

Energy Outlook 2020

Special Report



**Didn't
See Covid-19
Coming**

GI

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for 2020
& Beyond**



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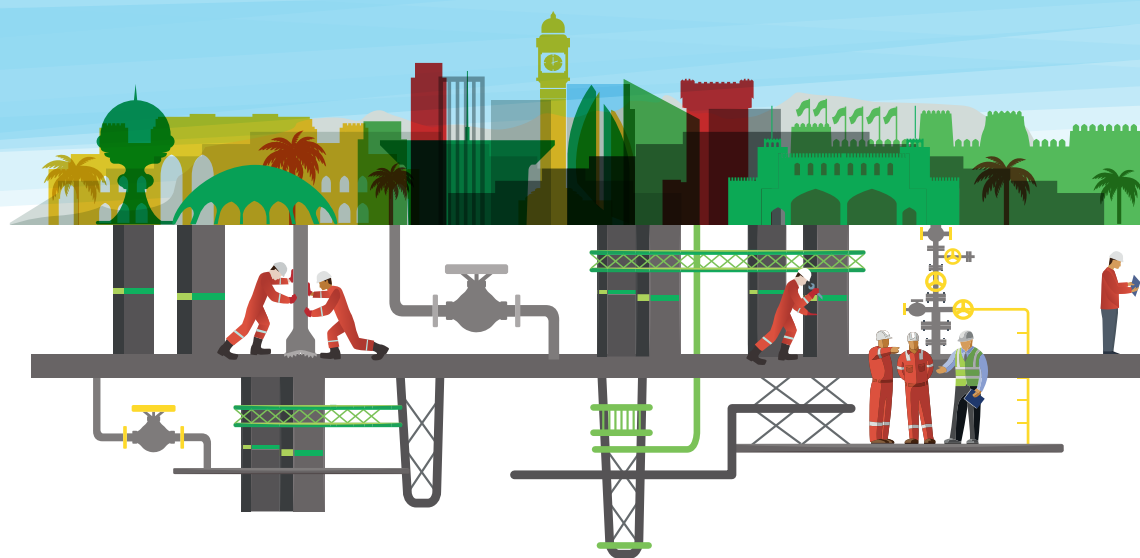


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FOREWORD

THE MIDDLE EAST ENERGY TRANSITION *Transforming from Followers to Leaders?*

By Sean Evers, Managing Partner, Gulf Intelligence

The great energy transition from fossil fuels to zero-carbon is finally here. But what is next? As per the International Renewable Energy Agency (IRENA), the cost of renewable sources of energy has tumbled over the last few years. IRENA outlines that the cost of generating power from onshore wind has fallen by roughly 23% since 2010 whilst the cost of solar photovoltaic (PV) electricity has fallen by 73% over the same period. Yet, is enough being done by the global community to meet the Paris Agreement's goal to limit global warming to 'well below 2°C'? What position is the Middle East energy sector taking in the energy transition and what ambitions lie ahead for the latest leader energy transition pack? The Middle East is boosting investment overall in green energy. Shams 1, located in western Abu Dhabi was the largest renewable energy project in operation in the Middle East when launched in 2013. Shams 1 continues to directly contribute towards Abu Dhabi's target of 7% power-generation capacity via renewable energy by the year 2020. Renewable energy and energy efficiency can together provide more than 90% of the necessary energy-related CO2 emission reductions worldwide. Saudi Arabia meanwhile has ambitions to add 9.5 gigawatts (GW) of renewable energy to the grid by 2023 – this is set to provide 10% of its energy mix. In North Africa, Morocco is planning a \$13 billion expansion of its wind, solar and hydroelectric power generation capacity which would see a total generation of 42% of its electricity attained from renewable sources by 2020.

The global transformation taking



place within the energy sector is vital to meet the decarbonization and climate mitigation goals outlined in the Paris Agreement. CO2 emissions must be restricted to keep global temperatures below 2°C. Anything above this and the planet as we know it will fundamentally alter. The growing domestic energy demand across the Middle East and North Africa region fueled by economic growth and expanding populations is set to be produced by renewable energy. DNV GL's Energy Transition Outlook predicts that, by 2050 solar photovoltaic (PV) will dethrone gas – which today counts for 60% of electricity generation as the main source of power in the Middle east and North Africa region. Oil and gas production will continue to play an important role but the shift

to renewables will be a major game changer and the new norm in the future.

In a Gulf Intelligence Survey conducted in Q3 2019, 46% of respondents believed that global oil demand will peak by 2030. We're now 10 years away from this date and Middle East energy companies are already investing heavily and leading the way in diversifying their energy supply lines. Strengthened with the 4th industrial revolution that's upon us, the region is ready to lead the energy transition, but is everyone prepared to follow? It is clear that the Middle East and North Africa as a whole is no longer in the passenger seat, but rather a driving force of energy transition ambition. ■

Leading the Energy Sector in Sustainability



MINISTERS' OUTLOOK

NEW SILK ROAD Strategies to Compete?

H.E. Eng. Suhail Mohamed Al Mazrouei, Minister of Energy & Industry, UAE

H.E. Dr. Tawfiq-e-Elahi Chowdhury, Energy Adviser to the Honorable Prime Minister, Bangladesh

Moderator: John Defterios, CNN Business Emerging Markets Editor and Anchor



“People talk about the energy transition. But we are going through an energy transformation.”

H.E. Dr. Tawfiq-e-Elahi Chowdhury
Energy Adviser to the Honorable Prime Minister, Bangladesh

Moderator: Bangladesh has a population of 160mn consumers and growing. What sort of demand do you have today and are you interested in forging the same sort of partnerships with the UAE, as China has for example, to have energy security?

H.E. Dr. Tawfiq-e-Elahi Chowdhury: Bangladesh is growing very fast, at 8% GDP per annum. People talk about the energy transition. But we are going through an energy transformation with huge demand for consumption, production, agriculture and industry. So, we must have good access to energy. As an energy importer, we need a stable market. OPEC does consider the interest of its

5mn b/d
is the UAE's production goal by 2030, with the OPEC member on track to hit 4mn b/d this year.

8%
GDP growth per year in Bangladesh is one of the highest rates worldwide.

customers, but it should also consider discounts for long-time customers, such as Bangladesh which will have growing demand for another 20 years.

Moderator: The motivation for the OPEC+ group today is stability of investments and the stability of supplies. Does this balance well to address the needs of emerging markets?

H. E. Eng. Suhail Mohamed Al Mazrouei: If you look at the past seven years or so, the UAE, Saudi Arabia and many other countries have invested in those nations and helped them build refineries



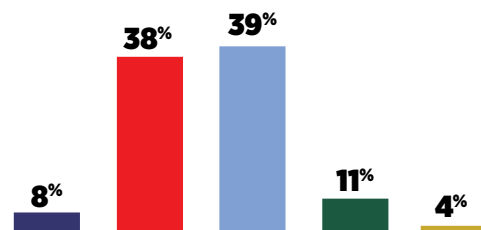
“We are selecting partners, such as India and China, on the basis of a long-term customer relationship. In Africa, many resources are being developed and we are contributing to investments in Egypt, Algeria and other countries.”

H.E. ENG. SUHAIL MOHAMED AL MAZROUEI

and storage facilities to ensure that they have security of supply. We will continue doing that. As producers of hydrocarbons, we also have other pressures. One is competition from other forms of energy, such as renewables, which are now competing on affordability. Another is the need to be sustainable and address environmental concerns when it comes to CO₂ emissions. Another is the security of supply, which we are addressing through storage facilities and ensuring long term contracts. We are also investing in and building renewable energy facilities in emerging economies and ensuring that we are consulting with major importing countries on affordability and price.

What will the average price of Brent crude oil be in the 2020s?

- A. Below \$40 a barrel
- B. in the \$40-\$60 range
- C. in the \$60-\$80 range
- D. in the \$80-\$100 range
- E. Above \$100 a barrel



Source: GIQ Industry Survey results were harvested from the input of more than 350 government and high-level energy stakeholders in Q1, 2020

This is something we also discuss and consider at OPEC meetings.

Moderator: Bangladesh has a re-gasification plant and is taking gas from the Gulf region. What are the country's priorities for energy expansion to meet economic growth?

H.E. Dr. Tawfiq-e-Elahi Chowdhury: We're focusing on having an energy mix. We are going to have our first nuclear reactor in about two years. We're trying to develop renewable energy, but we still must depend mostly on fossil fuels as a baseload. We are importing about 4mn metric tons of LNG and we expect this to increase to 10mn metric tons. We have a re-gasification facility offshore and we are developing facilities onshore. But all these plans will be in jeopardy without a reasonable price. If prices are not affordable, we'll have to look for other choices. We are already focusing on energy efficiency and energy conservation, which could be crucial for us in terms of being able to afford imported energy in the long run.

Moderator: India and China are the two bulwarks of emerging markets. But you also have countries like Ethiopia, Vietnam and Bangladesh, which together have populations of more than 300mn. Is that a new area of focus for the UAE in terms of partnerships and assistance in energy delivery?

H.E. Eng. Suhail Mohamed Al Mazrouei: Asia and Africa are going to remain a major focus for us. The other unique thing that the UAE offers as a major supplier, which many other producing countries do not, is the opportunity to invest in our upstream sector. We are not offering this to just anyone. We are selecting partners, such as India and China, on the basis of a long-term customer relationship. In Africa, many resources are being developed and we are contributing to investments in Egypt, Algeria and other countries. We are very committed to both these markets and we would like to increase our influence there.

**Edited transcript*

600mn is the anticipated rise in the number of people living in Africa's cities over the next two decades. This is much higher than the increase experienced by China's cities during the country's 20-year economic and energy boom, highlighted the IEA. The takeaway? The Middle East must look south west to Africa, as well as east to Asia.

1st nuclear reactor in Bangladesh is expected by 2022.

150% rise in LNG imports is expected in Bangladesh; from today's 4mn metric tons to 10mn metric tons in the 2020s.

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Partners matter

INTERVIEW WITH MOHAMED AL RAMAHI, CEO, MASDAR

Mohamed Al Ramahi: When they [the leadership in Abu Dhabi] established Masdar, renewable energy did not exist in the Middle East and North Africa (MENA). Sustainable urban communities and carbon neutrality were not even considered mainstream. They were theoretical discussions that usually happened at universities. Now, they are part of mainstream conversations. Obviously, Masdar

AED600bn is earmarked for investments by the UAE government by 2050 to meet the growing energy demand and ensure sustainable growth.

pioneered that evolution and transformation into the energy mix. But there are a lot of other players today too. When we started, there were none. We were the first to develop a wind farm in Oman and we are now building the largest wind farm in Saudi Arabia. Plus, in Jordan, we operate the largest wind farm and we will soon commission the country's largest solar farm.



“ Whatever you know about the energy sector in the Middle East doesn't mean that you know how it works in the US. The dynamics are totally different.”

Moderator: The UAE has clearly made its mark regionally and globally when it comes to green ambition. But the reality is that the targets within the Paris Agreement will, at the world's current speed, not be met. What more must be done?

Mohamed Al Ramahi: That's difficult to answer. The UAE was the first Arab country to endorse and sign the Paris Agreement. Through Masdar, the UAE is active in more than 30 countries, from east to the west, from south to north. For example, we worked with the Australian Government in Antarctica to refurbish the research center on climate change. Our objective is to always work with partners, in the public sector and with governments. As a global leader, we have all the required expertise. But partners are part of our strategy. For me, as

50%

The UAE's 'Energy Strategy 2050' aims to increase the contribution of clean energy in the total energy mix from 25% to 50% by 2050

\$11bn

worth of deals announced by Masdar in 2019.

CEO, I would like to have a partner that shares the same vision and values to help derisk my exposure.

Moderator: What are your ambitions in the US?

Mohamed Al Ramahi: We are in Texas and New Mexico. This is only the start as we invested in the country last year. Every market is unique. Whatever you know about the energy sector in the Middle East doesn't mean that you know how it works in the US. The dynamics are totally different. The US has at least four power markets, for example. It's a very complicated environment and it requires a different skill set.

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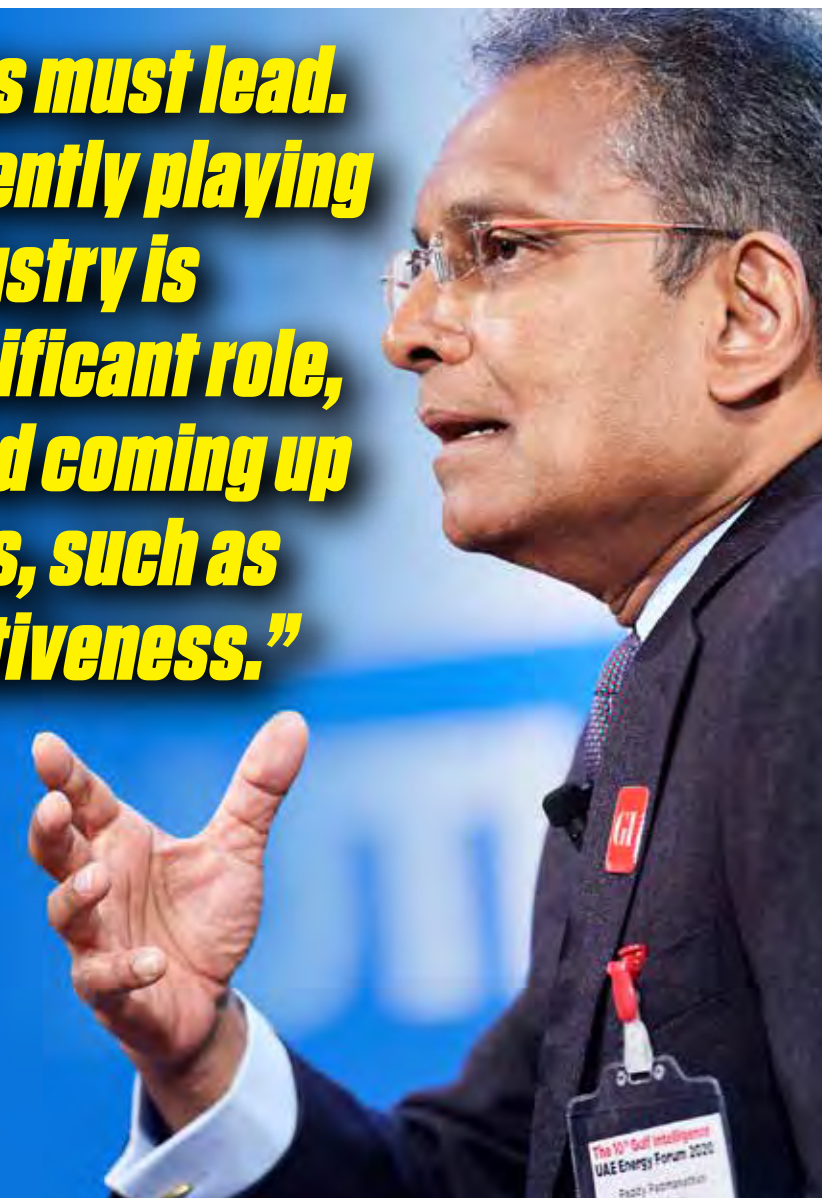
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“Governments must lead. They are currently playing catch up. Industry is playing a significant role, innovating and coming up with solutions, such as cost competitiveness.”

Interview:
PADDY PADMANATHAN
 CEO & President
 ACWA Power



Moderator: What will be the top driver for the growth of renewable energy in 2020?

Paddy Padmanathan: Cost cutting. The reality is that money talks. Technology is allowing us to increasingly reduce the costs of renewable energy. We can produce electricity in a country like the UAE for 1.7 cents per kilowatt hour. Fossil fuels, even in the cheapest segments, costs around 5-6 cents per kilowatt hour. These [renewables] are unbelievable numbers. Now we can get electricity at that cost, we can open up some amazing opportunities in how we fuel industry.

Moderator: Is the cost of infrastructure holding back renewables?

Paddy Padmanathan: Many countries that have

increased the portion of renewables in their energy system have shown that with the infrastructure we have, penetration can be achieved at 30-50%. Infrastructure costs haven't been a large issue, except in some countries with poor infrastructure. Still, Jordan, for example, has very poor transmission infrastructure. Yet, they have managed to inject more than 30% of renewables into the country's system.

Moderator: How significant are the hurdles for renewable energy with regards to storage?

Paddy Padmanathan: Storage will be an issue for the next five years. For the majority of the world, there is a certain amount of energy that we consume when the sun is shining. For example, a huge amount of energy gets consumed for

30%
 of Jordan's energy ecosystem is accounted for by renewables, despite transmission challenges.

5
 By 2025, the industry must dramatically improve storage for renewables. This remains the Achilles' heel of scaling up renewables in line with national capacity targets.



“ You will not see any new coal-fired power plant financings. China will be the last country to do so, phasing itself out fairly quickly in the next couple of years.”

50% renewable penetration can be achieved before the conversation of storage significantly curtails progress due to high industrial daytime use today. But storage will be critical when wanting to use renewables at night, i.e. when the sun is not shining.

2030 will see a world without coal, due to economic incentives to end a fuel that has been used for millennia (China started using coal more than 5,000 years ago).

industrial purposes during the day. We can increase renewable penetration up to 50% before getting tangled up with the storage issue. If we want to decarbonize electricity generation, we must find a storage solution. It will probably become irrelevant over time though. There will be much more interconnection, with gas as a transitional fuel.

Moderator: Which stakeholders must take the lead in 2020 to turn the climate change targets as per the Paris Agreement into economic opportunities?

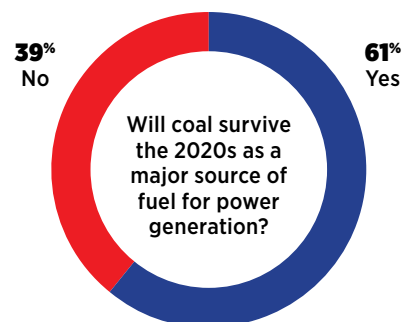
Paddy Padmanathan: The answer is very simple: governments must lead. They are currently playing catch up. Industry is playing a significant role, innovating and coming up with solutions, such as cost competitiveness. For consumers as an overall stakeholder group, it is very interesting. More

people are talking about why we allow 18-year-olds to lecture us, as opposed to thinking about the content of the message. The public is playing a role, but it's a very mixed picture.

Moderator: Will coal survive the 2020s?

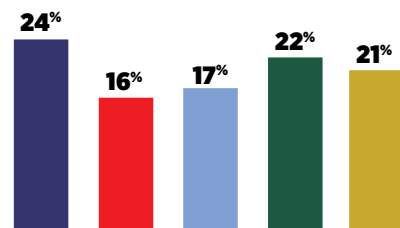
Paddy Padmanathan: No. Money will talk again. We are in the business of structuring huge amounts of project finance. There are only three countries that are left; China, Japan and Korea. And they are all going to stop financing coal-fired power. You will not see any new coal-fired power plant financings. China will be the last country to do so, phasing itself out fairly quickly in the next couple of years.

**Edited transcript*



What will be the top driver for the growth of renewable energy in 2020?

- A. Cost cutting
- B. Sustainability/Lower carbon footprint
- C. Security of supply/Diverse fuel mix
- D. Regulatory mandate
- E. Economic incentive



Source: GIQ Industry Survey results were harvested from the input of more than 350 government and high-level energy stakeholders in Q1, 2020

NEW DIRECTIONS, COMPLEX CHOICES

The outlook for the oil and gas industry in 2020.

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Key findings:

Findings point to a boost in investment in the energy transition, despite weakening confidence for 2020

- **Drop in confidence** - Two thirds (66%) of senior oil and gas professionals are confident for industry growth in 2020, down 10 percentage points from 2019.
- **Growing resilience** - Almost half (46%) say their companies would still achieve acceptable profits if the oil price were to average less than USD50 per barrel this year.
- **Decarbonization takes centre stage** - Some 71% expect to increase or maintain investment in decarbonization, rising sharply from 54% in 2019, despite volatile market conditions.
- **Hydrogen investment** - The industry's intentions to increase investment in the hydrogen economy have more than doubled in a year.
- **Efficiency, decarbonization driving optimism** - Companies investing in efficiency and decarbonization are the most optimistic for the year ahead.

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CLIMATE CHANGE

Social and Technical Solutions in 2020?



“The biggest struggle today? Accepting that we can only succeed if we all pull in the same direction. If industry pulls in one direction and government pulls in the other, we will get nowhere. This simple lesson still needs to be learned.”

Dr Udo Huenger, Vice President Middle East, BASF



Source: Insights harvested from a roundtable at the 10th Gulf Intelligence UAE Energy Forum in Abu Dhabi on 8 January, 2020. More than 40 high-level energy executives shared their views on the Critical Question under the Chatham House Rule. Any further use of this information must cite this document.

EXECUTIVE SUMMARY

Veiled inaction: that is the biggest threat. Many fear that politicians and business leaders are making it look like meaningful action is happening on climate change, where, in fact, little progress is made. The gap in the ‘triangle of momentum’ between science, the public’s perception and the level of ambition in board meetings must be urgently narrowed.

The solution boils down to a plentiful, but complicated ingredient: people. Positive momentum of government, industry, academia and the public are pivotal to spur social and technical solutions in the 2020s. Today, this collective is too weak. For those not incentivized by social and environmental reasons, there is an economic one. There could be potentially \$3trn-\$10trn of earnings before interest and taxes in a successful decarbonization scenario, according to a Blue Paper from Morgan Stanley Research in November 2019. Daily news headlines remind the world of the cost of giving climate change a cold shoulder (a status quo for many in the ‘triangle of momentum’ over the last three decades). From the flooding of the 500-year-old Mark’s Square in Venice to the fires sparked by excessive heat that are raging across large swathes of Australia (the world’s sixth largest country), the narrative of climate instability gains pace. The clock is ticking louder than ever before. What’s next?

TOP TAKEAWAYS

1 CLOSE THE GAP OF FEAR

The gap between those calling for more ambitious action and those fearing and opposing it is widening. The opposite must happen, especially as social justice has stepped firmly into the realm of climate policy (notably pressure on developing nations). Raising awareness of the relevance and benefits of mitigating climate change is vital to incentivize all.

2 PUT A PRICE ON CARBON

For more than a decade, many in industry have called for a price on carbon to support business cases for renewable and energy efficiency projects. Today, some 40 countries and more than 20 cities, states and provinces use carbon pricing mechanisms, according to the World Bank. And carbon pricing schemes in place worldwide now account for approximately 1.3% of annual global

greenhouse gas emissions. Not enough – by far. For example, a price on carbon would help accelerate efforts to use the rocks in Oman’s Hajar Mountains for carbon capture and storage (CCS); a process that is currently too expensive and risky for investors. It is time to answer industry’s calls, which in large part, means gaining the support of government policies.

3 POP THE BUBBLES

There are two ‘bubbles’ of key players in the energy markets. The first is the conventional energy market and the second represents stakeholders in climate policy. Both must be ‘popped’ so that talent can collaborate and identify solutions to common challenges. One point that was highlighted is a stricter application of Environmental, Social, and Governance (ESG) standards on financing corporations, plus exploring the benefits of geoengineering, an increasingly relevant field.

2015

The Paris Agreement is a global climate protection accord that entered into force on November 4, 2016.

75%

The G20 states emit around three-quarters of global CO₂ emissions and therefore they – and their industries and public – play an influential role in the success of the Paris Agreement.

“ If Europe wants to reach its 2030 climate goals, we need an estimated €180bn. The economic loss from climate change today is €120bn. So, the spend is actually not that bad.”

4 FEARLESS LEADERSHIP

Win the internal ‘fight’ within your organization to create an environmentally aware and problem-solving culture. Having a progressive CEO and/or CFO at the helm means the battle is half won. It is easier than ever for business leaders to justify the economics of green growth. In renewables alone, the levelized cost of electricity (LCOE) per megawatt-hour for onshore wind, solar PV and offshore wind fell by 49%, 84% and 56% respectively since 2010, according to Bloomberg New Energy Finance.



PRESSURE POINTS

Poor climate mitigation is especially detrimental for the Middle East and North Africa (MENA) region, one of the most vulnerable to the negative impacts of climate change. The region is susceptible to a rising number of droughts, floods, excessive heat and water scarcity. For the latter alone, the MENA region has the world’s greatest expected economic losses from climate-related water scarcity – up to 14% of GDP by 2050, according to the World Bank. And the Cyprus Institute and the Max Planck Institute for Chemistry in Mainz calculated that the heat in the MENA will compromise human habitability, regardless of whether the Paris Agreement is successfully implemented. Between 1986 and 2005, it was very hot for an average of 16 days. By mid-century, it will be unusually hot for 80 days a year and 118 days by the end of the century.

5 SAME PROBLEM, NEW TOOLS

Leverage the digital tools of the 4th Industrial Revolution to improve efficiency, identify trouble spots and refine forecasting (among many other uses). Tools range from predictive analytics, data science and artificial intelligence (AI) to robotics and 3D imaging. As laid out in the Exponential Climate Action Roadmap by Ericsson, digital technologies could reduce global CO₂ emissions by up to 15% – or one-third of the 50% reduction required by 2030 – through solutions in energy, manufacturing, transportation and others.

6 DON'T VILIFY

The temptation to fill in the blanks of knowledge, especially amid times of great change, is human nature. But it cannot continue. Many incorrect discussions and conclusions are being made, vilifying industries and hindering solutions. For example, plastics can be effectively managed to reduce their negative impact and the oil and gas industry has revolutionized the quality of life for billions of people in the last century. Damning either is fruitless; better to find solutions to make them cleaner and greener.

7 EDUCATE CONSUMERS

Companies must identify business models that help consumers change their choices. Simply, this can mean replacing sales of incandescent light bulbs (100-year-old technology) in supermarkets with LED lights, or notifying customers of the CO₂ emissions generated for a beef steak from Brazil versus that of camel meat from the UAE. Such efforts also mean companies must be incentivized by government policy.

**not in order of priority*

\$1bn

The Oil and Gas Climate Initiative (OGCI) committed \$1bn to new investment fund, OGCI Climate Investments, in 2016. Many more such industry-driven financial support ecosystems are needed.

30%

Analysis by Stanford University concluded that the current trajectory – which would see global temperatures rise by up to 4°C by 2100 – would result in 30% lower per capita GDP than a scenario without additional warming, said the Boston Consulting Group (BCG). The IPCC projects that if the rise were instead limited to 1.5°C, GDP would be only 8% lower.

2017

BASF has been a member of the Alliance of CEO Climate Leaders since 2017. The company is also a founding member of the CEO Climate Dialogue (CCD), a group of leading companies and NGOs working together to advance a market-based approach to climate change policy in the US.

The future is not what you dream, but what you make.

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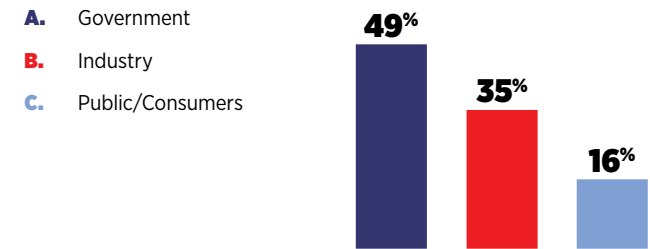


INDUSTRY SURVEY

What Must Happen Next to Hit the Middle East's Green Goals?



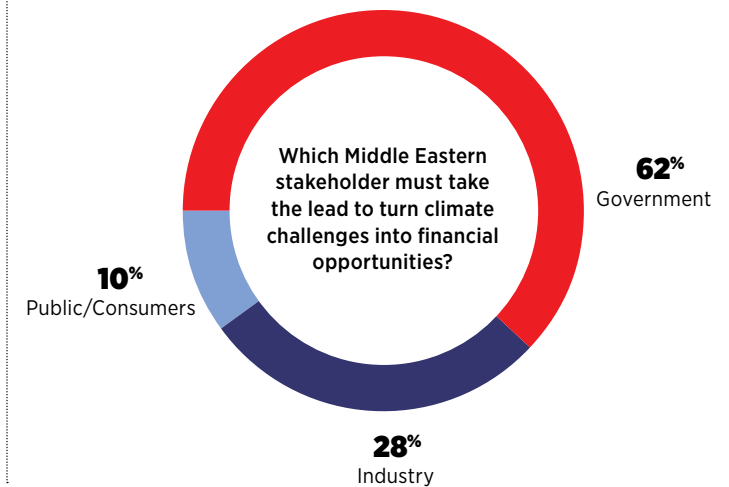
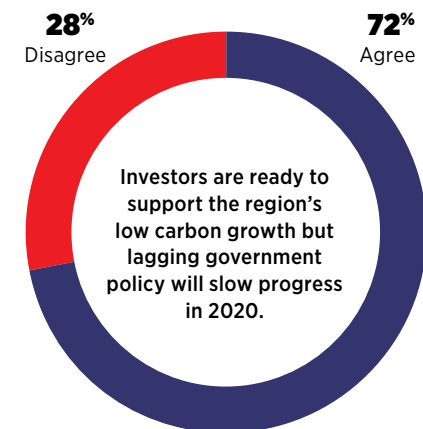
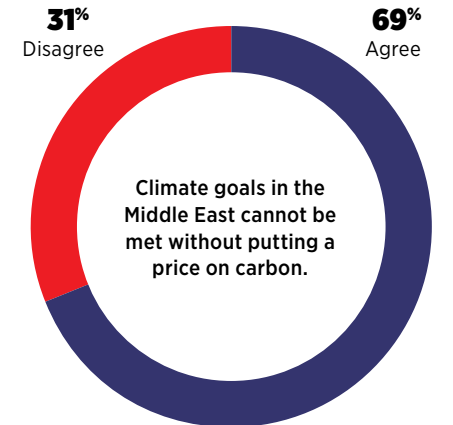
Which of the following stakeholders must take the lead over the year ahead to turn climate change challenges presented by Paris Agreement into economic opportunities?



The Gulf Arab states remain one of the fastest growing consumers of fossil fuels worldwide. Can the Middle East get left behind in the great energy transition and miss out on the economic rewards, estimated at \$1trn per year?



Eliminating subsidies in the Middle East is critical to drive the green economy and allow Arab states to lead in the global energy transition.



Source: GIQ Industry Survey results were harvested from the input of more than 350 government and high-level energy stakeholders in Q1, 2020

NEW CONCESSION CULTURES

How to Embed Positive Habits Among New Partners?



“Appreciate the corporate DNA of everyone around the table. Focus on aligning corporate cultures and visions as concessions increasingly have partners from all over the globe.”

Simon Lange, General Manager, OMV

Source: Insights harvested from a roundtable at the 10th Gulf Intelligence UAE Energy Forum in Abu Dhabi on 8 January, 2020. More than 40 high-level energy executives shared their views on the Critical Question under the Chatham House Rule. Any further use of this information must cite this document.

EXECUTIVE SUMMARY

81 years. That’s when the original concessions deal for Abu Dhabi was signed, in 1939. Many changes have occurred since then and many lessons have been learned. Now, as globalization and the demands on the energy industry intensify, it is time to apply those lessons. The energy market is diversifying, digitizing and decarbonizing – all at the same time. Other pressure points include rising energy demand, ongoing geopolitical uncertainty and looming peak oil. Against this backdrop, a new and more global style of consortium is emerging – one where collaboration, not competition, is the main ingredient. For example, the paradigm shift of the Middle Eastern national oil companies (NOCs) from national champions to global competitors has made allies more crucial than ever. Even the scale of the world’s most profitable company, Saudi Aramco, or the digital mastery of ADNOC, cannot tackle the aforementioned challenges alone. In 2011, competition in Abu Dhabi, for example, was fierce. Now, despite similar capital pressure, communication has radically improved. What lessons must be prioritized for existing concessions, and those to emerge, in the 2020s?

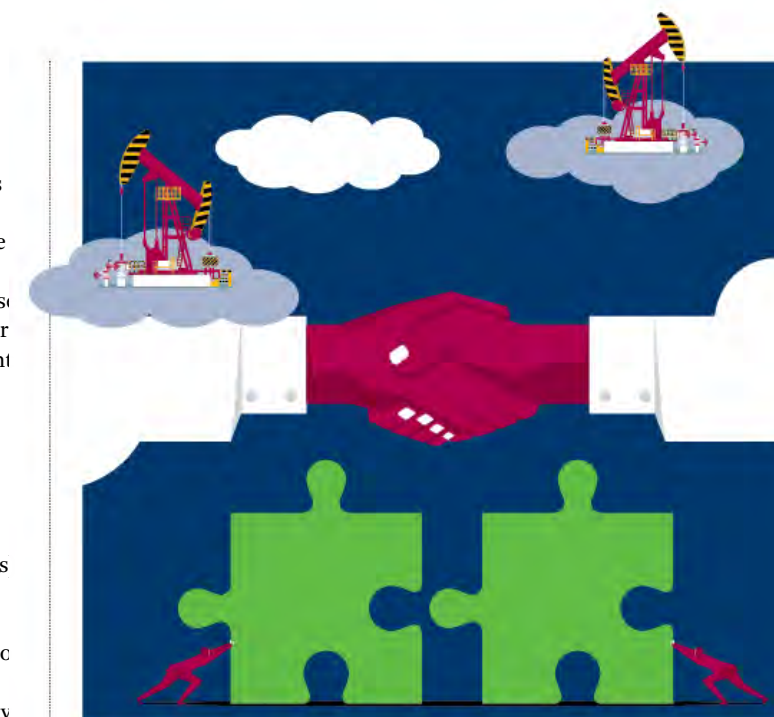
TOP TAKEAWAYS

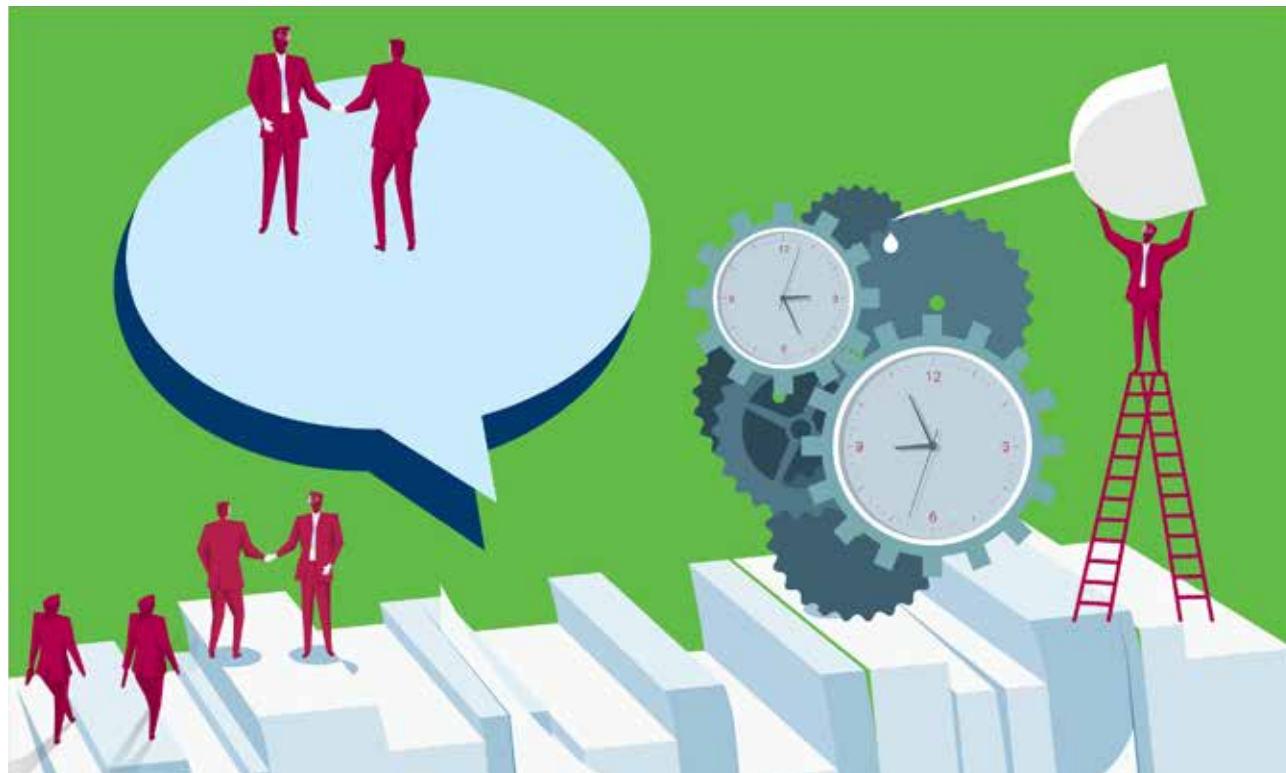
1 LEVERAGE SOFT SKILLS

Trust and transparency are key requirements from all concession partners. “Once the lawyers have signed the deal and celebrations are underway, the agreement should go in your desk drawer and never be touched again. Why? Because the day you reach for it is the day the trust in your partnership has eroded,” a roundtable participant said. This is especially true in today’s world of social media, environmental accountability and cyber risks.

2 MAXIMIZE THE NEXUS

Learn from all in the partnership. For example, international oil companies (IOCs) seek long-term, profitable projects and must oblige corporate social responsibilities (CSR). NOCs want profitable projects, but they must also consider their role as national champions i.e. security of supply, security of storage and security





of reserves. Still, there are many overlaps where knowledge sharing can streamline processes on both sides. Concessions often stretch into decades; no stakeholder wants an unstable ship. A well-steered concession can also focus on cutting costs (i.e. in the service sector), redesigning projects for maximum efficiency and standardizing every process possible. One roundtable participant said that projects planned in a world of \$100/bl oil (pre mid-2014) have thrived thanks to cost-cutting measures taking 50% off the expenditure.

3 DIVERSITY IS GOOD

Understand the motivations and goals of each stakeholder at the table and collaborate skillsets to offset each other's weaknesses. Misalignment leads to expensive and time-consuming mistakes and worse, soured relations and weakened safety. Partners cannot expect a Chinese company to be automatically in tune with a French company, for example. Alignment of local sensibilities and priorities must be explained and the 'visiting' partner must adapt to ensure a streamlined, no fuss partnership.

4 A NEW GLUE

Companies with government stakeholders (not necessarily just state-owned) are emerging as a reliable 'glue' in concessions and deals amid the rapidly changing energy landscape. Government-associated partners' interests often

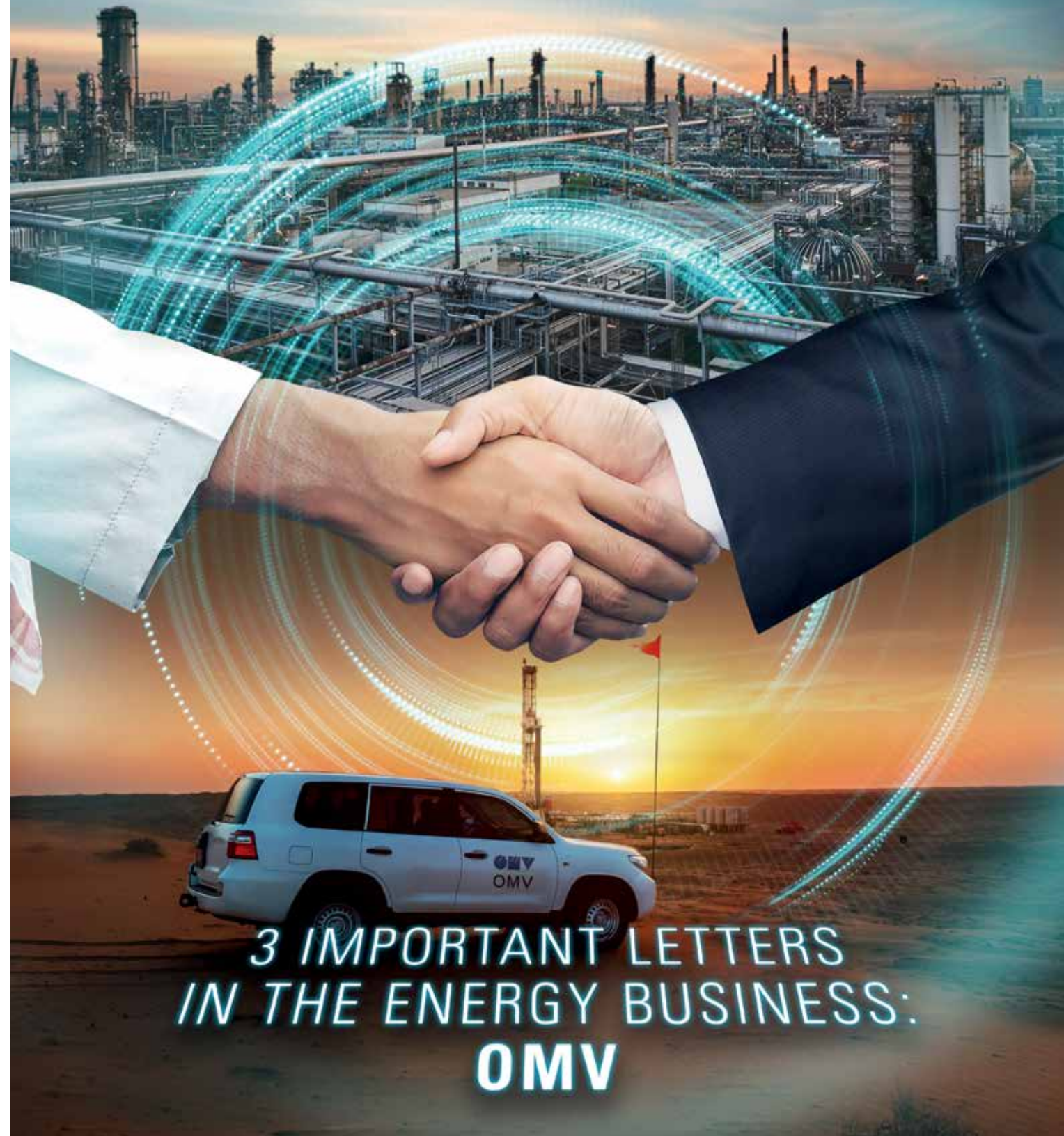
“ Once the lawyers have signed the deal and celebrations are underway, the agreement should go in your desk drawer and never be touched again. Why? Because the day you reach for it is the day the trust in your partnership has eroded.”

extend to energy security and diplomatic relations, which is in line with host entities seeking long-term alliances.

5 OLD IDEAS, NEW TECHNOLOGIES

The 4th Industrial Revolution can breathe new life into concession plans that have long been hindered by insufficient technology (notably for challenging and maturing oil and gas fields). Inviting technology companies as advisors into concessions means digital tools – predictive analytics, artificial intelligence, data science and so on – can maximize the concession's efficiency. Digital skills also tend to attract more risk-averse IOCs. IOCs are typically considered more digitally savvy, but NOCs in the Middle East have dramatically increased their use of digitalization in the last year.

**not in order of priority*



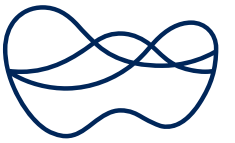
**3 IMPORTANT LETTERS
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DIGITALIZATION IN THE ENERGY SECTOR

Top 10 Recommendations to Improve Digital Skills in the 2020s?



“We must understand what drives us as humans, as well as the changes in technology and business. This will help our industry attract and retain talent, bringing in new and much-needed digital skills.”

Susanne Junk, Digital Transformation Manager, Wintershall DEA

Source: Insights harvested from a roundtable at the 10th Gulf Intelligence UAE Energy Forum in Abu Dhabi on 8 January, 2020. More than 40 high-level energy executives shared their views on the Critical Question under the Chatham House Rule. Any further use of this information must cite this document.

EXECUTIVE SUMMARY

Awash with technical PhD-level talent and at the forefront of mathematical developments, the energy industry’s slower adoption of digitalization has surprised many. The digital tools under the umbrella of the 4th Industrial Revolution (4IR) are being used in the energy industry, but gingerly and not always appropriately. A lack of digital skills and internal barriers in companies’ culture and mindset are the biggest roadblocks hindering digital progress in the energy sector, according to a DNV GL survey of 2,000 engineers and senior executives. A large majority (91%) said it is a fundamental core for their organization to invest in. The challenge is simple. Industry lacks the skills required to sustainably and affordably grow the energy market in the 2020s. But the solutions are far more multifaceted – and time sensitive.

TOP TAKEAWAYS

1 PRIORITIZE PEOPLE
Focus on human talent and how people use digital technologies, rather than how digital technologies can be used by humans. This encompasses building a digital culture by ramping up the awareness of the relevance and benefits of the 4IR and the most valued skills in the 2020s (i.e. data science).

2 EDUCATE, EDUCATE, EDUCATE
Support employees’ learning ambitions via secondments and training programs. Upskilling in-house talent deepens employees’ loyalty, makes the employer more attractive to new talent and fosters a strong ecosystem of partners. Middle Eastern companies – energy and digital – must accelerate their efforts in this space. Notably, employees must have the time and space to learn.



DEFINITION: 4IR

“A fusion of technologies that is blurring the lines between the physical, digital and biological spheres.”

World Economic Forum (WEF)

3 THINK STRATEGICALLY, NOT HASTILY

Some energy stakeholders embracing digital talent do not know how to use it. “I’m not worried about the Google of the world stealing my data scientist. The worry is whether I can give them the right kind of opportunity to grow and apply their expertise properly.” Companies must understand their goals before hiring/training digital talent.

4 EMPOWER EMPLOYEES

Staff need space, autonomy and a creative environment where ideas are celebrated. This must also encompass different working conditions. For example, the flexibility of remote working is increasingly attractive to employees, especially millennials.



“Talent must be able to disseminate reams of data into workable information.”

5 FINE TO FAIL

Getting it wrong is not the problem; abandoning the challenge is. Ensure younger employees (typically digitally fluent, creative) and older employees (typically wiser, resilient) work together so failures do not derail momentum.

6 TECH AND ENERGY INDUSTRY MUST COLLABORATE, NOT COMPETE

Software companies compete with the energy industry for talent, as they have identified a disconnect between their technologies and industry knowledge. Offering cross-industry internships enables the two to collaborate and fosters stronger digital talent overall.

7 ESTABLISH INNOVATION HUBS

Work collaboratively on identified challenges to write roadmaps and build prototypes, therefore upskilling in-house staff and creating valuable intellectual property (IP) and patents. Also, build team efforts with strong partners for a broader ecosystem.

8 INCREASE INDUSTRY’S ATTRACTIVENESS

Energy markets have taken a reputational hit in the last decade, especially fossil fuels. Market a more realistic viewpoint of the energy markets – i.e. have spurred global growth and improved the living conditions of billions of people. This will help attract and retain digital talent, especially among millennials.

9 INDUSTRY-ACADEMIA MUST UNITE EFFORTS

Industry must work closely with academic departments to ensure academia is ‘producing’ graduates that are valuable in industry. Monthly meetings or a joint Industry-Academia Committee would be strong steps to accelerate progress in what has been a long-running challenge.

10 STATUS QUO IS EVOLVING

The hard work is paying off. Great improvements have been recorded in the use of artificial intelligence (AI) in subsurface management, making significant improvements to the recovery of oil reserves, for example. The next task is ensuring that talent can disseminate the reams of data being generated from such projects into workable information. Therein lies the need for strong leadership to train and educate.

**not in order of priority*

20,000
years of progress on innovation could be crowded into the 21st century alone, predicted Ray Kurzweil, Futurist and Chief Engineer of Google. While the outlook seemed ambitious when it was made, the astonishing pace of progress thanks to the 4IR has surpassed all expectations.

\$12bn
could be saved in the industry a year on drilling thanks to the better use of technology, mostly in onshore and shallow waters, according to Wood Mackenzie. Up to \$24bn could be saved a year on operating oil producing assets.

\$6trn
bill due to cybercrime damages is anticipated every year by 2021, up from \$3trn in 2015, according to Cybersecurity Ventures. Such attacks worldwide already cost the world \$600bn in 2017, 0.8% of global GDP, according to McAfee. Improving the digital skills gap must encompass training digital sheriffs.

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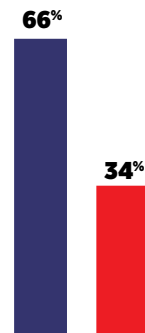
INDUSTRY SURVEY

Test of Arab NOCs Agility in 2020: Will they Pass?

More than 300 high-level attendees to the 4th Gulf Intelligence Middle East Summit at IP Week shared their insights on: *What's next for NOCs?*

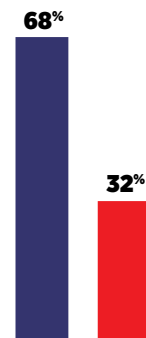
As NOCs become international NOCs (INOCs), can they maintain their dual responsibility of generating revenue and the social contract of national employment?

- A. Agree
- B. Disagree



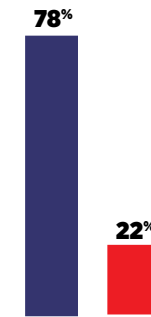
Which is a bigger obstacle to Arab NOCs successfully transforming into "I"NOCs?

- A. The great energy transition to a lower carbon economy
- B. The 4th Industrial Revolution - Digital disruption



Gulf energy companies ACWA and MASDAR have been reported as achieving the lowest solar power generation bids in the world. Does the Middle East have a natural advantage to lead in the new low carbon energy world, as they did in the hydrocarbon era?

- A. Yes
- B. No



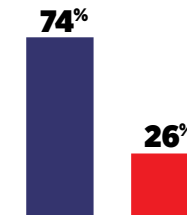
Arab NOCs in transformation are shifting from NOC-IOC (ADNOC-SHELL) partnerships to NOC-NOC (ADNOC-CNOOC). Is this a winning strategy?

- A. Yes
- B. No



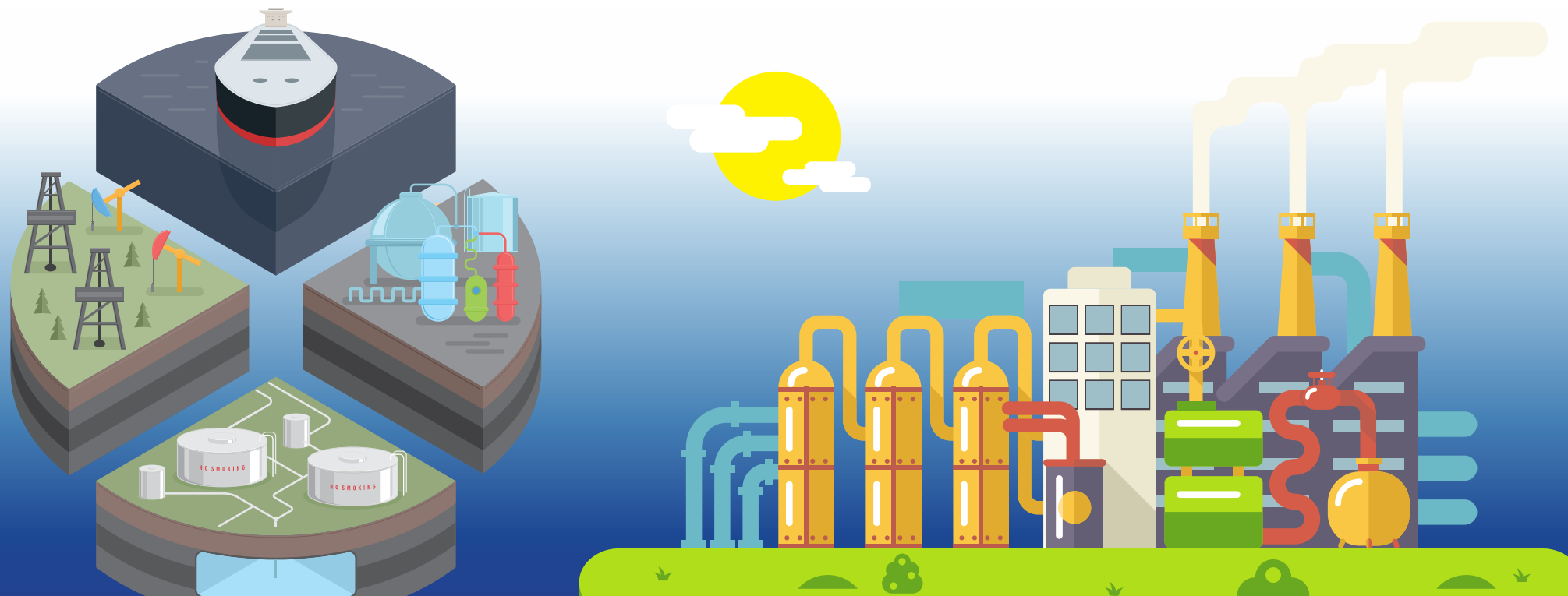
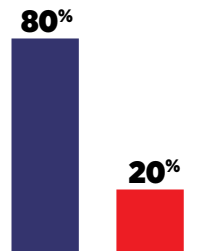
We do not face a stark choice between free trade and protectionism, technology and jobs, immigration and national identity or economic growth and social equity. These are false dichotomies. However, the prominence of these polemics in contemporary discourse illustrates how unprepared we are for Globalization 4.0.

- A. Agree
- B. Disagree



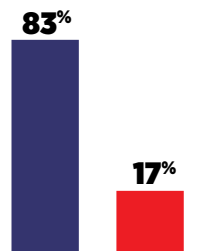
We are on the cusp of a new era, called Globalization 4.0, where the data-driven technologies of the 4th Industrial Revolution are rewriting the rules of the global economy and transforming the energy industry.

- A. Agree
- B. Disagree



In recent years, globalization has been blamed for destroying jobs and triggered a backlash of protectionist politics, with populist slogans as 'America first'. In order to protect their license to operate, the international energy industry must help forge a new social economic contract so all workers feel secure enough at home to remain open to the world.

- A. Agree
- B. Disagree



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