First IPTC in Saudi Arabia Attracts Top Executives, Breaks Attendance Record

John Donnelly, Trent Jacobs, and Stephen Whitfield, Staff Writers | 01 March 2020

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The 12th International Petroleum Technology Conference, held 13–15 January in Dhahran, was the largest in its history with more than 18,000 attendees. It marked the first international multidisciplinary, intersociety oil and gas conference and exhibition to be held in Saudi Arabi and featured some of the globe's top oil and gas executives, including the energy ministers of Saudi Arabia and Bahrain, Saudi Aramco's president and CEO, and the CEOs of ExxonMobil, Total, Petronas, and Woodside.

Below are highlights from some of the plenary, panel, and technical sessions that took place during the 3-day event.

Welcoming a New Energy Era

The conference opened with a distinguished panel offering its outlook for oil and gas markets in the next year and the next decade.

"This is the first interdisciplinary oil and gas conference to be held in Saudi Arabia," said Mahmoud M. Abdulbaqi, chairman of the board of ARGAS and chairman of the IPTC Board of Directors. The conference was hosted by Saudi Aramco. The opening panel included Abdulbaqi; Mohammed Y. Al-Qahtani, senior vice president, upstream, Saudi Aramco; Yasir Al-Rumayyan, chairman of the board, Saudi Aramco; and Prince Abdulaziz bin Salman Al-Saud, minister of energy, Kingdom of Saudi Arabia.

Saudi Arabian Energy Minister Prince Abdulaziz bin Salman Al-Saud (right) tours the exhibit floor on the first day of the conference.

“These are exiting times for the Kingdom,” al-Qahtani said, as both Saudi Aramco and the oil and gas industry at large face a new decade of growing demand but with a need to lighten the industry’s carbon footprint. Saudi Aramco raised a record $29.4 billion in its recent IPO.

Al-Rumayyan said the oil and gas industry thinks in terms of decades, which runs up against the notion that the “energy transition” will occur “from a definitive point A to a definitive point B” and will take place at the same time in the same way everywhere. Instead, he offered what he called the “pragmatic narrative” of a transition happening over decades and that there “will be many energy transitions” at different speeds.

The more narrow narrative is having negative consequences for the industry, he added, because it is influencing some banks to back away from funding oil and gas projects. This lack of investment eventually will lead to a supply shortage that could cause oil price spikes in the near future, he said.

He acknowledged the need of the industry to “lighten the carbon footprint” through technology and innovation, but it must continue to meet the world’s energy needs. The industry must never forget its role to responsibly supply energy required to power the world and sustain economies, he said. If the industry “offers real solutions with real energy to meet real needs” it will last well into the future, he added.

Saudi Energy Minister Al-Saud noted the historically important role that Saudi Arabia has played since the discovery of oil about 80 years ago. The global economic growth of the past half century, which paved the way for transformative development and lifted many out of poverty, would not have taken place without the stability of oil supply from Saudi Arabia.

That mission continues today, with the OPEC-plus effort to cut oil supply to stabilize oil prices after the crash that began in 2014, he said. “The Kingdom will continue to do all it can to guarantee a stable world oil supply,” he said.

That is why Aramco was confident in pursuing an IPO, because it welcomed the bright lights that would shine on Aramco’s capabilities and achievements. The IPO required a thorough audit of Aramco’s oil and gas reserves, and he called on other national oil companies to undergo the same process to add transparency to world oil markets.

Al-Saud said that science, technology, and innovation “would clearly be the game-changer” in industry efforts to reduce its carbon footprint. But it must also be able to attract young people to the oil and gas industry. “The key to the energy transformation is human capital,” he said.

Lessening Carbon Footprint Builds Trust

The oil and gas industry is listening more to citizens about their environmental concerns but must do more to build trust and must find a way to tell the story of the progress the industry has made over the past 2 decades.

That was the consensus of a panel discussion that brought together representatives of Saudi Aramco, ADNOC, Shell, and two service providers. The session was titled, “Shaping the Upstream Ecosystem for a New Energy Era.”

Both Mohammed Y. Al-Qahtani, senior vice president, upstream, Saudi Aramco, and Yaser Saeed Al Mazrouel, executive director upstream directorate with ADNOC, said that their respective companies have made significant progress in reducing their carbon footprint.

A recent study that examined crude oil grades supplied to Asia from 20 countries concluded that Saudi Arabian crude has the lowest carbon intensity. And its Manifa field has won several environmental excellence awards. Aramco looks at the potential carbon footprint when assessing new projects, Al-Qahtani said.

ADNOC has greatly reduced offshore flaring and announced a set of comprehensive sustainability goals in January. The plan includes decreasing its greenhouse gas emissions intensity by 25% by 2030, limiting its freshwater consumption ratio to below 0.5% of total water use, and planting 10 million mangroves, which are particularly good at absorbing CO_2, in the Al Dhafra Region by the end of 2022.

Both companies pledged to continue these industry-leading efforts. “We will continue to drive that trend,” said Al-Qahtani.

Improving the industry's environmental record was part of a larger discussion on the energy transition and what form it should take. Katie Jackson, Shell's executive vice president of commercial and new business development, said that her company will keep investing in hydrocarbons going forward but also in programs that are lower in carbon intensity and particularly in cleaner electricity. "We need to make our upstream business as sustainable as possible," she said.

The energy transition may take much longer than most realize but is critical to the sector's survival. "Amid the multitude of challenges (the industry faces), the energy transition does rise to the top in terms of importance," she said.

Al-Qahtani said the word that will describe the successful company of the future is "smart." It will be a company that is seen by society as part of the solution, not part of a problem, and will have three main attributes:

- IQ—smart in how it uses technology and how it maximizes efficiency
- EQ—emotionally intelligent in caring about all its stakeholders, not just its shareholders
- CQ—cost-competitively intelligent in its focus on excellent quality and service

The Aramco executive decried the current trend of looking at the short term in R&D, particularly by service companies. R&D that offers significant improvement takes years, but much of the emphasis today is on incremental progress, he said. "This is extremely concerning for all of us," he said. "We want breakthroughs."

Aramco recently established its own research centers in the Middle East, Europe, Asia, and the US.

Al Mazrouel said ADNOC is also doing more R&D. "We are looking for technology that really makes a difference," he said.

ADNOC began a transformation in 2016, looking at ways to optimize operations, agreeing to several partnerships spanning both the upstream and downstream, and conducting more research. The idea was to take a comprehensive look at all its operations to try to understand how to make the company more efficient, resilient, and competitive.

Environmental progress across the industry is not uniform. Sherif Foda, CEO of National Energy Services Reunited Corp., said flaring in the Permian Basin has increased because small operators want to produce as much oil as quickly as possible. There would be a cost for that company to reduce flaring.

But the industry "must get its house in order" if it wants to improve public perception, Jackson said. "This is a reputational challenge for the industry."

That is important if the industry wants to build trust with those outside the industry, she said, adding that the industry has the technology to limit its footprint in many areas. Other panelists noted that the industry's reputation was also critical when it comes to attracting new talent.

Oil Looms Large in Future Energy Mix

The road to a low-carbon future will add enormous complexity to oil and gas operations, but the industry still figures to play a significant role in the energy mix. That was the theme from one of the CEO plenary sessions ("Vision to Prosperity: A New Energy Era Emerges"), in which five CEOs from various parts of the supply chain spoke about how their companies factor into a rapidly changing world.

In his first public speaking engagement since Saudi Aramco's IPO, Aramco President and CEO **Amin Nasser** said there is a practical, economic framework for transition worth discussion, one in which oil and gas plays a significant role.

"We look at this transition in a pragmatic light, because surely its foremost driver is a desire to move to a lower-carbon energy mix or, more precisely, an energy mix with lower greenhouse gas emissions. But, when it comes to transitioning, oil and gas is not yet halfway there, and there is a lot more low-hanging fruit," Nasser said.

Nasser also spoke on a more granular level about the potential vulnerability of the company's assets in the wake of drone attacks on its oil processing facilities at Abqaiq and Kurais in the Eastern Province last September. The attacks forced the shutdown of the facilities, but Aramco recovered quickly, as it restored production to pre-attack levels within 2 weeks.

Nasser said Aramco has a track record of "being a very reliable supplier" to its customers, and the attacks were a testament to its reliability. That reliability, he said, stemmed from three areas: its infrastructure, its workforce, and the way the company manages its resources.

"Our ability to restore a facility is unmatched in the industry," Nasser said. "It's a testament to our training, the involvement in emergency response, and the drills we run. Unless you take these drills seriously, you will end up with a disaster. Our emergency response, our highly trained workforce, made it possible for us to restore the facility quickly, and our business continued. Our contractors were ready to execute. Everybody knew what they were supposed to do."

Petronas President and Group CEO Wan Zulkiflee bin Wan Ariffin said the security risk in operations will remain the same as the industry moves forward. Volatility, he said, is something companies must contend with and accept. The impact of the energy transition may add significantly to that element of volatility, and companies need to be ready for that as well. However, Wan Ariffin said it is too early to know exactly what that impact will be.

"Different governments will adopt different policies, and only time will tell if these policies are successful or not. Technology will be a key differentiator for all the organizations in this industry. I think there will be more nontraditional partnerships moving forward, many unconventional partnerships between technology companies and oil and gas," he said.

Woodside CEO and Managing Director Peter Coleman said attracting high-quality young talent into the industry will require bold thinking and versatility.

Coleman said top-notch young talent only wants to work for an industry that has a bright future. While harnessing advanced technologies are good way to demonstrate that oil and gas is a dynamic and future-focused industry, the best way that it will attract new blood into the industry is to show that it is serious about taking on climate change.

"We are part of the solution. We support a transition to a lower-carbon future, and we intend to play a role in it. As the world deals with the

consequences of climate change, the pressure to reduce emissions will only increase, and as an industry we must be ready to develop the most climate-friendly product we can possibly produce. This figures into the design and operation of our facilities, and our other efforts to offset our emissions. We must develop resources in the most carbon-efficient way possible, and it's up to us as industry leaders to make sure that's prioritized," Coleman said.

Baker Hughes President and CEO Lorenzo Simonelli said the industry faces a "fundamental challenge" around the narrative of oil and gas that it must address if it wants to maintain a social license to operate. He pointed to Baker Hughes' "Road to Net Zero," in which the company pledged to achieve net zero carbon emissions by 2050, as a way forward.

Nasser Discusses Climate Debate, Oil Outlook

Practical Ways To Address Climate Change

An "Energy Think Tank" panel discussed the debate around climate change. The idea that there is a middle ground, a way to bridge this divide that addresses concerns of both producers and consumers, was a key theme of the panel discussion.

Adam Sieminski, the president of the King Abdullah Petroleum Studies and Research Center in Riyadh, said there is such a path. It is called the "carbon-circular economy."

"The idea is that through closing the loop in how CO_2 is produced, reused, recycled, renewed, or permanently stored if necessary, you can continue to use hydrocarbons," he said. The catch, he added, is that all the above needs to be represented by solutions that are practical and affordable enough to implement.

Within Saudi Arabia, Sieminski gave examples of such programs that are already under way, including ones aimed at improving the energy efficiency of air conditioning units and automobiles. Looking more broadly into the future, he said countries that embrace the carbon-circular concept may find themselves embracing more nuclear power and fuel switching.

But carbon-circular programs also include projects to inject CO_2 into "natural sinks," which could be spent oil reservoirs, or active ones for enhanced oil recovery—a practice that has been used on a limited basis around the globe. "In order to make this really work from a realistic point of view, you need enabling policies," said Sieminski, noting that scalable solutions require ample research funding along with fiscal incentives to offset the risks of trying to develop them.

Robert Armstrong, the director of the Massachusetts Institute of Technology's (MIT) Energy Initiative, shared other "new and promising ideas" for negative emissions and CO_2 sequestration technologies that are in the early stages of emerging. One that comes straight from MIT researchers is known as an electro-swing battery that absorbs CO_2 while charging, and then release the CO_2 back for other uses when it discharges.

"All you need is a slight voltage swing to go from capture to desorption," explained Armstrong. "That enables you to capture a wide range of concentrations—anywhere from air concentrations for direct capture, all the way up to the concentrations you see in flue gas from a typical power plant."

A largely unexplored territory for CO_2 sequestration is the building industry.

As the world's population continues to swell, demand for living dwellings and workspace is increasing too. Armstrong said the building industry is often left out of discussions around emissions but that the sector should consider turning to the petroleum industry for alternatives to steel and concrete, which happen to be carbon-intensive products.

"We know hydrocarbons can be made into polymers and composites—very strong and very lightweight materials," he said. "If we could move the building sector toward hydrocarbons, our estimates suggest that you would need as much, if not more, hydrocarbons for that as you use today in the transportation sector."

From left, Bahrain Energy Minister Shaikh Mohammed Bin Khalifa Al Khalifa, ExxonMobil Chairman and CEO Darren Woods, Total Chairman and CEO Patrick Pouyanné, and Columbia University professor Jason Bordoff during a first-day panel.

Also on the panel was Scott Tinker, the Director of the Bureau of Economic Geology at The University of Texas at Austin, who has spent the past

several years studying energy poverty and even made a documentary about the subject.

He explained that as people in industrialized nations become entrenched in their views on energy use and climate change, they should not forget that the paramount issues facing the peoples of poorer nations is not the state of the atmosphere—it is the state of water quality, soil pollution, and access to cleaner-burning fuels. “Cooking inside with biomass kills 3 million people each year—that’s more than malaria and AIDS combined—just from the particulates in the smoke,” said Tinker.

The big point is that discussions around climate change, and what to do about it, must be balanced with nuance.

Richer nations have consumed fossil fuels as much as they wanted for a century to grow their economies. Only recently have those economies reached a tipping point where they can now afford to invest in alternatives. Tinker noted that holding the world’s developing countries to the same standards when it comes to reducing their use of fossil fuels would be “condemning” these countries to substandard environments.

“Coal and oil in emerging economies are still very critical,” he said, noting that Vietnam is set to commission 50 or more coal-fired power plants in the next 15–20 years to support its growing electricity needs. “It’s a narrow country that’s about 1,000 miles long with jungle, and they don’t have any solar or wind power available—and they’re not going to cut down the jungle,” he said. “These are the realities.”

To push such perspectives to the front of the climate debate, Tinker said the oil and gas industry must engage in “an honest conversation” about such issues and represent itself as “the sensible voice in that space.”

Gazprom Neft Takes Project Award

Adapting to Industry 4.0

Industry 4.0, the latest industrial revolution, has hit the manufacturing sector, building upon the adoption of computers and automation into industrial processes and adding smart, autonomous systems powered by data and machine-learning algorithms.

The oil and gas industry is well suited to take advantage of Industry 4.0, so long as it can understand the drivers of this change, the convergence of new hyper-connected technologies, and the effects it may have on the existing workforce. A group of industry executives sat down to discuss how that might work.

Nabil Al-Nuaim, chief digital officer at Saudi Aramco, said the industry was going through an “extreme revolution,” primarily in the connection between artificial intelligence (AI) and manufacturing. He called AI a “game-changer” for the industry because of the possibilities it offers for companies, like Aramco, with massive amounts of data it needs to process. The question, he said, is whether companies are ready to scale up to a level needed to properly incorporate AI platforms into their operations.

“How do you integrate all of this data into our platform? Which parts of the value chain will be most impacted in order for us to achieve our business objectives? You need the data and the AI to answer these questions,” Al-Nuaim said.

Al-Nuaim discussed Aramco’s work in this space during the panel. Last March, the company unveiled a 4IR (Fourth Industrial Revolution) Center at its premises in Dhahran that it said would play a pivotal role in uplifting the technical skills of its workforce. An AI Hub, focused on developing

advanced analytics and machine-learning solutions in hydrocarbon-related applications, is at the heart of the center.

“We must improve the market,” Al-Nuaim said. “It’s all about value-driven digital transformation programs. It’s all about how much value you can derive by implementing these programs, and what are the hidden costs? Aramco has a big volume of data, so there is potential to commercialize some of the applications and the IP [intellectual property] that we have created for our own operations.”

Al-Nuaim said AI gives industry a golden opportunity to leverage business units operating in different organizational siloes. Uma Sandiya, general manager of oil and gas at C3.ai, said the breakdown of those siloes—one of the biggest hurdles to full-scale implementation of digital platforms—starts at the executive level.

Derek Mathieson, chief marketing and technology officer at Baker Hughes, said that, while the push to Industry 4.0 requires the buy-in from the workers who will be affected, it also dovetails with the crew change the industry has undergone in recent years. He said the demand for data scientists from its university graduate and recruitment programs has gone from “almost nothing” to a significant percentage. As a different type of worker enters the business, he said companies may have to “retool on the innovation side” and reconfigure how these people fit into the design and creation of their businesses.

“We need to rethink how we think about the creation of real value,” Mathieson said. “The whole nature of competition is starting to change. For the first time in as long as I can remember, as many of our customers are working with Microsoft and Amazon as they are with Baker Hughes and Schlumberger. We’re living through the industrial revolution today. We’re seeing some of the ordering in the supply chain. We’re seeing the arrangement of partnerships with a range of tech suppliers.”

Restart for Prolific Wafra Requires Collaboration Across Disciplines

Need for Young Talent

The scope of emerging technology for the oil and gas industry could be summed up in just three areas: advanced computer programming, new physical toolsets, and alternative applications of upstream systems.

An executive panel session, “Emerging Technologies and Challenges from Exploration to Development,” featured examples of each category from several of the industry’s most technologically capable firms along with candid thoughts on how they might impact the industry’s people problem.

Nasir Al-Naimi, vice president of petroleum engineering and development for Saudi Aramco, highlighted several ambitious technology initiatives that are poised to “revolutionize” his company’s core exploration operations.

Among them is a recently launched digital program called GeoDrive, which is an integrated geophysical imaging and modeling program designed for intensive exascale computing—considered to be one of the next major milestones for high-performance computing.

“This platform improves image-processing efficiency by 90%, pushing the limits of image resolution,” said Al-Naimi. “It is especially helpful in areas with challenging and complex geology.”

In 2016, Aramco debuted another in-house digital feat called TerraPowers that represents the industry's first trillion-cell reservoir simulation and hydrocarbon migration algorithm.

"This will allow our engineers to visualize the entire Arabian Peninsula and Red Sea," added Al-Naimi.

One frontier area where Aramco is using its new suite of geophysical technologies is at its budding unconventional program that is targeting the Kingdom's tight-gas formations. The advanced softwares are already lowering drilling costs, "while increasing our productivity several times over," said Al-Naimi.

Al-Naimi also highlighted the growing use of ocean-bottom nodes, but with the added feature of robotics, which he said represents a "disruptive technology" for the seismic sector. Known as the "Spice Rack" program, Aramco has been developing autonomous robotic nodes for subsea seismic acquisition for the past several years with its partner Seabed GeoSolutions.

Sophie Zurquiyah, chief executive at the geoscience giant CGG, also highlighted the expanding use of ocean-bottom node technology that delivers more precise seismic data which in turn puts the subsurface into sharper focus. Better images, she said, are translating into better-placed wells and giving operators more confidence in deciding the optimal number of wells needed to develop an asset.

"If you look at the Gulf of Mexico, which has a particularly complex subsurface with lots of salt, all of the projects that have been approved by our clients there have had ocean-bottom node surveys," said Zurquiyah.

Panelists from Halliburton and Schlumberger emphasized their company's recent decisions to move away from the closed, proprietary model that has been used by the service companies since the dawn of the oil and gas software business.

"To drive the next industry revolution, we need more than just incremental change—we need to develop a common operating system, an open architecture, a system that allows all companies to plug in and contribute to our understanding of the well, the reservoir, and the field," said Trey Clark, vice president of wireline and perforating services at Halliburton.

When they looked at the challenges of implementing this new wave of technology, the panelists shared the view that the biggest obstacle involves the industry's access to young and skilled workers.

Al-Naimi said that while about 70% of Aramco's upstream workforce is under the age of 35, attracting young people to oil and gas remains a top concern for the world's largest company. A chief hurdle are widespread beliefs in the public arena that the industry is in decline, which he said, "exert a negative influence on recruitment."

"We must work together to dispel this misconception, emphasize our renewed focus on cutting-edge technology, and prepare our companies for these younger employees who will carry this Industry 4.0 forward," said Al-Naimi.

The reach of tech firms is expanding faster than the upstream business and is often seen by young people as more exciting, Zurquiyah said. "As well, we have a deficit of image—so we need to work as an industry to try and address that."

She said one way the industry can turn this situation around is by modernizing its work environments, making career advancement opportunities more transparent and available, and by embracing the concept of work-life balance. "There are expectations from this group of people—and we need to make sure we listen to that."

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