatic lifestyle changes.

The views reflected in this article are the views of the author and do not necessarily reflect the views of the global EY organisation or its member firms.
As a non-advocacy, non-political organisation the World Petroleum Council has accreditation from the United Nations as a non-governmental organisation and is registered as a charity under UK law. WPC is dedicated to the promotion of sustainable management and use of the world’s petroleum resources for the benefit for all. WPC conducts the triennial World Petroleum Congress, covering all aspects of the industry, including management of the industry and its social, economic and environmental impact.

**Vision**
An enhanced understanding and image of the oil and gas sector’s contribution to sustainable development.

**Key strategic areas**
- **World Class Congress** to deliver a quality, premier oil and gas congress
- **Inter-congress activities** to organise forums for cooperation and other activities on specific topics; and to engage WPC members and all stakeholders
- **Cooperation with other stakeholders** to add value by cooperating with other organisations to seek synergies and promote best practice
- **Communication** to increase awareness of WPC’s activities and oil and gas operations, through enhanced communication, both internally and externally
- **Global representation** to attract and retain worldwide involvement in WPC
- **Youth and gender engagement** to increase the participation of young people and women in oil and gas issues, including a dedicated Committee for the development of active networking opportunities with young professionals
- **Legacy** to manage a central WPC legacy fund to benefit communities and individuals around the world based on WPC’s mission.

**The World Petroleum Congress**
Every three years, the Council organises the World Petroleum Congress hosted by one of its member countries. The triennial Congress is also known as the “Olympics of the petroleum industry”. It covers all aspects of oil and gas from technological advances in conventional and unconventional upstream and downstream operations to the role of natural gas and marketing, management of the industry and its social, economic and environmental impact. The USA will be the host of the 23rd World Petroleum Congress in 2020 (www.23wpc2020.com).

**Benefits of joining the WPC**
The benefits available to National Committees when they join the Council include:
- opportunities to host meetings of the Executive Committee, task forces, committees, events and, once fully established, a Congress
- discounts on Congress fees and copies of WPC publications
- regular information on WPC activities, task forces, meetings and briefings
- network with other National Committees, directly and through the Secretariat
- invitations to propose programme officers for congresses

The most significant benefit of joining the World Petroleum Council and Congress is to participate in the leading global institution representing the international and domestic oil and gas industries and to have an equal voice and vote in its deliberations and decisions.

**World Petroleum Congresses historical timeline**

<table>
<thead>
<tr>
<th>Year</th>
<th>Congress</th>
<th>Host City</th>
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<tbody>
<tr>
<td>1951</td>
<td>3rd WPC</td>
<td>The Hague</td>
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<tr>
<td>1955</td>
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<tr>
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<td>2017</td>
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<td>Istanbul</td>
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</table>

For more information on the full benefits and how to join visit www.world-petroleum.org
The world’s most prestigious oil and gas events

2018 - 2020
World Petroleum Council (WPC) Schedule of Events

2nd WPC Leadership Conference
18-20 February 2019 | Renaissance Hotel, Mumbai, India
A global conference on industry leadership in responsible operations, international cooperation & sustainable solutions for the petroleum sector.
www.wpcleadership.com

6th WPC Youth Forum
23-28 June 2019 | St. Petersburg, Russia
A special Forum held every 3 years and led by WPC’s Young Professionals Committee, provides a platform for the next generation of the oil and gas sector to present their views alongside senior industry experts.
www.wpcyouthforum.org

WPC Downstream Conference
Integration, Strategy and Leadership
14-16 Oct 2019 | International Exhibition & Convention Centre, Manama, Bahrain
The Downstream Conference will focus on the global challenges facing this sector of our industry, considering the strategic leadership and changing business models needed for refining and petrochemicals.
www.world-petroleum.org

23rd World Petroleum Congress
6-10 December 2020
George R. Brown Convention Centre, Houston, USA
The triennial World Petroleum Congress is the largest international petroleum congress and attracts the highest level of industry and government leaders, including Heads of State and C-Suite from around the globe.
www.23wpc2020.com

For more information about any event, please contact WPCSecretariat@world-petroleum.org
advancing possibilities

At Saudi Aramco, we do so much more than provide energy to the world. We grow new businesses, fuel the economy, and drive innovation. By connecting energy, people, and ideas, we expand the possibilities sparked by our business to spur diversification and drive sustainable economic growth. Everything we do reflects our core belief that energy is opportunity.

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