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**PEOPLE
POWERED**



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SPE KSA
Section

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Message from The Editor-in-Chief

Dear Reader,

People are the defining thread that connects every page of this edition. Behind every innovation, every breakthrough, and every meaningful achievement are the leaders who inspire change, the mentors who invest in others, the teams who collaborate with purpose, and the individuals whose curiosity, resilience, and dedication make a difference. This edition of SandRose capitalizes on human potential, reflecting on the people who shape our industry and what it truly means to be people-powered.

We begin by exploring how resilient organizations are built by investing in people, earning trust, and building a culture where individuals can thrive. Through a leadership perspective shaped by navigating uncertainty and transformation, we reflect on the importance of adaptability and staying connected to the people who drive an organization forward. It is a reminder that resilience is not only about responding to change, but about growing through it.

Building on that perspective, we explore what it really means to sustain high performance in today's demanding world. This conversation challenges the notion that success is defined by constantly doing more, reminding us instead that resilience, adaptability, recovery, and continuous learning enable individuals and organizations to perform at their best over the long term. It is a timely perspective for an industry that continues to evolve.

As the edition unfolds, we explore the quiet realities of invisible challenges and the importance of creating environments where every individual feels

seen, understood, and empowered to contribute. By embracing different perspectives and recognizing strengths that are not always visible, we create workplaces where innovation, belonging, and compassion go hand in hand.

These ideas continue through mentorship, equitable leadership, and personal growth. Each offers a different perspective, yet together they reinforce a simple but powerful truth: meaningful progress is never achieved alone. Behind every successful organization is a culture built on trust, collaboration, and a shared commitment to helping others succeed.

As you turn these pages, I hope you discover ideas that challenge your thinking, stories that inspire your leadership, and perspectives that encourage you to reflect on the people who have influenced your own journey.

More importantly, I hope this edition reminds us that each of us has the opportunity to shape someone else's journey through encouragement, mentorship, and a willingness to invest in others.

If there is one idea that connects every page of this edition, it is this: progress is shaped not only by what we achieve, but by the people who make it possible. That is what makes our industry truly people-powered.

Happy reading.

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Message from The SPE-KSA Executive Board Chairman

Dear Reader,

When I think about what makes SPE-KSA special, I always come back to one thing: our people.

Over the years, I have had the privilege of seeing ideas that began as simple conversations evolve into programs, initiatives, and experiences that have created meaningful impact across our community. Behind each one are volunteers who chose to step forward, give their time, share their expertise, and turn an idea into something that serves others.

Our volunteers are the backbone of SPE-KSA. But what makes me especially proud is not only what they contribute to the Section, but how they grow through the experience. I have seen volunteers join us looking for one way to contribute and go on to lead programs of their own. They discover new interests, develop new skills, and build relationships that extend well beyond SPE. Watching that journey unfold has been one of the most rewarding parts of serving this community, and it reminds me that the legacy of volunteering continues today, with each generation building on the contributions of those who came before them.

These experiences remind us that volunteering is never one-sided. When we create opportunities for people to contribute, we also create opportunities for them to lead, learn, and grow. This is what being People-Powered means to me: building a community where every contribution, big or small, helps others succeed and becomes part of our shared story.

The same People-Powered spirit that shapes our

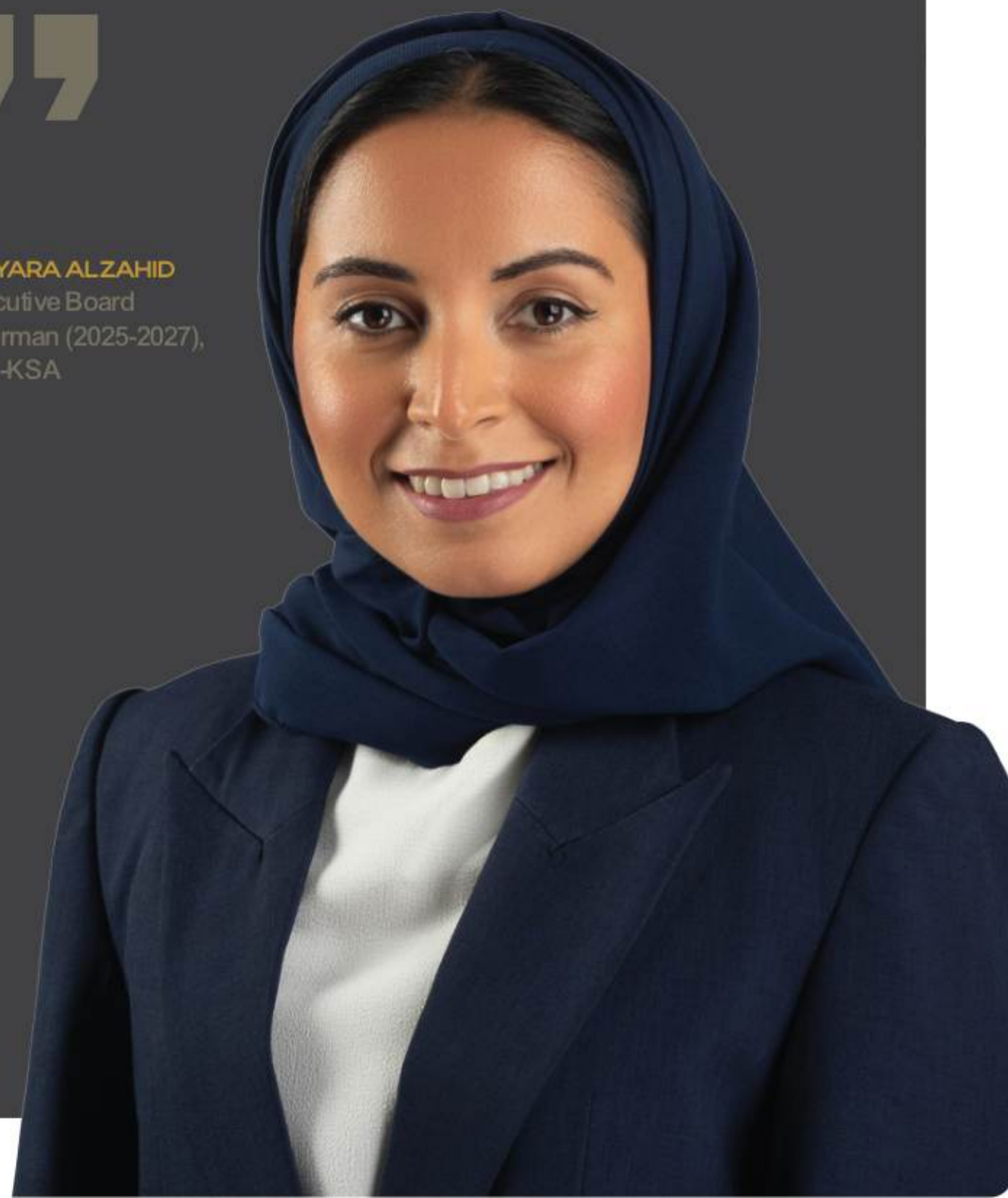
community is reflected in every issue of SandRose. Every issue comes to life because people choose to share something of value with our community. Our contributors bring their knowledge, experiences, and perspectives to these pages, while our editors dedicate their time and care to bringing every story and every issue to life. This People-Powered issue is a celebration of the people who make progress possible: those who step forward, share what they know, support one another, and strengthen our community.

Everything SPE-KSA has achieved is the result of people who believed in what we could build together. As we look ahead, that same ambition, commitment, and shared sense of purpose will continue to shape who we are and the impact we create. That is what it means to be People-Powered.

SPE-KSA is powered by you.



DR. YARA ALZAHID
Executive Board
Chairman (2025-2027),
SPE-KSA



SPE-KSA 2025 - 2027

Executive Board



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Leading Through Transformation: Resilience, Innovation, and People

An Interview with Girish Saligram, President and CEO of Weatherford

You came into your leadership position at Weatherford in the middle of a pandemic. What were those first 90 days like?

As I reflect on that period, I'm amazed by how far we've come. The Weatherford team has accomplished something truly remarkable, and I remain deeply grateful for their resilience, commitment, and belief in what we were building together. Those first 90 days were unlike any leadership transition I had experienced. I joined Weatherford in the middle of the pandemic, at a time when the organization was going through tremendous upheaval. We had emerged from bankruptcy in December 2019 and came perilously close to a second one during the covid downturn. Our market capitalization had fallen to roughly \$150 million while carrying approximately \$2.6 billion in debt. We had never generated positive free cash flow for two consecutive years, nor had we ever combined profitability and cash generation in the same year.

In many ways, it was an existential moment for Weatherford. My approach was simple: listen. I focused on understanding the realities of the business, the customer relationships we had retained, and the value drivers we could build upon. At the same time, we needed an operational cadence that would minimize cash burn and help us generate cash while we developed a long-term strategy. The most important part of that process was understanding the leadership fabric of the organization.

We needed the right structure, the right rhythm, and a clear North Star that people could rally behind.

I sought input from people across the organization, from customers, and from external stakeholders to gain a genuine 360-degree view of what was holding Weatherford back and where our greatest opportunities existed. Ultimately, those first 90 days were defined by listening, learning, and building alignment around a path forward.





How would you say that you won over your engineers, operators, and field personnel when it came to implementing transformation initiatives and changing the ingrained culture of the company?

When I came into the organization, I found that the people already had the energy, the passion, and the spirit of unity needed to succeed. What they needed was direction. They wanted to win. For me, transformation starts with clarity. People need to understand why change is necessary. It cannot be change for the sake of change. They need to understand the problem you're trying to solve and why a different approach makes sense.

The next step is creating quick wins. You need

tangible examples that demonstrate progress and allow people to see the benefits for themselves. Once employees can see the results, momentum builds very quickly. What became apparent to me early on was that Weatherford already possessed exceptional technology. Customers believed in it, our teams believed in it, and the results validated it. My role was not to tell engineers how to design better products. My role was to create an environment where those innovations could be commercialized successfully and where employees could see a direct connection between their work and customer outcomes. As we evolved our technology strategy and demonstrated results, credibility followed. People became increasingly willing to embrace new ideas because they could see the impact

firsthand. One thing we worked very hard to do was ensure accessibility to the leadership team. Like many organizations, we used to hold quarterly town halls that largely consisted of one-way communication and updates. We shifted to monthly interactive town halls with a much higher degree of engagement.

Initially, covid restrictions made that difficult. I began hosting virtual roundtables with employees four and five levels below the executive team. Once travel resumed, I spent significant time visiting our locations around the world. One phrase I heard repeatedly was, "You're the first CEO to visit this location." A year or two later, I started hearing something even more meaningful: "You came back." People need to know that you care. They need to see that you're willing to engage honestly, tackle difficult issues, and follow through on what you say. Credibility is built when actions consistently match words.

Could you comment on revamping your employee value proposition and core values? Why did you feel that was important to you?

Like most organizations, we had a set of values. What struck me, however, was how long and complicated they had become. If you asked people what our values were, they would often hesitate and respond with generic corporate terminology that didn't truly resonate.



We felt our values should mean something. They should be simple, memorable, and reflective of who we are.

To get there, we conducted focus groups across the organization and gathered input from employees around the world. We wanted to understand what genuinely resonated with people.

The result is something I'm incredibly proud of because it represents both the Weatherford we are today and the Weatherford we aspire to become. Our foundation is built on three pillars: safety, quality, and compliance. Safety is about ensuring everyone returns home to their families the same way they arrived at work.



Quality keeps our jobs safe because quality is the foundation of credibility with our customers. Compliance keeps the organization safe because it forms the framework upon which everything else is built.

Beyond that foundation, we have four core values. The first is passion; passion for our customers, our technology, and our industry. The second is innovation. We want to be a company that differentiates itself through new ideas and better ways of working. The third is accountability. We hold ourselves accountable to one another, to our customers, to our stakeholders, and to the communities in which we operate. The fourth is value creation.

We want to create value not only for our customers, but also for our employees and the communities we serve. These values come together under what we call "Our Weatherford", the spirit of collaboration and shared purpose that binds us together as an organization.

How do you balance the need for innovation with operational discipline, especially in the context of a company that has had to recalibrate its financial prudence?

In the early years, discipline had to come first. We needed to become intensely focused on cost, cash generation, and financial stability. At the time, we simply did not have much room to take risks. Before we could think about expanding our ambitions, we had to make sure the balance sheet was healthy and the business was on solid footing.

What was interesting was that, after spending so much time operating in that environment, we had to relearn how to take risks. We had become accustomed to making only the decisions that felt almost certain because there was very little margin for error. Once we reached a stronger financial position, the challenge became creating a culture where people felt comfortable saying, "I have an idea, and it may not work, but it's worth exploring." I believe the most successful companies create an environment where people can take calculated risks, learn from mistakes, and fail without putting the organization at risk. That's where innovation thrives.

At the same time, I think we often define innovation too narrowly. People tend to associate it exclusively with technology. To me, innovation is much broader than that. It's about business models, operating models, people strategies, and processes. It's about finding better ways to do things.

Everyone can innovate every single day by asking a simple question: How can we do this a little better than we did yesterday?

Do you have any advice to young professionals who are predominantly technically endowed, but want to find ways to flex those business acumen and strategic muscles?

The first piece of advice I would offer is to remain intellectually curious. We live in a world where information is more accessible than ever, yet it is also increasingly easy to stay within your own lane and consume only what is presented to you. I've always believed there is tremendous value in exploring beyond your immediate area of expertise and connecting the dots across different disciplines, industries, and perspectives.

The second piece of advice is to take risks. Take on the difficult assignment. Volunteer for the challenge that nobody else wants. You learn far more in situations where there is uncertainty than you do in roles where the path is already clearly defined. When you're forced to figure things out on your own, the experience becomes invaluable.

The third is to invest in your network of mentors. Throughout my career, I have been incredibly

fortunate to learn from people who coached me, challenged me, and took chances on me. One thing that continues to amaze me is how willing successful people are to share their experiences when asked. Often, the hardest part is simply working up the courage to start the conversation and say, "I'd love to get your perspective on something." The key is authenticity. People can tell when you're genuinely interested in learning, and they can also tell when you're not. Approach those conversations with sincerity, and you'll be surprised by how much support is available.



As somebody who came into the energy industry with a relatively fresh pair of eyes, is there something that stands out to you as a misconception or an underappreciated aspect about it at large, and Weatherford in particular?

I'll start with the industry. **The perception that oil and gas is somehow behind when it comes to technology couldn't be further from the truth.** The breadth of technology in this industry is extraordinary. We bring together thermodynamics, mechanical engineering, hydraulics, electronics, software, artificial intelligence, sensing technologies, chemistry, and countless other disciplines. Few industries operate at the intersection of so many fields while simultaneously working in environments that are as technically demanding as ours.

When people think of energy, they often picture a traditional industry. What they don't always see is the remarkable level of innovation, engineering, and problem-solving that takes place every day. As for Weatherford, I believe what is most underappreciated today is how different the organization is compared to what many people remember from the past. We're incredibly proud of our legacy, but Weatherford today is a fundamentally different company.

We're not trying to be everything to everyone, everywhere. We've become a significantly lower-capital-intensity business, focused on technologies that truly differentiate us in the market. We have a smaller footprint than we



once did, but we are generating substantially stronger returns. The perception many people still have is based on a previous version of Weatherford. Part of our job now is continuing to demonstrate how much the organization has evolved.

What have been some of the most difficult decisions you have had to make? How did you navigate them? What have you learned from them?

Over the course of my career, I've had to make many difficult decisions, whether it's deciding where to invest capital, which technologies to pursue, or which business strategies to follow. But no matter how many times you do it, the hardest decisions are always the ones that

affect people. In our industry, there are times when business conditions force difficult choices. Sometimes that means reducing headcount, and those decisions are never easy because you're not just affecting employees. You're affecting families, communities, and livelihoods. It's something I have never taken lightly.

One of the ways I try to navigate those situations is by building a business that is more resilient to cycles. That means maintaining a lean organization and creating enough stability in the business that we can better absorb downturns when they occur. When difficult decisions do become necessary, I believe it's important to make them decisively. Delayed decisions create uncertainty, anxiety, and distraction throughout an organization. If a decision needs to be made, make it quickly and

make it cleanly. Equally important is communication. People deserve to understand why decisions are being made and what those decisions mean for them.

Perhaps the biggest lesson I've learned is the importance of compassion. It's easy to say, "It's just business." While that's true, it's also deeply human.

The individuals sitting across from you don't experience those moments as a business decision. They experience them personally. Having the empathy to listen, absorb, and genuinely understand what people are going through is critically important.



You touched on building a lean organization. Is there anything you would like to add about integrating that resilience into an organization?

In our industry, there are a few factors that play a significant role in building resilience. First, I believe in maintaining a lean support structure. It gives the organization the flexibility to adapt as market conditions change and allows us to scale more effectively through different cycles. Second, I focus on maintaining a strong base of production-oriented work that continues regardless of broader market conditions.

Having that foundation provides stability during periods of uncertainty. Third, differentiation matters. When downturns occur, customers continue to invest in technologies that solve important problems and create value.

Having differentiated technology gives you an advantage when conditions become more challenging. The other element is understanding your labor model and ensuring it can flex appropriately as the business evolves. At Weatherford, we've worked to build a lighter-asset, higher-return, and more flexible operating model; one that relies on differentiation through technology rather than sheer scale. That flexibility is an important part of how we think about resilience.

Resilience comes from staying lean, staying differentiated, and maintaining the flexibility to adapt.



Throughout our conversation, you've emphasized resilience, innovation, and people. As you look to the future, what do you believe will ultimately define long-term success in our industry?

One of the things I have come to appreciate most about this industry is the importance of partnerships.

Success is rarely achieved alone. It comes from bringing together the right technology, the right people, and the right partners, all working toward a common goal.

We've been in Saudi Arabia for several decades, during which we have established many enduring partnerships, including a joint venture with Al-Rushaid Group that spans more than 40 years. Throughout that time, we've had the privilege of working alongside some of the

industry's leading organizations, including Aramco.

What makes these relationships special is that they go beyond the traditional customer-supplier dynamic. We genuinely view them as partnerships. This Kingdom exemplifies how our industry can succeed by bringing together cutting-edge technology, exceptional people, and long-term collaboration. Partnerships like these are not built overnight; they require trust, commitment, and continuous investment. As long as we continue to innovate, invest in people, and nurture those relationships, I believe the future of our industry is incredibly bright, and that we will all continue to be successful together.



The Science of Sustainable Performance: Rethinking Stress, Recovery, and High Performance

An Interview with Dr. James Hewitt, Human Performance Scientist

Dr. James Hewitt is a former elite racing cyclist turned Human Performance Scientist who applies endurance sport principles to knowledge work, helping leaders sustain high performance without burnout. His Regenerative Performance framework, used by Fortune 500 companies and Formula 1 teams across 30+ countries, translates athletic training science into practical strategies for thriving in always-on work cultures.

Your path to your current area of expertise has not been linear. Would you share how your journey has led you towards the study of human performance?

My journey started on the roads of southern France, chasing a dream of becoming a professional cyclist. I soon realized that I wasn't the most talented athlete, so I compensated with data; quantifying and optimizing everything.

That embedded a powerful belief: quantification plus optimization equals success. For a while, it worked. After retiring from racing, I returned to university before setting up a coaching business and joining a leading Human Performance company in Switzerland. By my thirties, I'd checked off the conventional success boxes: C-suite position, family, home. Then came a cancer diagnosis that shattered everything.

Lying in a chemotherapy ward, I was forced to confront some hard truths: My optimization

obsession was less about peak performance and more about the illusion of control. Cancer taught me that true performance isn't about perpetual maximization. It's about the rhythmic oscillation between challenge and renewal.

Thankfully, I made a full recovery, but I recognized the same hyperoptimization trap in the clients I coached. They were grinding until they hit a wall, then collapsing into unproductive guilt. I was inspired to create a model that could equip people with principles from endurance training to make high performance in the workplace more sustainable.

This model became Regenerative Performance: a framework that embraces flexibility over rigid optimization and accepts that life's greatest challenges rarely arrive on schedule. My non-linear path gave me a unique lens to see what the self-improvement industry misses: sustainable success requires strategic renewal as much as effort.



Many of our readers have experienced shift work or remote operations in challenging environments. From a performance-science perspective, what do we usually get wrong about sleep, fatigue, and recovery in these contexts?

The biggest misconception in 24/7 and shift-work operations is that we adapt to inadequate sleep. We don't. Research shows that sleeping six hours per night for two weeks produces cognitive impairments equivalent to going two nights without sleep. But here's the critical part: people don't feel that impaired. A sleepy brain is like a drunk brain: it makes people poor judges of their actual functioning.

I recognize that shift patterns can't easily be changed: operational demands, resourcing requirements, and contract structures often dictate schedules. So, rather than focus only on what's difficult to control, let me share what you can influence:

What you can control individually: Even with fixed shift patterns, small adjustments to your sleep routine can make meaningful differences. Try to maintain as consistent a sleep-schedule as possible even on days off. I know it's tempting to completely flip your schedule, but social jetlag (irregular sleep timing between work and rest days) is associated with worse metabolic health and higher cardiovascular risk. Even reducing that variability by 30-60 minutes helps.



Create a sleep-conducive environment:

Make your room as dark as possible (blackout curtains or a sleep mask), keep it cool (around 18-20°C), and minimize noise with earplugs if needed. These aren't luxuries: they're practical tools that measurably improve sleep quality, especially critical for day-sleepers after night shifts.

Understand your chronotype (your natural biological preference for sleep-wake timing):

About 25% of people are early birds, 25% are night owls, and 50% fall between. If you have any influence over shift preferences (even informally among colleagues), consider requesting shifts that better align with your natural rhythm. A natural night owl will likely adapt better to night shifts, for example.

Elite athletes often serve as role models. for peak performance. In your research, what lessons on sustaining performance have you found that apply more to everyday professionals than to Olympians? And what do you mean by the term regenerative performance?

There's the counterintuitive lesson from elite endurance athletes: they don't train hard all the time. For example, world-class cross-country skiers spend 80% of their 500 annual training hours at low intensity. Only 10-20% is high-intensity work.

This polarized approach flies in the face of what I see in many workplaces. People spend most of their time in what I call «Middle Cognitive Gear»: stuck in meetings, responding to emails, constantly task-switching. It's like training at moderate intensity all day, every day. You're working, but inefficiently, and you never get the benefits of true high-intensity focus or genuine recovery.

Regenerative Performance applies this athletic wisdom to demanding environments through three principles:

First, flexibility over rigid optimization. For example, in operations, you can't always predict when a unit will trip or when a critical decision is needed. You start with honest assessment of available resources on any given day, not comparison to some idealized peak.



Second, adaptable principles rather than detailed protocols. Elaborate morning routines don't survive a 3 AM callout for a process upset. What matters are principles that work whether you're on day shift, night shift, or managing a turnaround.

Third, acceptance that operational demands rarely arrive on schedule. What matters most is having a sustainable approach that could flex when reality demands it.

Practically, this means designing your workday around deliberate shifts between Low, Middle, and High Cognitive Gears when operational conditions allow. Protect periods for critical thinking, whether that's safety reviews, process optimization, or strategic planning. Take genuine breaks during quieter periods. Build recovery into the operational rhythm, not just after people burn out.

Elite athletes understand that adaptation happens during recovery, not just training. The same is true for engineers and operators. Cognitive capacity gets stronger from oscillation between challenge and renewal, not from relentless grinding.

Organizations that apply these principles see not just better wellbeing, but measurably better safety outcomes and decision quality.



In your experience, what's one habit or mindset shift that yields the most bang for buck for someone who wants to improve their performance without overhauling their entire lifestyle?

Shift from viewing stress as something to avoid or ignore, to seeing it as something that can be utilized. This is particularly relevant in contexts where stress is inherent, whether managing a turnaround, responding to an unplanned shutdown, or making critical safety decisions under time pressure, for example.

Research from Stanford University has revealed that simply watching three short videos about the enhancing effects of stress was enough to measurably shift people's mindsets. Those who adopted a stress-is-enhancing view sought more feedback, showed better physiological regulation, and performed better under pressure.

The practical application is surprisingly simple. When you feel your heart rate elevate before a critical management review or while responding to an operational upset, instead of trying to calm down or thinking I'm too stressed,» reinterpret those sensations: «This energy will help me perform better. You're not suppressing stress, you're reframing it as readiness rather than threat.

Here's the implementation:

First, acknowledge the stress. Label it: I'm

feeling stressed about this shutdown timeline.

Second, welcome it as a signal that something important is at stake. This matters for safety and operations.

Third, utilize it as fuel. This energy is preparing me to make sound decisions.

Studies indicate that people who learn to reappraise stress perform better months later. Leaders who reappraise stress are rated as more decisive, competent, and effective under pressure, exactly the qualities needed in your operational environment. This shift creates lasting change even during sustained high-pressure periods like major turnarounds or incident responses.

It requires no schedule changes, no equipment, no elaborate protocols, just a willingness to think differently about the stress that's already present in your work. For professionals managing 24/7 operations in challenging environments, this might be the highest-leverage change you can make.



Your book discusses relatedness and connection, yet performance science focuses on individual optimization. How do we balance personal development with our need for social connection?

This exposes a fundamental flaw in how we think about performance. The self-improvement industry is built on a myth of rugged individualism: transformation as a solo journey. We're told to embrace solitude and eliminate distractions (often meaning people). But this misunderstands human psychology.

Self-determination theory is clear: We have three core needs: autonomy, competence, and relatedness. They're not competing. They're complementary and mutually reinforcing.

The research shows beneficence (making a positive impact on others) is a significant predictor of wellbeing. And the link between prosocial behavior and wellbeing is driven by increased feelings of autonomy, competence, and relatedness. Helping others boosts all our fundamental needs simultaneously.

Yet we're living through a loneliness epidemic. One in ten people has no close friends. Half of all adults report feeling lonely. Loneliness increases premature death risk by 26-29%—comparable to smoking fifteen cigarettes daily.

The solution isn't choosing between personal growth and connections. It's recognizing that genuine development happens in relationship, not isolation.

From hustle culture to obsessive optimization, the performance and wellness space is rife with misleading notions of what it means to perform and succeed. What are some of the most persistent myths or misconceptions that you'd like to debunk in this area?

Let me tackle three myths that particularly affect professionals in demanding operational environments:

Myth 1: Everyone needs to wake up at 5 a.m.

This ignores chronotypes; our genetically-influenced sleep-wake timing. About 25% are early birds, 25% are night owls, 50% fall between. For shift workers and those on rotation schedules, fighting your chronotype on top of irregular hours compounds health risks. Research shows forcing early starts on natural night owls increases safety incidents, cardiovascular risk, and impairs decision-making. In operations where a wrong decision can have catastrophic consequences, respecting chronotype isn't about comfort, it's about safety. Where possible, consider chronotype when assigning shift patterns.

Myth 2: You can "catch up" on sleep during days off

While some recovery is possible, recent research shows that even after 10-hour recovery sleep, the benefits are temporary:

performance deteriorates more rapidly when rechallenged with sleep restriction. You can't bank sleep like overtime hours. Consecutive nights of adequate sleep (7-9 hours) are essential for sustained cognitive function, particularly for safety-critical decision-making. For people on rotation schedules, this means the recovery period needs to be longer than traditionally assumed, and return-to-work scheduling should account for re-adaptation time.

Myth 3: High performers can operate on less sleep

The DEC2 genetic mutation that allows genuinely short sleep affects only 0.02% of the population: roughly one person in a 5,000-seat auditorium. The rest of us experience significant cognitive impairment from short sleep, even if we don't feel it.



In petrochemical operations, this myth is particularly dangerous. People responsible for control rooms, managing safety systems, or making operational decisions while chronically sleep-deprived are operating with significantly impaired judgment, they just don't realize it.

The pattern across these myths: they encourage rigid, unsustainable behaviors that sound disciplined but actually increase risk in operational environments. The antidote could be to design systems around biological reality, not aspirational myths. Adequate sleep, aligned shift scheduling, and genuine recovery aren't luxuries; they're operational necessities for safety and performance.

Teams are often described as the fundamental unit of performance. What does the science tell us about how group dynamics and collective energy affect outcomes, and how can leaders better nurture this?

The science reveals something remarkable: when teams coordinate effectively, their brains synchronize. This isn't a metaphor; it's measurable neural activity coordinating across people, called Interactive Neural Synchrony. And it predicts real outcomes: teams with higher synchrony communicate better, solve problems faster, and learn more effectively from each other.

This happens through three mechanisms:

Behavioral coordination:

Which is when people's body language aligns, speech rhythms sync, and they create shared tempo. This literally coordinates brain activity. Think of a Formula One pit crew changing four tires in 1.8 seconds: twenty people executing movements so precisely coordinated that timing is measured in thousandths of seconds.

Conceptual alignment:

This means building compatible mental models over time. Not identical thinking, but compatible frameworks. In a workplace context, this might look like Sales and Engineering developing shared understanding of what «faster» means, where Sales learns why certain checks matter, and Engineering understands which delays actually hurt deals.

Mutual prediction:

The more you interact, the better you predict responses. Your brain activity reflects not just your behavior, but your predictions of your colleague's behavior. When predictions are accurate, coordination becomes effortless.

The teams that excel aren't necessarily those with the perfect mix of skills. They're those that build synchrony mechanisms allowing different strengths to work in relationship with each other. That's what transforms potential into performance, and capable individuals into teams that can make sound decisions under pressure when it matters most.

Voices on the Theme

Bringing together individuals from different backgrounds and areas of expertise, this feature explores a topic connected to the issue's central theme through personal experiences, professional insights, and varied perspectives.



Invisible Challenges: The Quiet Effort No One Sees

Invisible challenges often go unnoticed, not because they are rare, but because they exist in plain sight. They take many forms and are often shaped by experiences that are not immediately apparent to others.

These may include neurodivergent conditions such as ADHD, autism, dyslexia, and dyspraxia, where differences in attention, processing, communication, or learning styles can influence how individuals engage with their work and environment. They may also include sensory differences, where everyday stimuli such as noise, lighting, textures, or crowded spaces can become overwhelming or distracting.

Invisible challenges also span a wide range of other conditions, including hearing impairments that may require lip-reading or assistive

technology, chronic illnesses such as lupus or diabetes, and mental health conditions such as anxiety, depression, or PTSD.

For some, these experiences are intermittent, fluctuating in intensity and unpredictability. For others, they are lifelong, quietly shaping daily routines, decision-making, and energy levels. Many individuals develop coping mechanisms or choose to mask their experiences, whether to avoid stigma, meet expectations, or simply navigate systems that were not designed with them in mind.

This piece brings together voices from medical, personal, and professional perspectives to shed light on what is often unseen, yet deeply influences how people live, work, and move through the world.





Noor Alnaji

MD, MBA, SBP

Consultant Pediatrician

Pediatric Primary Care Unit Head

Johns Hopkins Aramco Healthcare

"Not all challenges are visible. In both clinical and everyday settings, we often encounter individuals who appear to be functioning well on the surface, yet are exerting significant effort to maintain that appearance. This phenomenon, referred to as 'masking,' involves adapting or suppressing natural behaviors in order to meet social expectations and avoid standing out. Some of the most well-adjusted individuals we encounter may, in fact, be working the hardest to appear that way. In recent years, there has been increasing awareness of 'masked conditions,' particularly neurodevelopmental differences such as ADHD, autism, and even speech conditions like stuttering.

While masking is often discussed in adult and workplace settings, it is important to recognize that it rarely begins there. Masking is something we observe developing early in childhood. Children are highly perceptive. From a young age, they begin to recognize which behaviors are socially accepted and which are not. A child who is naturally impulsive, struggles with eye contact, or processes information differently may quickly learn, through subtle feedback from peers, teachers, or other adults, that their natural responses stand out. Over time, they adapt. They sit still when it feels unnatural, rehearse social responses, or suppress behaviors that might draw attention.

Among the many cases of children with high-functioning autism, specifically girls with ADHD, this adaptation can be so effective that the underlying condition goes unrecognized. These children are often described as 'well-behaved,' 'quiet,' or 'coping well,' while internally exerting significant effort to maintain that appearance. In structured environments like school, this can even be rewarded. By the time these individuals reach adolescence and adulthood, masking is no longer a conscious strategy; it becomes habitual. They have learned how to respond, how to present themselves, and how to manage expectations.

The long-term effects of masking can be substantial. Keeping that level of self-monitoring going is tiring. Many individuals report chronic fatigue, anxiety, and burnout. Maintaining a mask requires continuous cognitive and emotional effort. Over time, this can lead to difficulties with identity, as individuals struggle to distinguish between their authentic self and the person they have learned to present. From a clinical perspective, another important consequence is delayed diagnosis. When a

child or adolescent appears to be coping externally, their challenges may be overlooked. As a result, they may not receive the support or accommodations that could have reduced the need for masking in the first place.

Creating supportive environments does not require identifying every individual who is masking. The goal is not to try to 'unmask' every individual. Rather, it involves fostering a culture of psychological safety, where differences in communication, work style, or social interaction are understood and accepted. Flexibility, clear expectations, and openness to diverse ways of thinking can make a significant difference. Practical steps may include offering flexibility in how tasks are completed, normalizing a range of social behaviors, and encouraging open communication without judgment. When individuals feel safe to express themselves authentically, the reliance on masking naturally decreases.

Ultimately, masking is not simply an individual behavior; it is a response to the environments in which individuals develop and function. By shifting our perspective, from expecting individuals to continuously adapt to designing systems that accommodate diversity, we can better support those whose efforts often go unseen. Recognizing the quiet effort behind masking is the first step toward more inclusive, responsive, and compassionate care and practice."



Abdulrahman Ali

Associate IT Systems Analyst Saudi Aramco
Person with Disability, Hard of Hearing



"Effective communication plays a central role in creating an inclusive and supportive work environment, especially when navigating hearing-related challenges. It is important to recognize that individuals who are hard of hearing or Deaf are not all the same. Each person may have different preferences and needs, even though there are some common similarities. Understanding and respecting these differences is key to effective collaboration.

In my experience, clear and visual communication methods make a significant difference in ensuring mutual understanding and productivity. Incorporating visual elements such as body language, facial expressions, and written explanations greatly enhances clarity. For example, using a whiteboard while explaining ideas helps reinforce key points and ensures that important information is not missed. These approaches not only support

me, but can also benefit the entire team by making discussions more structured and accessible.

In-person meetings are generally more effective in my experience compared to virtual meetings. Platforms like Zoom can be challenging due to overlapping conversations, difficulty tracking multiple speakers, and sometimes confusing transcription or closed captioning. Being physically present allows me to rely on visual cues and better follow the flow of discussion, which improves both engagement and comprehension.

At times, I may need brief repetition or clarification, although this is not frequent. When it does happen, it helps ensure accuracy and alignment within the team. To stay fully engaged during longer discussions, I also find it helpful to pause periodically, approximately every 10 minutes, to confirm understanding. In such cases, I may ask the meeting leader to summarize key points so I can stay aligned with the conversation.

These practices are simple but effective ways to create a more inclusive communication environment. Small adjustments, such as using visual aids, encouraging structured discussions, and allowing moments for clarification, can make a meaningful difference. Ultimately, fostering awareness and flexibility in communication styles helps build a workplace where everyone can contribute confidently and effectively."



Lisa Silpigno

P.E. and ACC

HR Manager

SLB

"In the workplace, much of what shapes our interactions happens quietly. Assumptions are formed quickly, often based on what we observe, while factors influencing behavior are not always visible. Colleagues may be navigating invisible challenges, including neurodivergent conditions, hearing loss, chronic health conditions, or other differences that affect how they process information, communicate, or engage in their work.

In many cases, individuals adapt by masking aspects of their experience to meet expectations or avoid being perceived as different. While this can create alignment on the surface, it may also lead to added effort, stress, or disengagement over time.

For teams and leaders, the opportunity lies not in identifying every challenge, but in shaping environments where individuals do not need to conceal them in the first place. This begins with how we interpret behavior and how we choose to respond.

Behaviors such as inconsistency, withdrawal, or difficulty focusing are often interpreted at face value. In reality, they may reflect factors that are not immediately visible.

A colleague may be managing fluctuating energy due to a health condition. Another may process information differently and require more time or structure to engage effectively. Others may experience sensory or cognitive overload in certain environments.

Leading with compassion means pausing before forming conclusions and approaching situations with curiosity rather than judgment, while asking ourselves what would truly be of service. It shifts the focus from assumptions to understanding, and from reaction to intention. Thupten Jinpa, a visiting research scholar at the Stanford Institute for Neuro-Innovation and Translational Neurosciences, explores this in his book, *A Fearless Heart: How the Courage to Be Compassionate Can Transform Our Lives*.

Jinpa discusses a study conducted at Johns Hopkins in 2003 and referenced in a 2018 Forbes magazine interview, where a brief

compassion-based intervention with cancer patients focused on a simple message: 'We're going to be here with you. We're going to go through this together. I'll be with you every step of the way.' Even in a short interaction, this approach helped reduce anxiety and create a sense of shared experience. Shifting from 'I' to 'we' creates common ground. In the workplace, this invites the other person to safely remove their protective mask.

Communicating with insight goes beyond expressing ideas clearly. It requires empathy and understanding how others receive, process, and respond to information. For individuals navigating invisible challenges, differences in processing speed, attention, energy levels, or comfort in certain settings can affect how information is understood and acted upon. Clarity and structure therefore become essential.

Setting clear expectations, breaking down complex tasks, and reinforcing key points in writing can make information more accessible and reduce the risk of misunderstanding. Creating a space for questions and checking for alignment further supports effective collaboration.

Incorporating insight into our communication is not about changing what we say, but about being present with the other person. Listening and speaking mindfully help create a space for more people to fully engage and contribute. Inclusion is not defined by isolated actions, but by consistent behavior. Inclusion is shaped by everyday actions. How we interpret, communicate, and respond to others determines whether people feel supported and able to contribute."



Mohammed Althani

Offshore Reservoir Simulation Group Supervisor

Saudi Aramco

Member, SPE International Diversity and Inclusion Committee

"As a leader in Diversity, Equity, and Inclusion, I believe that creating an inclusive workplace for employees with disabilities, including those with invisible disabilities and masked conditions such as stuttering, ADHD, autism, and other neurodivergent conditions, is crucial for their success and well-being. To achieve this, three pillars are essential: leadership commitment, employee awareness, and a safe environment for People with Disabilities. By implementing these pillars, organizations can create workplaces that value diversity, promote equity and inclusion, and support the success and well-being of all employees.

Leadership commitment is the foundation of creating an inclusive workplace, particularly when supporting employees with challenges that are not immediately apparent. It requires genuine buy-in from upper management and a trickle-down effect to the first line of leaders. Leaders must demonstrate commitment through actions and policies, including training that addresses the needs and experiences of employees with mental health conditions, chronic illnesses, or neurodivergent conditions. For example, leaders can learn how to recognize and respond to signs of distress or anxiety in employees who may be struggling with hidden disabilities, and how to create a supportive environment for employees with conditions like ADHD or autism. Education and awareness enable leaders to understand these unique challenges and develop effective strategies to support and accommodate them.

Raising awareness about disabilities and inclusion is critical to creating an inclusive workplace, especially when it comes to employees who may be hiding their disabilities or struggling with conditions that are not easily visible. Employees need to understand the experiences of colleagues living with disabilities that are not immediately

visible, as well as how to create a welcoming and supportive environment. This includes communicating effectively with colleagues who may have difficulty with verbal communication, or creating sensory-friendly workspaces for employees with sensory sensitivities. Because these disabilities are often overlooked, they require intentional training and awareness to ensure employees understand and can support their colleagues. By providing education and awareness programs, we can break down stigma and create a culture of understanding and support, where all employees feel valued and empowered to contribute their best work.

Creating a safe environment requires a culture of psychological safety, where employees feel comfortable disclosing their needs and seeking support without fear of judgment or retaliation. This involves providing a supportive and non-stigmatizing environment, where employees feel empowered to ask for help and accommodations when needed. The principle of 'nothing for them without them' is central to this pillar, as it recognizes that the most effective solutions are those developed in partnership with People with Disabilities themselves. By listening to and acting on their concerns, we can create workplaces where all employees feel valued, included, and empowered to contribute their best work, regardless of their abilities or disabilities. By implementing these three pillars, we can create a workplace that values diversity, promotes equity and inclusion, and supports the success and well-being of all employees. This leads to a more productive, innovative, and successful organization, where employees can thrive and reach their full potential."



From Curiosity to Impact: A Journey of Growth, Adaptability, and Purpose

Farah Al Betairi
Communication Manager for Saudi Arabia and Bahrain
SLB



A movement is only as strong as its people. Being part of one has shown me that progress is never driven by a single individual, it's shaped by the collective effort of those who consistently show up, contribute, and push forward, even in small ways.

My journey began when I started as an Information Technology Analyst at SLB in 2018, stepping into an industry that was both complex and constantly evolving. Like many at the beginning of their careers, I didn't have all the answers, but I had curiosity, a strong work ethic, and the willingness to learn. Inspired by my father, who has always been a role model to me, I pursued a career in the energy industry. Over time, I came to understand that growth is less about certainty and more about showing up consistently, especially in moments where you're still figuring things out.

Throughout my career, I've moved across roles that challenged me to adapt, ranging from IT Communications to Sales & Commercial. Each transition pushed me outside my comfort zone, forcing me to learn quickly, build credibility, and navigate unfamiliar environments. Today, as the Communication Manager for Saudi Arabia and Bahrain at SLB, I recognize that those moments of discomfort were not obstacles, they were the moments that shaped how I think, communicate, and lead.

What made this journey meaningful was the environment around me. Working with people from different backgrounds has challenged my

perspective and pushed me beyond my own assumptions. Our surroundings play a significant role in shaping our perspectives and identity, and my surroundings have reinforced the powerful idea that who you surround yourself with shapes not only your work, but your identity.

Looking back, I realize that growth rarely comes from staying within a single lane. It comes from being willing to step into new roles, ask questions, and learn from others, especially those with more experience. I found that with the right strategies, it's possible to navigate challenges and transition between domains or even entire disciplines. Mentorship, curiosity, and clarity of purpose have been some of the most important drivers in my journey, and they remain essential for anyone navigating an evolving career.

As a young leader, I'm often asked what advice I would give to those just starting out. I always emphasize the importance of self-exploration and the value of drawing from each stage of life, no matter how minute it may seem. Progress is built in layers, and the habits you form early on will shape how far you go. A striving young leader should never limit themselves, keep trying, and constantly explore new challenges and opportunities.

Beyond my role at SLB, being part of Connect Women in KSA and Bahrain has been a defining experience. It is a great platform dedicated to building a robust network where women can share unique perspectives, think critically, and

foster creativity. As a prominent leader within this community, I have engaged in various facets of community stewardship, including International Women's Day, Women in the Field, and Breast Cancer Awareness. My involvement is a reminder that meaningful change doesn't happen in isolation, it happens when people come together with a shared purpose.

When I think about success, I don't define it only through titles or milestones. I think about the impact left behind, on people, on ideas, and on the direction of the work itself. If there's one thing I've learned, it's that growth doesn't come from having everything figured out. It comes from showing up, doing the work, and continuing forward even when the path isn't clear.

And in the end, that's what truly makes progress people-powered.



Equity and Inclusion:

The Heart of Transformational Leadership

Rawan Tahif, Associate Petroleum Engineer
Malik Alkhudair, Associate Petroleum Engineer
Saudi Aramco

In an era defined by transformation and interconnection, organizations are increasingly recognizing that success depends not only on what they achieve, but also on how they achieve it. The modern workplace thrives when equity and inclusion are embedded in the foundation of organizational culture, ensuring that fairness, respect, and inclusivity consistently guide every decision.

Equity is not about treating everyone the same; it is about ensuring that each individual has access to the opportunities, resources, and support they need to thrive. Inclusion, in turn, cultivates environments where every person is valued, heard, and empowered to contribute their full potential. Together, equity and inclusion shape a culture that enables excellence—one that celebrates contribution, encourages accountability, and nurtures both professional and personal growth. This philosophy goes beyond policies or initiatives; it is a mindset that transforms leadership, teamwork, and organizational performance.

Equitable Leadership in Action

Equitable and inclusive leadership has become a strategic necessity in all organizations. In a world where innovation depends on collaboration, leaders must foster environments where all voices are not only welcome but also essential to progress.

As Musleh Alnajrani, Aramco Geosteering Division Manager, who led the project to integrate women professionals in the Exploration Core Lab, emphasized:

“Equity means giving people the support and tools they need to succeed, and showing that everyone’s ideas matter. This aligns with our values of integrity and citizenship, which includes treating people fairly and respecting every individual’s contribution.”

His perspective captures the essence of modern leadership, the balance between driving operational excellence and honoring human connection.

Equity is a driver of performance, collaboration, and innovation, ensuring that organizational growth, business excellence, and individuals’ well-being progress hand in hand.



Humility and the Forever-Student Mentality

The most effective leaders share a common thread of self-awareness, empathy, humility, and courage. They recognize their limitations, listen deeply, and act with integrity. Fatima Yusuf, Aramco Senior Organization and Management Advisor, who led the initiative to include female engineers in remote locations, highlighted the importance of humility as a cornerstone of equitable leadership.

“Embrace humility and let go of one’s ego. We always hear, ‘I have done it, why can’t you?’ But any individual is not the yardstick through which we can measure other people’s experiences. The nuance of the human condition is infinite, and if it worked for you, there is no guarantee it will work for others.”

Her words capture an essential truth: leadership is not about imposing personal success stories but about enabling others to create their own.

Fatima also advocates for what she calls a “forever-student mentality.” By remaining open, curious, and free of judgment, leaders can better understand the varied needs within their teams. She adds, “Some people’s needs are different from yours. Our instinct is often to ridicule or dismiss them. We should fight this instinct and instead try to learn and empathize.”

Meanwhile, Musleh points to empathy and cultural awareness as defining elements of his leadership approach. “Empathy helps me connect with people, and cultural awareness helps me lead diverse teams respectfully. Understanding those differences helps build stronger relationships and better collaboration.”

Both leaders emphasize the importance of integrity and accountability, ensuring that actions consistently align with words and elevate leadership credibility.



Practical Actions for Inclusion

Equitable and inclusive leadership is realized not through grand gestures but through consistent, intentional actions that reinforce trust, belonging, and transparency. Musleh believes in simplicity as the key to excellence.

"I believe in keeping things simple, since simple actions, such as open team discussions where everyone can share ideas, rotating responsibilities so each person gets a chance to lead, and training and recognition programs, build excellence and a strong sense of teamwork."

Such practices democratize leadership, allowing every individual to experience ownership and accountability. By rotating roles and responsibilities, leaders can cultivate confidence and resilience across their teams.

Fatima offers a complementary perspective: "Business goals and inclusivity complement each other; one defines what we do, the other defines how we do it."

Her insight reframes inclusion not as a competing priority but as a catalyst for operational success. By embedding equity into daily practices, from communication styles to project management, leaders create environments where engagement and performance reinforce one another.

A defining element of this approach is creating an environment where people feel genuinely heard, not simply invited to speak. Musleh emphasizes that true inclusion lies in listening with intent and responding with respect. By fostering open dialogue and ensuring that contributions translate into meaningful action, he transforms communication into trust. "When people know their perspectives influence outcomes," he notes, "they become more engaged, confident, and invested in the team's success."

This deliberate effort to listen ensures that quieter voices are not overshadowed, regardless of personality, background, or communication style, allowing innovation to emerge from all corners of the organization.

Benefits of Equity and Inclusion

The benefits of equity and inclusion extend far beyond positive culture.



They directly strengthen performance, innovation, and organizational sustainability. As Musleh explains, "A team that feels valued performs better, works safer, and solves problems faster. By making inclusion part of our excellence and safety culture, we achieve better and more sustainable results."

Equitable leadership creates a virtuous cycle. When people are supported and respected, they invest more deeply in their work, share ideas more freely, and show greater initiative. This collective commitment and dedication drive both individual development and organizational growth. As Musleh notes, "When people grow, the organization grows – that is real excellence." Fatima's perspective echoes that through increased support and visibility, individuals bring their full potential to the table. Equity, in practice, unlocks energy and insight that might otherwise remain hidden.

All of the above outcomes highlight that equity and inclusion are not abstract ideals; they are practical enablers of performance and continuous excellence and sustainable growth.

Fostering a truly equitable and inclusive culture is a transformative journey that requires more than intention. It begins with reflection and persistence, grows through the readiness to rethink established approaches, and succeeds through the willingness to challenge deeply rooted norms that no longer serve a purpose. The most significant barriers are often invisible: assumptions, habits, and patterns of interaction that quietly influence decision-making. Since these barriers are sometimes deeply ingrained and often operate beneath our conscious awareness, they can be particularly challenging to overcome. This explains why people often fall back on familiar habits and patterns of interaction, even when these habits are no longer effective.



The natural pull toward the familiar often fuels resistance to the changes needed to create a more inclusive culture. Recognizing this tendency, Musleh notes that "By reinforcing collaboration and respect as core expectations, we gradually shift those patterns." Clear communication and consistency are crucial in this process. They turn hesitation into understanding and transform resistance into alignment. This approach builds trust and lasting cultural momentum.

Fatima highlights another critical challenge: internal bias.

"Regularly check your own biases. In social science, the in-group versus out-group dynamic is a strong force. No one is immune to it. Regularly reflecting on and questioning our own beliefs, thoughts, and behaviors is key."

Her solution is grounded in reflection, empathy, and connection. "Get to know people as individuals. It's amazing what comes up and how insightful it can be." This authenticity builds psychological safety, the foundation upon which trust, collaboration, and innovation thrive. These practices may seem simple, but they redefine the tone of leadership and the culture of the workplace itself.

The evolution of leadership is moving steadily toward integration, where equity and inclusion are embedded at the core of organizational culture rather than treated as stand-alone

initiatives. "Inclusion is already part of how we lead, not an initiative," says Musleh. "The next generation of leaders will combine technical skills with empathy and cultural intelligence. Equitable leadership is part of our journey toward excellence, integrity, and sustainability, developing people as much as we develop energy."

This vision captures the future of leadership: a model that harmonizes technical mastery with human understanding and well-being, recognizing that sustainable success depends not only on innovation but on the capacity to genuinely connect, uplift, and empower.

Equitable and inclusive leadership is both a commitment to fairness and respect, and a catalyst for performance, collaboration, and long-term success."



Leadership Principles for the Future

As Fatima reminds us, humility and empathy are not secondary traits but central strengths. They reflect a leader's capacity to see beyond themselves and to nurture the potential of others. This allows individuals to approach challenges with openness, to recognize differences without judgment, and to build bridges across experience.

And, as Musleh demonstrates through his own practice, by prioritizing transparency and fairness, integrity and accountability cultivate equity, ensuring that every voice is heard, all contributions are valued, and every person is empowered to grow.

Effective leadership that consistently embraces fairness, empathy, and integrity fosters the growth and engagement of the people around it. When equity and inclusion are integrated into decisions and interactions, progress becomes a collective achievement, laying the foundation for organizations to thrive ethically, sustainably, and humanely in the years to come.



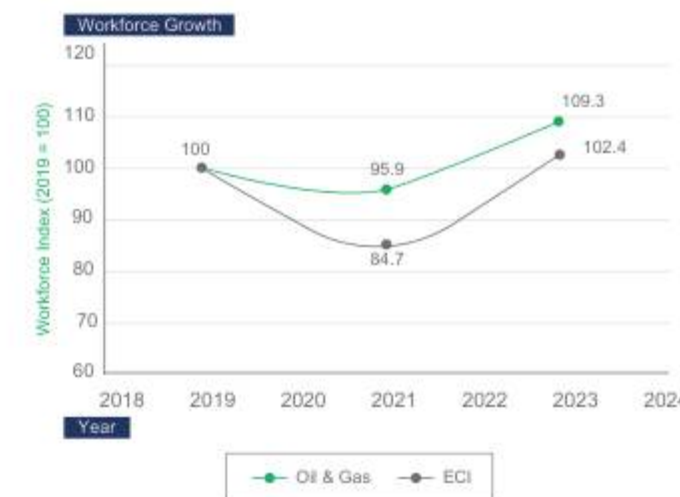
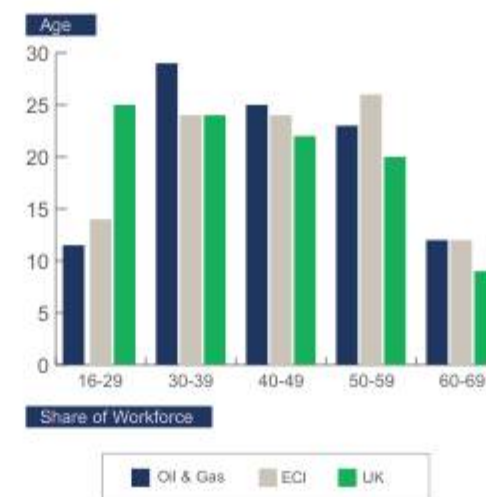
Bridging the Gap: The Power of Mentorship in the Energy Industry

Saad Hamid, Petroleum Engineer
Saudi Aramco

The energy sector now stands at a pivotal crossroads. While the world's appetite for cleaner, more reliable power continues to grow, the workforce that underpins these advances is aging. A recent Engineering Construction Industry Training Board (ECITB) census of the oil and gas industry, which surveyed over 16,000 workers across 531 sites, shows that only about 12% of the core workforce is under 30 years of age, whereas 54% fall between 30 and 49 years, and approximately 35% are 50 years or older.

Although the industry anticipates a 9.3% increase in headcount relative to 2019 levels, this growth may still be insufficient to replace retiring talent and satisfy the heightened demand for expertise in emerging low-carbon technologies, digital twins, and advanced analytics. Consequently, a substantial reservoir of tacit knowledge risks being lost just as the sector needs it most to drive the energy transition forward.

Oil & Gas and ECI Workforce Headcount Index (2019–2024)



Source: ECITB Workforce Census

SPE eMentoring Program

Mentorship offers a practical antidote to this looming expertise gap. As the Society of Petroleum Engineers (SPE) emphasizes in its eMentoring Program Mentor Handbook, "there is no replacement for hands-on experience, which is a direct function of time spent in the field."

Veteran engineers can share the hands-on, on-the-ground insights that only years of operation can provide, while also offering emotional support and career guidance to younger professionals. Effective mentors demonstrate active listening, compassion, and a genuine commitment to serving the industry, helping mentees translate theory into practice and navigate the increasingly complex regulatory and technological landscape.

The SPE eMentoring platform translates these timeless mentorship principles into a concrete digital experience designed for the energy sector. Participants create detailed profiles that capture their technical backgrounds, career aspirations, and personal interests. An algorithm then matches mentees with mentors whose expertise aligns closely with the mentees' developmental needs, whether in offshore drilling, renewable integration, or emerging carbon-capture technologies.

The program's structured six-month cycle provides a clear framework for establishing objectives, monitoring progress, and exchanging feedback, yet remains flexible enough to support a lasting partnership when both parties wish to continue beyond the formal term.

To maximize the value of the e-mentoring relationship, mentors should begin each session with a focused mindset, minimize distractions, and set a concise agenda so they can give their undivided attention, a practice highlighted in the SPE Mentor Handbook.

Co-creating a SMART development plan, which is Specific, Measurable, Achievable, Relevant, and Time-bound, aligns expectations and defines concrete milestones. These may include mastering a new simulation tool, leading a pilot project, or navigating environmental, social, and governance requirements.

Throughout the mentorship, emphasizing strengths, encouraging reflective practice, and providing timely, constructive feedback sustain engagement and build confidence. As the six-month period draws to a close, a dedicated transition discussion helps the mentee articulate next-step goals, easing the shift into greater professional responsibility.

Networking is another essential dimension of effective mentorship. By sharing personal experiences and facilitating introductions to industry bodies, professional societies, and cross-disciplinary forums, mentors expand their mentees' circles of influence.

The SPE Mentoring System's discussion boards and virtual events create ongoing spaces for knowledge exchange, reinforcing the handbook's observation that "quality relationships can enrich your life and empower you to achieve your goals." Such connections not only broaden perspectives but also open doors to collaborations that are vital for addressing the complex challenges of the modern energy landscape.

KFUPM Mentorship Program

In the high-stakes environment of the modern energy sector, the transition from academic theory to operational excellence is a journey best traveled with the guidance of those who have already navigated the path.

Within the Kingdom of Saudi Arabia, the King Fahd University of Petroleum and Minerals (KFUPM) Mentorship Program, themed "Real Guidance, Real Impact," serves as a vital bridge between academic excellence and the dynamic requirements of the global energy industry.

By connecting current students with experienced alumni professionals, the program transforms the transition from university life into professional practice through a structured

journey of discovery and growth, helping mentees gain real-world perspectives as they plan their career paths.

The program is structured as a four-month engagement designed to provide exposure to different industries and personalized career guidance. Eligibility is targeted toward sophomores and above, ensuring that students have reached a foundational level of maturity before engaging with industry veterans.

The journey begins with a virtual opening session to align expectations, followed by mandatory monthly meetings between mentors and their assigned mentees. These interactions, which can take place in person or remotely, allow for a steady exchange of technical knowledge and professional wisdom that is often missing from traditional curricula.



KFUPM Mentorship Program Closing

Ceremony of First Three Batches



The program recently celebrated the impact of its previous cohorts at a special closing ceremony. The event provided a meaningful opportunity to reflect on how these relationships have helped students gain clarity, confidence, and direction.

The impact of this initiative extends beyond individual career advice, fostering a powerful network of KFUPM graduates who are committed to cultivating the next generation of leaders.

Mentors who generously share their time and experience fulfill a critical responsibility in sustaining the industry's talent pipeline. Upon fulfilling their duties, mentors receive an official certificate of appreciation from the university, while mentees earn a certificate of completion to signify their professional development. The KFUPM Mentorship Program demonstrates the value of strong institutional collaboration, showing that the future of the energy industry relies as much on human capital as it does on technical innovation.

Ultimately, this initiative reinforces a cycle of excellence: alumni return to empower students, who in turn become the mentors of tomorrow. This sustainable model of leadership development will continue to support Saudi Arabia's energy sector as it advances toward global leadership.

The Enduring Value of Mentorship

The true power of mentorship lies in its ability to transform high-potential students and young engineers into high-performance professionals by humanizing the transition from the classroom to the field.

Global initiatives such as SPE eMentoring demonstrate how digital connectivity can break geographical barriers, allowing seasoned experts to pass on critical industry knowledge to the next generation of engineers, regardless of location.

In the Kingdom of Saudi Arabia, the KFUPM Mentorship Program provides a structured journey of discovery that fosters professional relationships and helps students gain clarity and direction. These programs demonstrate that the future of the energy sector depends as much on the transfer of institutional wisdom as it does on technical mastery. By formalizing these connections, the industry helps ensure that its workforce is not only academically qualified, but also equipped with the resilience and strategic mindset required for global leadership.

Ultimately, mentorship creates a self-sustaining cycle of excellence. Today's mentees, empowered by the insights of their predecessors, can become the mentors of tomorrow, ensuring the long-term vitality of the energy landscape.

Mentorship is far more than a charitable gesture; it is a strategic lever that safeguards institutional memory, accelerates skill development, and strengthens the talent pipeline essential for a sustainable, low-carbon future.

By leveraging purpose-built mentoring platforms and following proven best practices, including focused attention, clear goal setting, empathetic support, and continuous engagement, industry leaders can ensure that the wealth of experience held by today's senior professionals is passed on to tomorrow's innovators, securing the sector's resilience and prosperity.



Lithium in the Age of Renewables: Production Strategies and Future Directions



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Lithium, often referred to as “white gold,” has become a cornerstone of the global transition toward cleaner energy. Its role in lithium-ion batteries, which power technologies ranging from smartphones to electric vehicles and large-scale energy storage systems, has made it one of the most sought-after elements in the modern economy.

As demand continues to rise, important questions surrounding lithium’s origin, availability, production methods, sustainability, and economic viability have moved to the forefront. Understanding these dimensions is essential to navigating the opportunities and challenges facing the lithium industry as it supports the expansion of renewable energy and low-carbon technologies.

From Elemental Origins to Sustainable Supply

Lithium, represented by the symbol Li, is the lightest metal in the periodic table, with an atomic number of three. It is a soft, silvery-white alkali metal that is highly reactive and flammable.

Lithium originated during the early stages of the universe and through processes associated with stellar nucleosynthesis. On Earth, it occurs primarily in mineral deposits and brine solutions. Research published in *Economic Geology* highlights the wide geographic distribution and diversity of lithium deposits, including mineral-hosted and brine-based resources.

Although lithium is a finite resource, its relative abundance and distribution across different geological environments create the potential for a diversified and resilient supply. Achieving this potential, however, depends on environmentally responsible production practices and technologies that reduce waste, energy consumption, water use, and disruption to surrounding ecosystems.

Understanding Lithium Sources

Lithium is produced or recovered from four principal sources. These categories may

continue to evolve as technologies advance and new resource opportunities emerge.

Hard Rock Deposits

Lithium-bearing minerals such as spodumene, petalite, and lepidolite can be extracted using conventional open-pit or underground mining methods. Australia is a major producer of hard-rock lithium, with the Greenbushes mine representing one of the most established examples of large-scale production.

Hard-rock mining can provide relatively high lithium concentrations, but it generally requires substantial energy for mining, crushing, processing, and refining. Its environmental considerations include land disturbance, water consumption, waste generation, and emissions associated with processing.

Continental Brines

Lithium can also be extracted from underground brines found beneath salt lakes and salt flats. Significant resources occur in South America’s Lithium Triangle, which includes parts of Argentina, Bolivia, and Chile, as well as in regions of China such as Qinghai and Tibet.

Traditional brine production typically involves pumping lithium-bearing fluids to the surface

and concentrating them through evaporation. This method can have lower operating costs than hard-rock mining, although evaporation may require considerable time and can place pressure on water systems in arid environments.

Geothermal Brines

Hot, mineral-rich fluids associated with geothermal systems represent another potential lithium source. The Salton Sea region in California is among the best-known areas attracting research and investment in geothermal lithium development.

Geothermal projects may offer the combined benefits of renewable power generation and mineral recovery. However, the high temperatures, pressures, chemical composition, and scaling tendencies of geothermal fluids require specialized materials, equipment, and processing technologies.

The International Energy Agency's *The Future of Geothermal Energy* highlights the broader potential of geothermal resources to contribute to energy security while supporting new applications, including the recovery of critical minerals from geothermal fluids.

Recycled Materials

Lithium can also be recovered from spent lithium-ion batteries and other lithium-containing products. As electric vehicles and battery-storage systems reach the end of their operating

lives, recycling is expected to become an increasingly important part of the lithium supply chain.

Recycling can reduce waste, recover valuable materials, and lower dependence on newly mined resources. However, the sector continues to face challenges related to collection, transportation, battery sorting, evolving battery chemistries, processing efficiency, economic competitiveness, and regulatory requirements.



Expanding the Lithium Resource Base

Advances in lithium-recovery technologies are expanding interest beyond traditional mines and salt-flat brines. Hydrocarbon operations, geothermal systems, and industrial waste streams may all contribute to a broader and more diversified lithium supply.

Lithium in Oil and Gas Field Brines

Produced water from oil and gas operations can contain measurable concentrations of lithium and other dissolved minerals. Research published in *Chemical Engineering Journal Advances* has examined the potential to transform these fluids from waste streams into sources of valuable materials.

Recovering lithium from produced water could provide a dual benefit by creating value from an existing fluid stream while supporting improved water-management practices. Its commercial viability, however, depends on lithium concentration, water chemistry, flow rate, separation performance, infrastructure, and processing costs.

Lithium from Geothermal Fluids

Geothermal fluids offer the possibility of combining lithium recovery with renewable



energy generation. Existing geothermal infrastructure may reduce some development requirements, while the associated energy can potentially support extraction and processing operations.

The feasibility of each project remains strongly dependent on fluid composition, reservoir performance, extraction efficiency, reinjection requirements, and the long-term management of geothermal resources.

Direct Lithium Extraction

Direct lithium extraction, commonly known as DLE, refers to a group of technologies designed to selectively recover lithium from brines without relying primarily on long evaporation cycles.

These technologies may use adsorption, ion exchange, solvent extraction, membranes, or other separation processes. DLE has attracted attention because of its potential to accelerate



production, improve lithium recovery, reduce the physical footprint of operations, and enable development from brines that may not be suitable for conventional evaporation.

Research into lithium-bearing petroleum source-rock brines and organic-rich shales has also advanced understanding of how lithium is released, transported, and accumulated within subsurface formations. These studies can help identify prospective resources and guide the design of future extraction systems.

Opportunities and Development Challenges

Emerging lithium resources create new possibilities for energy producers, technology developers, researchers, and investors. They may expand supply, support regional critical-mineral strategies, and create additional value from existing energy infrastructure.

However, several barriers must be addressed before many of these opportunities can reach commercial scale.

Technical Complexity

Lithium-bearing fluids can contain high concentrations of competing ions and dissolved materials. Extracting lithium selectively while maintaining high recovery rates requires advanced technologies that can perform reliably under variable temperature, pressure, salinity, and chemical conditions.

Commercial Readiness and Cost

New extraction technologies may require significant initial investment in research, pilot facilities, processing equipment, and supporting infrastructure. Commercial performance must be demonstrated over extended operating periods before projects can attract large-scale investment.

Regulatory Requirements

Lithium projects may involve mining regulations, water-management requirements, environmental approvals, waste-disposal standards, mineral rights, and permitting frameworks. Emerging extraction methods may not always fit easily within existing regulatory structures, potentially affecting project schedules and investment decisions.

Resource Variability

Not all lithium-bearing brines are commercially viable. Concentration alone does not determine project success. Fluid chemistry, reservoir connectivity, production rates, impurities, extraction efficiency, processing requirements, infrastructure, and market access all influence economic performance.

Reservoir Modeling and the Future of Subsurface Lithium

Reservoir models play an important role in guiding lithium exploration and improving understanding of lithium accumulation, release, transport, and production behavior.

Universities and research institutes are developing numerical models to represent the movement of lithium through subsurface formations. Accurately reproducing the underlying physics and chemistry remains

challenging, particularly when predicting concentration gradients, fluid-flow behavior, mineral reactions, and interactions between lithium and reservoir rocks.

Lithium transport can involve complex physicochemical processes. These may include the release of lithium during the thermal alteration of organic matter, movement through porous media, dissolution and precipitation reactions, and cation exchange between formation fluids and clay minerals.

Cation exchange is particularly important because lithium may replace sodium or potassium ions within clay minerals or be retained on mineral surfaces. Understanding these interactions can help explain lithium mobility and identify the conditions under which it may be transported or concentrated.

Research published in *Transport in Porous Media* has examined lithium release and transport at both pore and reservoir scales. Related basin-scale modeling has explored the potential of petroleum source-rock brines as an alternative lithium resource.

Future reservoir models are expected to incorporate more detailed geochemical reactions, field measurements, real-time data, uncertainty analysis, and machine-learning techniques. These advancements can improve resource characterization, support well-placement and production decisions, optimize extraction strategies, and reduce technical and financial risk.

Comparing Production Pathways

The economic and environmental performance of lithium production depends on resource type, project location, grade, chemistry, extraction technology, energy availability, infrastructure, regulatory conditions, and market dynamics.



Production Method	Initial Investment	Operating Cost	Profitability	Environmental considerations	Energy Consumption	Overall potential
Hard Rock Mining	High	Medium	Medium	Land disturbance, waste generation and water use	High	Medium
Conventional brine extraction	Medium	Low	High	Water-system pressures and long evaporation periods	Medium	High
Geothermal brine extraction	Low to medium	Low to medium	Medium	Low (existing infrastructure, low water usage)	Low to medium	Medium
Battery recycling	Low to medium	Low to medium	High over the long term	Reduced waste and lower dependence on primary resources	Low to medium	High

Comparison of Key Lithium Production Pathways

*Performance varies significantly according to project conditions, technology maturity, resource chemistry, infrastructure, and scale.

Source: Adapted from the International Energy Agency’s Global Critical Minerals Outlook 2025, The Future of Geothermal Energy, The Role of

Critical Minerals in Clean Energy Transitions, and supporting research on lithium mining and recycling.

The comparison illustrates why no single production method can meet future demand independently. Hard-rock mining and conventional brines will likely remain important, while geothermal lithium, direct lithium extraction, and recycling could play increasingly significant roles as technologies mature.

Building a Circular Lithium Economy

Recycled lithium is attracting growing attention as battery deployment expands worldwide. Its long-term economic potential is linked to the increasing volume of batteries expected to reach the end of their useful lives.

Several challenges must nevertheless be addressed. Battery packs differ in their design, chemistry, condition, and material composition. Collection and transportation can be complex, while disassembly and processing require appropriate safety measures and specialized facilities.

Closed-loop systems, in which materials recovered from used batteries are returned to battery production, could strengthen supply security while reducing demand for newly extracted materials. Research published in Sustainable Chemistry One World emphasizes the importance of continued innovation, investment, and coordinated policy in improving the effectiveness of lithium-ion battery recycling. Recycling should not be viewed only as a waste-management solution. It can become an important source of critical minerals and a central component of a more circular battery economy.

Balancing Growth with Sustainability

Lithium is a cornerstone of the global energy transition, yet its production through conventional mining and emerging extraction technologies presents significant economic and environmental challenges.

Developing alternative sources, including lithium-rich brines associated with conventional and unconventional hydrocarbon assets, alongside more efficient battery-recycling technologies, will be essential to building a diverse and sustainable lithium supply.

Continued investment in research, technology, reservoir modeling, and field-scale demonstration can support more efficient extraction and processing while reducing operational costs and environmental impacts. Collaboration among energy companies, technology providers, research institutions, governments, and local communities will also be essential to moving emerging concepts from laboratory studies to responsible commercial development.

As demand for electric vehicles and energy-storage systems increases, the lithium industry must balance production growth with environmental stewardship and responsible resource management.

Through innovation, collaboration, and the development of diverse lithium sources, the industry can strengthen supply resilience and contribute to a more sustainable energy future.

Explore the Research

Scan the QR code to access the complete collection of references and further reading behind this article.





Water Security in the 21st Century: Governance, Technology, and Sustainable Resource Management



Dr. Hishmi Jamil Husain,
Lead Strategy Market &
Analyst
Saudi Aramco

The Global Water Challenge

Global Water Resource Challenges

The world's population has continued to grow, leading to increased demand for water for domestic, agricultural, and industrial use. The impacts of climate change, such as prolonged droughts, erratic rainfall patterns, and the melting of glaciers, have exacerbated water scarcity in many regions. This situation has increased the need for effective water management and sustainable resource planning. Coupled with rapid urbanization, this has put immense pressure on limited water resources, highlighting the importance of improved governance and efficient water allocation.

Driving Demand

Population growth and resource pressures continue to increase global demand for water across domestic, agricultural, and industrial sectors. The effects of climate change, including prolonged droughts, erratic rainfall patterns, and the melting of glaciers, have further intensified water scarcity in many regions. These trends highlight the importance of effective water management strategies and sustainable resource planning.

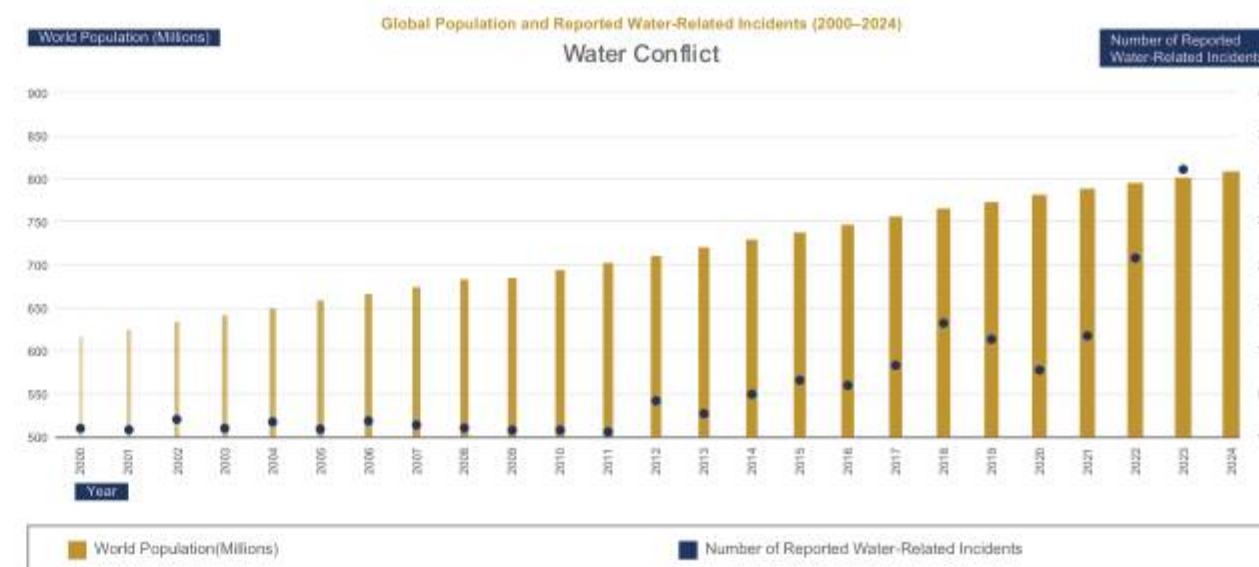
Intensifying Pressures

Rapid urbanization has placed immense pressure on water resources. Disputes over access, distribution, and resource allocation, along with increasing infrastructure demands, have increased the need for effective water management, improved infrastructure, and sustainable resource planning. These factors highlight the growing challenges surrounding water resources.

Rising Demand in a Changing Climate

Growing Pressures on Water Resources

Over the past two decades, the world has observed a concerning surge in water stress indicators and resource pressures linked to water scarcity and distribution. Data from the World Water Organization illustrates this escalating crisis starkly. In 2000, there were 22 reported water-related incidents, whereas by 2024, this number had risen to 419 globally. The number of reported incidents increased from 22 in 2000 to 419 in 2024, underscoring the growing challenges surrounding water and resource management.



Source: Worldometer; Oxford Environment Research (E2MAS); World Water Council



The Nile River Basin Dispute

One notable example is the Nile River basin dispute. The Nile, shared by 11 countries, has been a source of contention, particularly with the construction of the Grand Ethiopian Renaissance Dam. This project has sparked concern among neighboring countries, primarily over water rights and the potential downstream impacts of the dam.

Water Tensions Along the Indus River

Similarly, the Indus River has been a point of concern in Asia. Despite the Indus Waters Treaty of 1960, which aimed to manage water sharing, disputes have persisted, especially concerning the construction of dams on rivers flowing into downstream countries. These developments have raised concerns over water security in the region.

These examples highlight the growing challenges surrounding water resources and the potential for conflict, emphasizing the need for diplomatic solutions to mitigate these tensions.

Managing Shared Water Resources

Understanding Transboundary Water Resources

Transboundary water resources, including rivers and aquifers that cross national borders, are shared among multiple countries, making their management inherently complex and politically sensitive. These shared resources have increasingly become challenging to manage. Countries may encounter disagreements as they attempt to assert their rights and control over these vital resources.

The Need for International Cooperation

The absence of comprehensive and equitable water management policies exacerbates these tensions. Without clear guidelines, competing demands for water can lead to disputes. A lack of international cooperation and coordination further complicates the issue. Effective management of shared water resources requires collaboration, which is often hindered by differing national interests and priorities.

Balancing Competing Interests

As countries work to meet their water needs for various purposes, the demand for shared water resources increases, highlighting the importance of cooperation. To address this challenge, collaborative efforts are necessary

to establish fair and sustainable water-sharing agreements. These agreements should balance the needs of all parties involved to ensure the long-term management of this vital resource, promoting mutual benefits and sustainable resource management.

Moving Toward a Cooperative Future

The path forward involves fostering international cooperation, investing in water management infrastructure, and adopting policies that promote equitable access to shared water resources, thereby promoting regional stability. By understanding the complexities of transboundary water resources and addressing the underlying causes of resource management challenges, nations can work towards a more cooperative and sustainable management of these critical resources.

The Human and Environmental Cost

Environmental Pressures and Resource Stress

The growing pressure on water resources and infrastructure has significant human and environmental implications. Many communities face challenges related to water scarcity and limited access to reliable water infrastructure. The competition for water resources has resulted in the overexploitation of water sources, leading to severe environmental

consequences. This includes the depletion of groundwater reserves, the degradation of water quality, and the destruction of natural habitats.

Loss of Biodiversity and Long-Term Ecological Damage

Pollution and overexploitation of water sources have caused significant harm to ecosystems. This has resulted in the loss of biodiversity, as many plant and animal species struggle to survive in degraded environments. The environmental impacts of water-related disputes are often long-lasting. Deforestation, soil erosion, and the disruption of natural water cycles can have far-reaching and irreversible effects on the environment.



Social and Economic Consequences

Beyond the immediate human and environmental impacts, water management challenges also have significant social and economic implications. Communities affected by water scarcity often face food insecurity, reduced economic opportunities, and increased social tensions. The far-reaching consequences of water management challenges extend beyond local communities, posing threats to regional and global stability.

Securing the Future of Water

Strengthening Water Management Policies

The development of robust, equitable, and transparent water management policies is essential at the local, national, and international levels to address water resource challenges effectively. Encouraging the adoption of water-efficient technologies and practices can significantly reduce the strain on limited water resources and promote sustainable usage.

Exploring Alternative Water Sources

Developing alternative water sources, such as desalination plants and rainwater harvesting systems, can diversify water supply options and enhance water security. Investing in the construction and maintenance of water storage,



distribution, and treatment facilities is crucial for alleviating water scarcity and improving access to clean water. Ensuring that all communities have fair and equitable access to water resources is vital for supporting sustainable resource management and promoting social justice.

Fostering International Collaboration

Strengthening international cooperation through agreements and partnerships can facilitate the sharing of best practices and technologies, ultimately contributing to global

water security. Developing adaptive management strategies that account for the impacts of climate change and population growth can help ensure long-term water sustainability and support stable and effective resource management. By focusing on these key areas, the global community can work towards a future where water is managed effectively, equitably, and sustainably, reducing the potential for conflict and ensuring access to this vital resource for generations to come.

A Shared Responsibility

Addressing the Root Causes

Understanding the fundamental issues driving water management challenges, such as scarcity, unequal distribution, and competition over resources, is essential to resolving them. Effective solutions require robust water management practices, enforceable international agreements, and mechanisms to ensure equitable access to water resources.

Ensuring a Sustainable and Equitable Future

The vision for the future involves sustainable water management and equitable distribution, which are critical for supporting long-term water stability and ensuring global stability. Cooperation over water resources can foster mutual benefits and peace, transforming water from a source of conflict into a catalyst for collaboration.

The Role of the Global Community

International collaboration is vital in achieving sustainable and equitable water management, requiring collective action and commitment from all nations. By addressing the root causes of water resource challenges and implementing comprehensive solutions, the global community can move towards a future where water is a source of cooperation and peace, ensuring a sustainable and equitable world for all.



Technical Paper DIGEST

Curated to highlight relevant research and emerging ideas, these summaries of selected SPE papers provide readers with a clear overview of key findings, practical applications, and developments shaping the industry.

Collaborative Engineering and Design Leads to Optimized MPD Land Rig Concept



AREAS OF INTEREST:

DRILLING OPERATIONS, PRESSURE MANAGEMENT, INFORMATION MANAGEMENT AND SYSTEMS

Authors:

Svein Hovland; Ricardo Gonzalez; Ian Knight; Harshad Patil; Gregory Matherne

Paper:

SPE-206393-MS

Managed Pressure Drilling & Underbalanced Operations Conference & Exhibition

The close partnership between a managed pressure drilling (MPD) provider and a drilling contractor led to the successful and cost-efficient design, deployment and optimization of a land rig. The engineering teams identified safety and handling issues and facilitated quick rig moves with minimal disruptions to concurrent operations. Quality and safety were ensured throughout the project by leveraging digital tools. The implementation process consisted of three phases starting with a dedicated personnel team for operation and optimization in phase one, and transitioning to operation solely by a driller with only on-demand MPD supervision and engineering support in phase three. The success of the project highlighted the advantages of collaboration in achieving high-level engineering design products.

Metaverse for Subsurface – Augmented & Virtual Reality Immersive Collaboration and Robust Decision Making in Oil & Gas



AREAS OF INTEREST:

RESERVOIR SIMULATION, ENHANCED RECOVERY, ASSET AND PORTFOLIO MANAGEMENT, MIXED REALITY, FIELD DEVELOPMENT PLAN

Authors:

S. S. Biniwale; R. Lokesh; M. Elfeel; S. K. Khataniar

Paper:

SPE-225552-MS

SPE Europe Energy Conference and Exhibition

In alignment with the digital transformation efforts in the oil and gas industry, immersive technology including augmented reality (AR), virtual reality (VR) and mixed reality (MR) were facilitated to alleviate field development plan (FDP) pain points. A novel collaboration platform was used to connect Petrel-based 3D reservoir models to Unity-powered virtual environments to enable geoscientists and reservoir engineers to actively interact with 3D models. This led to enhanced spatial understanding, improved remote collaboration, reduced frequency of in-person workshops, and subsequently powered real-time decision making. The implemented immersive platform shows potential in accelerating planning, improving teamwork, optimizing resource management and reducing costs.



Technical Paper DIGEST

Microbiologically Influenced Corrosion in Unconventional Oil and Gas Facilities: A Tailored Integral Solution



AREAS OF INTEREST:

UNCONVENTIONAL RESERVOIR,
RISK MANAGEMENT, CORROSION

Authors:

M. Pagliaricci; G. Rojas; F. L. Massello;
J. Dos Santos; E. Bortoli; S. Navarrete;
W. Morris; W. Vargas; I. Vega

Paper:

SPE-228313-PA
SPE Journal

The development of a solution to mitigate microbiologically influenced corrosion (MIC) in oil and gas facilities is detailed in this article. The work targets the microorganism genus *Halanaerobium* that are native to some unconventional reservoirs worldwide. The conditions at surface facilities used for processing flowback water provide optimal reproduction conditions for this bacterium, which pose a high MIC risk due to their thiosulfate-reducing behavior, acid generation and mature biofilm formation. The application achieved a reduction in microbiome counts, a decrease in corrosion rates and the mitigation of the targeted microorganism. As microbiota changes throughout mitigation treatments, maintaining a long-term solution requires continuous chemical development and field testing and monitoring.



In-Situ Hydrogen Generation through Heavy Oil Pyrolysis Catalyzed by Clay Minerals



AREAS OF INTEREST:

HYDROGEN, HEAVY OIL, IN-SITU
GASIFICATION, MONTMORILLONITE

Authors:

Chen Luo; Huiqing Liu; Hassan
Hassanzadeh; Song Zhou

Paper:

SPE-221189-PA
SPE Journal

New insights into the hydrogen generation through in-situ heavy oil gasification are reported in this paper. The effect of the presence of different clay minerals on the hydrogen generation process is explored. Four key conclusions were made; First, the presence of clay minerals in heavy oil resulted in higher mass loss during pyrolysis; Second, the acidic catalytic and ion exchange properties of clay minerals facilitated a higher hydrogen, methane and carbon dioxide production flow rate; Third, the clay mineral montmorillonite generated the highest hydrogen rate compared to illite, kaolinite and chlorite clay minerals; Fourth, higher hydrogen conversion rates can be achieved, as clay minerals reduce the activation energy for heavy oil pyrolysis. The information gained from this study on activation energy and reaction rates can help in optimizing the gasification process and progressing the viability of initiating large-scale heavy oil hydrogen generation projects.



SandRose Recommendations

Shared by the SandRose community, these recommendations highlight books, podcasts, movies, and other resources that represent the diverse interests of our readers and the value of learning through one another's discoveries.



Movie 1

The Alpinist

Zainah Alsardi
Saudi Aramco

We often talk about "Unlocking Human Potential" in neat stories, like breaking a record or winning a trophy. The documentary called The Alpinist dismantles this framework. It posits that the purest form of potential is not about external validation, but about the private alignment of one's unique demanding pursuit. The film is not so much about a climber as it is about a modern investigation of nature, freedom, and self. It follows the late Marc-André Leclerc, a climber who redefined solo ascents. It's a deep look at a different kind of potential, an enormous amount of courage, and a refusal of fame. The Alpinist received critical praise and won several major awards, including the BAFTA Award for Best Documentary. You should watch it not to see a man cheat death, but to see a man truly live.

WHIPLASH

Movie 2

Whiplash

Yara AlShehri
Saudi Aramco

An electrifying portrayal of ambition and the price of greatness. Whiplash follows the story of a young jazz drummer pushed to his limits by a demanding mentor whose pursuit of perfection borders on cruelty. The film captures the fine line between ambition and obsession, showing how the drive to excel can both elevate and consume.



What lingers most from this film is its emotional intensity and the way it reveals the mental and physical toll of chasing perfection. It makes you reflect on whether greatness is achieved through passion or pressure. It's a gripping exploration of what it truly means to strive for excellence.



Podcast 1

The Diary of a CEO

Dena Abushanab
Saudi Aramco

Businessmen, celebrities, journalists, and psychologists, The Diary of a CEO got them all. Hosted by Steven Bartlett, this bi-weekly podcast dissects the journey of world-class experts, deep diving into their personal and professional triumphs and failures. Each episode is a portrait of the human experience. The conversations are authentic and introspective, drawing out stories that feel relatable and inspiring. The Diary of a CEO succeeds in breaking the illusion that successful people are fundamentally different from us. It humanizes them, and shows that their success doesn't come from mere luck or a "mystery power", but from a ton of discipline, determination, hard work, and a bit of talent.

SandRose Recommendations



Podcast 2

The Mel Robbins Podcast

Dena Abushanab
Saudi Aramco

"You can change your life and I can show you how", this is how Mel Robbins describes her award-winning podcast, and I agree! This upbeat, science-backed podcast is filled with practical tips to improve your quality of life. With topics such as "Tiny Fixes for a Tired Life", "The Real Reason Adult Friendship is So Hard", and the famous "Let Them Theory", each episode of the Mel Robbins Podcast presents an actionable roadmap for a better life. Whether you're looking to climb the corporate ladder, fix your relationships, or simply a light-hearted podcast to listen to on your drive to work, The Mel Robbins podcast is for you.

REGENERATIVE REGENERATIVE PERFORMANCE

Book 1

Regenerative Performance

Dena Abushanab
Saudi Aramco

In a world where we're expected to be available 24/7, it's hard to not view wellbeing and performance as adversaries. Professionals often find themselves in a constant tug-of-war between hustle culture and quiet quitting. This is where Dr. James Hewitt's new book *Regenerative Performance* comes into play. In it, Dr. Hewitt lays out the foundations for a cognitive endurance framework in which wellbeing fuels performance. Peak performance, Dr. Hewitt argues, is achieved when we

synchronize our efforts with our natural rhythms.

What sets *Regenerative Performance* apart is its use of endurance athletes training as a central metaphor, making the book's messages easy to visualize and digest. Similar to how endurance athletes adjust their efforts from high gear to low gear to match the terrain's difficulty and their energy cycles, knowledge-workers must learn how and when to shift gears to achieve sustainable performance.

Hewitt's framework is grounded in

indisputable truths: we can't always be "on" and we can't always perform at the same level. Our energy fluctuates throughout the day. It's also true that not all tasks require the same efforts. Routine tasks such as responding to emails and admin work can be done at medium gear (medium efforts) while deep analytical work can only be done at high gear. *Regenerative Performance* borrows from neuroscience, performance psychology, and personal anecdotes to show readers that they can achieve better results with the same effort if they learn to apply the right effort at the right time.

The book also explores the science of rest, distraction, and leadership-team dynamics and provides practical tips to help professionals find and follow their rhythm. In a world increasingly preoccupied with Artificial Intelligence, *Regenerative Performance* shifts the narrative to remind us that the real danger isn't machines trying to work as humans, it's the expectations of humans to work as machines, always on.

How to thrive without burning out.



SandRose Recommendations

DON'T FEED THE MONKEY MiND

Book 2

Don't Feed The Monkey Mind

Ghadeer Alhelal
Saudi Aramco

Several practices have promised relief from anxiety throughout human history, beginning with stoicism, and reaching simple breathing exercises, making it challenging to commit to one method and maintain a lasting outcome.

This is where this book comes in handy. Using an analogy of a hysterical monkey residing in your mind, sounding the alarm of rapid thoughts and anxiety whenever a situation is slightly uncomfortable, it provides a practical process to get a hold of this monkey mind and calm it down almost indefinitely.

According to the author, it's not a solution to resort to quick strategies to obtain temporary feelings of safety and relief when faced with anxiety, because such hasty reactions are a validation of these anxious thoughts, and are considered to be a form of feeding that monkey, as you'll be training it that anxiety is a successful method to attract your attention, to a situation that might not be a major cause of worry.

These hasty repeated safety strategies differ from one person to another and from one situation to another. It can be simple like avoiding a task due to fear of failure but it can also be too habitual to be considered a safety strategy. However, instead of conforming to the monkey's desires, one should adopt expansive

strategies as it's a stronger tool to use in the face of crippling anxiety.

Reading this book instinctively makes you notice your reactions to your anxiety and categorize them as safety or expansive strategies. It also teaches you how to practically react to these intrusive negative views from an expansive mindset, with willingness to be uncertain, acceptance of making mistakes and ability to be responsible for yourself only. Adopting this mindset will allow you to break the cycle and create room for growth and pleasure, it will allow your life to be ruled by higher values like self-expression, creativity and stability and not ruled by fear and safety.



SandRose Lens



Featuring submissions from across the SandRose community, these photographs showcase the creativity of our readers and the meaningful moments captured through their own lens.

"The craft of sewing the Hasawi bisht is a heritage art that demands skill and precision, where artisans blend artistry with mastery to embroider and tailor luxurious bishts using gold and silk threads, reflecting the authenticity and enduring traditions of Al-Ahsa"

Ali Almubarak

Professional Photographer

📷 @aliphotos.co



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Inspired by HRH Crown Prince
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