



Microsoft Energy Core

Special Report

Industry Board Meeting - Q4, 2020

Key Takeaways: *A new corporate era*



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Chapter 1: Executive Summary



A New Corporate Era

More eyes than ever are turning to digitalization and how to leverage this technological ally, as a tsunami of pressure points washes across oil and gas companies' balance sheets. Corporates' status quo has been radically altered in the last year: from the impact of the pandemic to record low oil prices, to name but a few drivers. Events have taken this typically unpredictable market into a new realm of uncertainty.

But the greatest shift has been tied to the energy transition towards a greener future, as per the Paris Agreement. In the 2007-09 global recession, the spotlight on environmental protection faded. But during the world's current pandemic-triggered recession, the spotlight is shining brighter than ever. And that means that every energy entity – no matter their size – must not only pay attention, but act.

Pledges to be carbon neutral by some of the world's biggest energy consumers and carbon dioxide (CO₂) emitters are providing much-needed goalposts. For example, some of the world's biggest economies – China (2nd), Japan (3rd), the UK (6th) and potentially the US (1st) – have pledged to be net zero by mid-century, or 2060. Many oil and gas majors are also rethinking their strategic roadmaps in order to transform into a new kind of energy company – a greener, more holistic one. Among others, energy majors BP, Shell, Total, Equinor, and Repsol have pledged to be net zero by 2050, while Italy's Eni has pledged its own target to be so by 2030 – a very short nine years away.

Digital allies

Amid this plethora of green regulatory and policy ambition is a simple reality: achieving net zero is impossible without employing the real-time efficiencies and

"The energy transition is real and it has been accelerated by the Covid-19 pandemic. The oil and gas industry has been dealt a double punch this year – first with lower oil prices and then with lower demand from the pandemic. Against this backdrop, companies are now even more focused on using digital transformation as an enabler."

Darryl Willis, Vice President of Energy, Microsoft

2030

is when Microsoft aims to be carbon negative, with a \$1bn climate innovation fund supporting this goal.

2050

is when Microsoft aims to remove all its historical carbon emissions.

2-10%

improvements in production and yield and 10-30% improvement in cost is evident when digitalization is successfully applied by energy companies, according to McKinsey.¹

10.22%

is the compound annual growth rate (CAGR) forecast for 2020-2025 for big data analytics in the energy industry, according to ReportLinker.²

Disclaimer: The quotes highlighted in this Special Report are not verbatim.

¹ <https://www.mckinsey.com/industries/oil-and-gas/our-insights/digital-transformation-in-energy-achieving-escape-velocity>

² https://www.reportlinker.com/p05865823/Big-Data-Analytics-in-Energy-Sector-Market-Growth-Trends-and-Forecast.html?utm_source=GNW

IN FOCUS

Partnerships matter – a lot

Achieving negative carbon ambitions will not be possible without making bold and united steps. In response to the rapidly changing marketplace, Microsoft is focused on working with customers and partners across four big areas of value: operate for the future, transform your workforce, transition to clean, and reimagine energy.

The need for greater collaboration applies to many energy markets, including carbon capture, utilization, and storage (CCUS). Even as the world shifts more aggressively towards renewable energy sources, numerous industrial processes will be difficult to abate. Therefore, innovative partnerships lie at the heart of finding a balance between supporting legacy infrastructure in fossil fuels and spurring a renewables market. One such project is a 3-year-old partnership called Northern Lights. The joint effort of the Norwegian government and Equinor, Shell, and Total, each of which has deep roots working with Microsoft, seeks to standardize and scale up CCS.

Another new project in the long-standing partnership between Shell and Microsoft is the aim to jointly develop technologies to cut CO2 emissions, as well as help customers and other organizations reduce their own emissions. Microsoft will help build new AI solutions that accelerate Shell's digital transformation and Shell will supply products and services that help Microsoft achieve its net zero target. BP and Microsoft are also collaborating as strategic partners to further digital transformation in energy systems and advance their net zero goals. This includes a focus on digital solutions, the continued use of Microsoft Azure as a cloud-based solution for BP's infrastructure, and BP supplying renewable energy to help Microsoft.

transparency offered by the digital tools of the 4th Industrial Revolution (4IR). This is especially true as the global economy recovers from the pandemic and many corporates' balance sheets are weakened by a sustained period of lower oil prices (the return on investment (ROI) for renewables does not tend to be as high).

Achieving net zero is too complex and vast a task – not to mention time-sensitive – to achieve with the 'old' toolbox. Companies and governments are increasingly realizing the enormous value of digital tools, including artificial intelligence (AI), predictive analytics, digital twins, Industrial Internet of Things (IIoT), and many more. It is also worth noting the profound value of the 4IR during the pandemic. By leveraging technologies

and digitalization, the global energy industry was still able to innovate and operate in a virtual world. As such, energy security was safeguarded during one of the worst pandemics in the last century.

Clearly, the decade ahead heralds a learning curve with a period of major readjustment. But that need not be a negative – a more multifaceted market is a healthier one. With investors eagerly watching the scales that balance diversification against ROI, what steps can energy companies take to simultaneously tick the critical economic and environmental boxes? The devil is in the details. With the environmental clock ticking especially loudly, detailed answers must be pinned down – and quickly.

"CCS is critical to achieving net zero ambitions – we will not get there without it. Now, after years of under investment, interest in CCS is gaining momentum."

Darryl Willis, Vice President of Energy, Microsoft

Founding partners



What is Microsoft Energy Core?

A global initiative and center dedicated to digital transformation in the energy sector. Building on AI and cloud-based technologies, Microsoft Energy Core supports organizations to develop AI solutions that improve operational efficiencies, enhance sustainability, increase energy innovation, and drive workforce transformation. Based in Dubai, Microsoft Energy Core has global scope.

Source of Whitepaper

This Special Report focuses on the exclusive insights harvested from Microsoft Energy Core's webinar on the 15th December 2020. Its pressing questions on what is next for global trends and challenges reflect the opinions and brainstorming of the 30 high-level executives who dialed in from ten countries on three continents – the Middle East, Europe, and Asia. The Chatham House Rule applies, bar those featured.

Microsoft Energy Core's Protocol of Engagement

- Microsoft Energy Core's industry board agrees to collaborate and exchange knowledge to accelerate innovation and digital transformation in the energy sector.
- Microsoft Energy Core's industry board members will attend quarterly meetings to establish an industry challenge to solve for using AI (see page 5). The identified challenge will move onto the ideation phase of the Center's integrated strategy where solutions will be brought to life through hackathons.
- Microsoft Energy Core Industry Board Members will be elevated as 'Featured Speakers' on a rotating basis for each quarterly board meeting.
- Microsoft Energy Core's industry board members will deploy at least one representative from their respective institutions to each hackathon to bolster the Center's posture and commitment to advancing digital transformation in the energy sector.
- Microsoft Energy Core's industry board will commit to qualify at least one minimum viable product that emerges from each hackathon and assess its viability to be deployed in a working environment. If the pilot phase of a minimum viable product proves to be successful, Microsoft Energy Core's industry board will strive to support further incubation and establish a strategy towards scaled roll out.
- Each quarter, Microsoft Energy Core's industry board members will deploy one representative from their respective institutions into the AI Academy to conduct a lecture on the practical applications of AI and the digital skills necessary for the future of work in the energy sector.

Accelerate Digital Transformation

At Launch: 10 Founding Partners & 35 AI Solutions

Today: 31 Partners & 115 AI Solutions



Meeting new targets

Fossil fuels will remain an essential part of the energy mix, and it is on the industry to manage production safety to reduce emissions, discharges, and the ecological impact, while providing energy at a reasonable cost. In addition, companies face complex investment challenges due to the extreme price volatility and cruel operational environment of exploration and production (E&P). Proper detection, reporting and analysis mechanisms are considered key enablers of sustainable development at the oil and gas company level.

GHG emissions from oil and gas operations, especially methane, pose a critical challenge for the industry as it receives more and more scrutiny from investors, government, and the public, all of whom are demanding ambitious reductions. There are several key GHGs, such as CO₂, NO₂, SO₂, N₂O and CH₄ (methane) releases, emitted by the oil and gas industry, especially refineries and petrochemical operations. Methane is responsible for 25% of global warming, with over a third of such emissions from oil and gas. All these emissions are calculated as CO₂e (carbon dioxide equivalent). Detecting GHG emissions and leaks has been difficult due to technical, logistical, and cost limitations.



Gamechangers?

However, existing, and upcoming emissions tracking satellites (e.g. GOSAT-2, Tropomi, GHG Sat, Bluefield, EDF methane SAT) offer a breakthrough towards precise, timely, and affordable detection on a large scale. The data these satellites can capture is relatively new and could be enhanced by applying AI and machine learning models.

Precise and scalable methane monitoring via microsatellites is a promising new technology, which will make it possible to monitor methane and other GHG releases. As with any new technology, there are limitations in terms of coverage, visibility to satellites, and front-loaded cost. However, such limitations are likely offset by the potential benefits expected.

The Energy Core: A Global Facility and Initiative

Harnessing the power of AI, cloud technologies and the IoT, organizations can transform their businesses, increase productivity, drive innovation and run more efficient and sustainable operations.

Program anchors on 4 key pillars:

1 Empowering Digital Transformation	2 Coalitions for Responsible Innovation	3 Closing the Skills Gap & Enhancing Employability	4 Sustainability & Societal Impact
Building on AI and cloud-based technologies, Microsoft Energy Core supports organizations to develop AI solutions that improve operational efficiencies, enhance sustainability, increase energy innovation, and drive workforce transformation.	Microsoft Energy Core is an open initiative that incorporates energy operators, leading industry partners and academics to lead responsible innovation across the energy value chain.	Energy Core showcases Microsoft's investments in AI skilling, complemented by contributions from leading universities, educational institutions, and industry partners to deliver AI readiness programs tailored for the energy sector.	Microsoft Energy Core has a mandate to create societal impact. Together with our partners, we are pursuing innovative solutions to solve the energy industry's most pressing issues on worker safety and environmental sustainability.

Energy Core Industry Board

Thought Leadership and Responsible Innovation

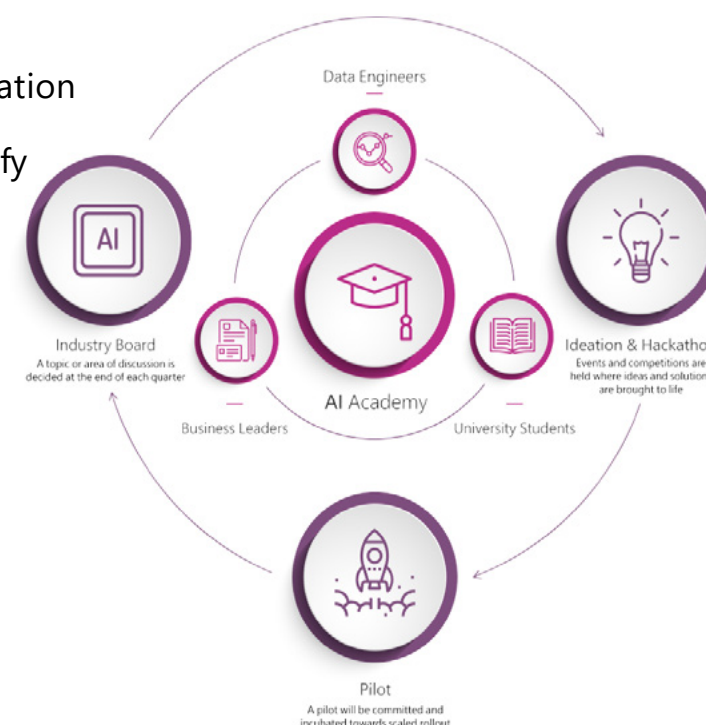
The Industry Board convenes quarterly to identify top of mind challenges to solve for using AI.

■ 14x Global Energy Operators

■ 4x Academic Institutions

■ 10x Founding Technology Partners

■ 1x Industry Body



Chapter 2: Digital Literacy

How to find a ‘common data language’ to standardize companies’ legacy infrastructure?

- Juan Jose Casado, Data & Analytics Director, Repsol
- Sebastien Grau, Regional Director, Middle East Turkey & Africa, Rockwell Automation
- Ali Faramawy, Corporate Vice President, Digital Transformation & Partnerships

Moderator: Sean Evers, Managing Partner, Gulf Intelligence

INSIGHTS

Legacy infrastructure is dealing with a complex technical transition – from data lakes to customer analytics platforms to stream processing – which is enormously increasing the complexity of data architectures. In turn, this hinders a company’s ability to deliver new capabilities, maintain legacy infrastructures, and to ensure the integrity of AI models.¹ Overall, this dulls a company’s competitiveness in a market where digitally-savvy rivals are already learning how to ‘speak digital’. The race is on to learn the lingo.

Take data as an example. It can be complicated, voluminous, and opaque, especially with legacy infrastructure. Piecemeal efforts over the years have created a fractured system. But leveraging the tools of the 4IR means overcoming these historical hurdles to reveal golden pieces of intel. Effectively managed via a ‘common data language’, the realms of numbers can be transformed to streamline efficiency and bolster profits – both of which are key to strengthening the long-term relevance of legacy infrastructure.

“Companies need to try and balance the common areas while finding some room for excellence where they can differentiate themselves through their people, their capabilities, and their ambitions.”

Ali Faramawy, Corporate Vice President, Digital Transformation & Partnerships

The same equation applies to increasing its environmental credibility, which is especially pertinent in what many perceive to be the ‘dirtier’ industry of fossil fuels.

But one of the pivotal pieces of this puzzle is still weak: standardization. Having a ‘common data language’ not only improves internal operations; it is also prized in our increasingly interconnected world as globalization 4.0 gains momentum. This will only become more relevant as corporates work to meet both the energy demand of nearly 10bn people and the Paris Agreement targets by mid-century. Mastering this balance act requires an entirely new level of corporate organization – and standardization must be one of the cornerstones.

Standardizing processes to create a ‘common data language’ is also vital to avoid the risk of stranded assets – a

fast emerging risk in the global energy transition. The cost of writing off stranded assets could reach \$900bn worldwide – or one third of the current value of big oil and gas companies – if governments aggressively tried to meet the limit of 2°C, according to the Financial Times’ Lex.¹ So, how to increase commonalities in this multifaceted and multi-locational industry in 2021?

“Talent is crucial to creating a ‘common data language’. We are nurturing data scientists. We want people to experiment with technology. This way, when they are talking to big data scientists, they understand what they are doing.”

Juan Jose Casado, Data & Analytics Director, Repsol



89%

of the 1,919 survey respondents said improving efficiency is a key objective of digitalization, revealed DNV GL’s 2019 Digitalization and the Future of Energy.³ The greater the commonalities, the greater the efficiencies.

163

zettabytes of data could be created worldwide by 2025 – ten times greater than in 2017, according to Seagate.⁴

35%

of survey respondents rated their organization’s operational technology against cyber-attacks as high, revealed the Ponemon Institute.⁵

TAKEAWAYS

FINDING THE BALANCE

Pinning down the balance between identifying a ‘common data language’ while trying to differentiate your company’s skills can be tricky, especially when working in partnerships or joint ventures (JVs). Differentiation needs to be minimized, but the interoperability must also leave enough room for companies to thrive independently. Even companies with the same aim have several routes to success. Companies’ mindsets are typically different, as are their time management skills, their internal politics, and talent profiles. The latter especially highlights why investing in talent on every front of a partnership – in a way that aligns all views so that work is streamlined and expeditious – is fundamental. Accepting that some gaps in commonality are inevitable will prove useful to sustaining good relations within a company/partnership.

IDENTIFY YOUR NEEDS

Each company’s needs are unique, so working with tech providers to create a custom solution will increasingly be the norm. But of course, this requires

“Digital should be for everyone, even though currently not everyone has the potential, the capacity or the resources. Consequently, I see different paces emerging when it comes to a ‘common data language’.”

Sebastien Grau, Regional Director, Middle East Turkey & Africa, Rockwell Automation

the energy stakeholder to also think deeply about what they need and what they must prioritize. Importantly, they must do this while considering how their actions can merge into wider industry, so that they can be part of creating and then evolving the ‘common data language’. Essentially, companies must grow as part of a continent, rather than distinguishing themselves as isolated islands. Many organizations have adopted application programming interfaces (APIs) to expose data from disparate systems to their data lakes and many are rapidly integrating insights directly into front-end applications.² Such efforts must accelerate in 2021.

IDENTIFY COMMON TOOLS

A common output requires common input, and that means using common tools. A partnership that is collectively using sensors to harvest real-time information must ensure that all the entities are employing the same type of technologies. This seemingly obvious step is not always the case; many technologies and technology applications exist across different parts of the energy value chain and geographies. Still, these ‘low level’ niggles must be resolved before partnerships can progress and, in some cases, achieve their goal of scaling up.

BOLSTER SAFETY

Finding ways to ensure upmost security between the information technology (IT) and operational technology (OT) teams is key as legacy infrastructure is modernized. Closing this loop – in large part by identifying ‘common data language’ and tech practices – is especially beneficial to quickly identify and plug inevitable weak spots. In turn, this will help operators more easily identify cyber threats – a major risk that will only intensify as the economic value of the market grows.

¹ <https://www.ft.com/content/95efca74-4299-11ea-a43a-c4b328d9061c>

² <https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/how-to-build-a-data-architecture-to-drive-innovation-today-and-tomorrow>

³ Digitalization_and_the_future_of_energy.pdf

⁴ <https://blog.seagate.com/business/enormous-growth-in-data-is-coming-how-to-prepare-for-it-and-prosper-from-it/>

⁵ <https://assets.new.siemens.com/siemens/assets/api/uuid:4ec3d46c-234e-4f48-9bc7-aef5889dcaba/version:1599660343/ponemoncyberreadinessoilgasfinal.pdf>

Chapter 3: Digital Talent

How to strike a balance of vertical and horizontal talent to achieve holistic digital progress?

- Dr. Steve Griffiths, Senior Vice President – Research and Development, Khalifa University
- Ronan O’Sullivan, Vice President – Energy Industries, India, Middle East, and Africa, ABB
- Brad Davis, Innovation and Commercialization Manager, Chevron

Moderator: Sean Evers, Managing Partner, Gulf Intelligence

INSIGHTS

Firstly, what is vertical and horizontal talent? Broadly, vertical talent is strength in process, creativity, and strategic capability. Horizontal talent tends to lean more towards increased technical skills and knowledge.¹ Both are applicable to technology development and application in the energy markets, especially when they are merged to become cross disciplinary teams – a process that typically needs to start in education. Students must be well-versed in the skills coveted by industry, which itself is quickly trying to catch up amid a rapidly evolving energy basket.

Gargantuan is an apt way to describe the current volumes of information and data available. And they will only soar further in 2021 and beyond. By 2025, 75% of the global population of nearly 8bn

“I remember joining Chevron 15 years ago and being one of those bright-eyed and bushy tailed engineers who thought he was going to change the world. And yet, we have done survey after survey of young employees and we see that after five years, that first excitement starts to fall away. We are not keeping our young talented engineers and scientists excited and motivated.”

Brad Davis, Innovation and Commercialization Manager, Chevron

people will be connected, creating, and interacting with data, forecast Seagate.² So, it is paramount that all talent is trained to identify and then manage data and other digital processes in order to extract worthwhile insights.

Knowing how to sift the ‘diamonds from the mud’ will also prove invaluable when students formally join the workplace, as industry values talent who can ‘hit the

ground running’ and manage the disparate data systems that are commonplace. New and ‘tidy’ data management techniques are only recently being employed by industry. For example, much data in legacy infrastructure requires a significant amount of organizational work. So, new employees who expect clean and standardized data will be disappointed and potentially slower moving, which in turn can weaken a company’s digital literacy.



71%

of survey respondents said their energy companies are prioritizing digital skills training when it comes to their digitalization investments. Cybersecurity (69%) and digital flow and automation (66%) followed, according to DNV GL.¹

34%

of respondents to the same survey said they need more creativity skills in their workforce.¹

71%

of respondents cited a need for employees with combined data and domain knowledge.¹

41%

of respondents point to a lack of a ‘digital mindset’ as the top barrier to digitalization.¹

¹ Digitalization_and_the_future_of_energy.pdf

“It is important to continually invest in enhanced technology. For example, students are now getting hands-on experience with new cloud adaptabilities and putting cases together on how they can really increase the efficiency of plant operations and maintenance at our facility.”

Ronan O’Sullivan, Vice President – Energy Industries, India, Middle East, and Africa, ABB

MIX UP STUDENTS’ SKILLS

Encourage students with vertical and horizontal skills to work together so that they can learn beyond their skill sets and specialties. For example, assigning teams from each ‘camp’ to work on a project together can test how they jointly translate their knowledge into solving business problems. This intel and the lessons learned can then be applied to the workplace, where vertical and horizontal talent already exists and, in some cases, needs reorganizing.

INDUSTRY-ACADEMIA UNITY

Industry must be more involved with graduate level research projects. R&D can extend across the value chain and even across geographies for international companies with a large global footprint – exposure that would certainly benefit students. Chevron is supporting students in getting a Masters over a six-month training program in data science and systems engineering, for example.

TAKEAWAYS

BE NUMBER READY

Regardless of whether students have horizontal or vertical talent, they must be trained to understand numerical analysis and statistics if they seek careers in the energy market. Those with knowledge of AI, machine learning, processing, and advanced computing, for example, will be far more adept at working in different business units and international markets. Adaptable intelligence (AQ) is increasingly

desired by corporates as amid the global upheaval, those with intellectual and digital agility will thrive.

EMPOWER DEVELOPERS

Innovation in-house requires a cultural shift, which encompasses moving away from disjointed efforts that can lead to a buildup of jumbled spreadsheets. Streamlining goals and facilitating developers’ aspirations can spark creativity for both talent and the company, therefore strengthening competitive edges.

“Regardless of what a student wants to do long-term, they must understand programming. They must move beyond the typical program and understand more about what data science involves.”

Dr. Steve Griffiths, Senior Vice President – Research and Development, Khalifa University

¹ <https://www.gla.global/gla-consultancy/vertical-development/>

² <https://blog.seagate.com/business/enormous-growth-in-data-is-coming-how-to-prepare-for-it-and-prosper-from-it/>

Chapter 4: Sustainable Growth

How to use digitalization to rethink economic and environmental goals in 2021?

- Ahmed Hashmi, Chief Digital Officer and Technology Officer – Upstream, BP
- Pattabhiraman Ganesh, Vice President – Digital Transformation & Lifecycle Services, Middle East & Africa, Emerson
- Uwa Airhiavbere, Managing Director of Worldwide Energy Industry Practice, Microsoft

Moderator: Sean Evers, Managing Partner, Gulf Intelligence

INSIGHTS

The success of the energy transition – cost-effectively providing more energy than ever before while dramatically reducing CO₂ emissions – will not be possible without leveraging digitalization. Realization of this unbreakable link gained paced in 2020, and now it must be supported to ensure that the potential of both camps – the energy transition and digitalization – are maximized in 2021 and beyond. Leadership within the energy industry must ensure that these nascent capabilities in the energy transition – such

“Three buckets must align for the energy transition to work: technology, policy, and finance.”

Uwa Airhiavbere, Managing Director of Worldwide Energy Industry Practice, Microsoft

as AI, predictive analytics, and digital twins – are built upon. Companies cannot revert to their old habits of environmental inefficiency as the Covid-19 pandemic is gradually brought under control and economics return to a ‘new normal’.

The role of digitalization in the energy transition is multi-faceted; only the very tip of the colossal iceberg of potential has been explored so far. For example, digital tools will be instrumental in making smart grids efficient and accessible, in bolstering energy efficiency, in helping curate a global carbon price, and greening much-needed fossil fuel markets, and much, much more. The list of opportunities appears to be endless. So, corporates must hasten their exploration of the benefits in 2021 – it is the only way to make the goals of the Paris Agreement a reality by mid-century.

3 DIGITAL PILLARS

HOW TO SPUR THE ENERGY TRANSITION?

Many of the building blocks needed to strengthen the points below have started to take shape. Over the next year, the goal will be to increasingly think long-term in order to sustainably spur the energy transition in the short-term. The industry’s growing resilience – in part due to its adaptation to several price shocks since 2014 and Covid-19 – means it is ever-mastering this balance.

• AGILITY

Deploying agile techniques around a company is a newer corporate narrative that is here to stay. The same applies to the ability to collaborate virtually, which creates much more efficiency. Sustaining this agility – be it in technology, human resources, business strategies, cross border partnerships, and so on – means not reverting to the pre Covid-19 state of ‘normal’. The heightened use of digitalization in operations over the last year must now form the foundation of a new status quo. Being able to flex while not jeopardizing energy security and profitability lies at the core of a successful energy transition.

• MODULARITY

Ensuring there is a ‘fabric’ of data inbuilt in more modular organizations is key to seamlessly connecting the different parts of the enterprise, especially during times of business growth. This also supports standardization across all talent pools and departments, while simultaneously helping spur progress on specific projects.

• AUTONOMY

Make the most of autonomous workflows to truly bolster efficiency and creativity. This includes releasing talent and removing the drudgery from their day-to-day operations – i.e., hunting for data and creating dashboards – so they can work on much higher-level tasks that typically result in higher value and more innovative results.



200bn

data points per day are ingested by the data pipelines in BP, which aims to ‘reimagine energy’ in the 21st century.

13%

of GHG emissions are currently covered by carbon trading schemes or a carbon tax, according to the World Bank. Digitalization lies at the crux of increasing this percentage in 2021 and beyond.²

50%

chance of reducing company costs if collaborative competition lasts 3-5 years, according to the Multidisciplinary Digital Publishing Institute.³

TAKEAWAYS

LEVERAGE CCUS

Greater momentum is needed surrounding the CCUS market – a very important tool in the road to net zero. After years of a declining investment pipeline, plans for more than 30 new integrated CCUS facilities have been announced since 2017. The vast majority are in the US and Europe, but projects are also planned in the Middle East, Australia, China, Korea, and New Zealand, detailed the International Energy Agency (IEA).¹ If all these projects were to proceed, the amount of global CO₂ capture capacity would more than triple, to around 130 metric tons per year. The 16 projects at advanced stages of planning, including several facing a final investment decision (FID) within the next 12 months, represent a total estimated investment of more than \$27bn. This is almost double the investment in projects commissioned since 2010 and around 2.5 times the planned investment in projects at a similar stage of development in 2017, the IEA said. Clearly progress is being made, but this must step up even more aggressively in 2021.

ALIGN ‘THREE BUCKETS’

Three buckets that must align for the energy transition to work are: technology, finance, and policy. While there is increased focus on technology, efforts on the policy front are still lagging and in turn, this impacts the availability of finance.

“I have more than 15,000 big data pipelines feeding many different workflows across the company. We are ingesting 200bn data points a day, which we are analyzing. All these analytics help us connect different competencies together in different ways. Rather than being a company that produces energy, we are a company that brings solutions.”

Ahmed Hashmi, Chief Digital Officer and Technology Officer – Upstream, BP

Policy must support technology to unlock finance, so that 20 renewable-orientated facilities can scale up to 2,000, for instance.

TRUST, TRUST, AND MORE TRUST

Building much-needed confidence in AI – along the value chain from tech companies, to energy stakeholders, to consumers – requires trust. There have been many AI pilots in recent years, which in part aim to build trust at a time when some remain hesitant. But now, with successful pilots proving the economic and environmental credibility of AI, the time for broader implementation is upon us. Industry must start taking this next step in 2021, while ensuring upmost transparency and communication with all stakeholders to sustain trust.

NEW BENCHMARKS

Establishing a carbon price is one of the biggest steps needed to truly accelerate the energy transition. Currently, some 40 countries and more than 20 cities, states and provinces already use carbon

pricing mechanisms, with more planning to implement them. Together, the carbon pricing schemes cover about half their emissions, which translates to just 13% of annual global greenhouse gas (GHG) emissions, according to the World Bank.² This is not an impressive percentage if you consider that the EU emissions trading scheme (ETS) – the world’s first international cap-and-trade scheme for emissions – was established 15 years ago. Smartly applying technologies – from monitoring, to harvesting, to analyzing data – is the only way to achieve a carbon price, be it regionally or internationally. The value of a global carbon price is undisputed. But the brick wall stopping energy stakeholders achieving this goal is, in part, due to the complexity of the task. Assigning a carbon value to every single energy product in every metric in every nation worldwide in a real-time system, as well using an easily comparable metric, is a mammoth task. Without the use of technologies like AI, predictive analytics, and the IoT, the level of detail required would be impossible.

“Existing facilities are going to move towards autonomous operations. That brings in challenges, but it also brings in a sharp focus on digitalization to bolster production and improve efficiency. And then there is the importance of addressing CO₂ emissions, which is where AI really comes into play.”

Pattabhiraman Ganesh, Vice President, Digital Transformation & Lifecycle Services, Middle East & Africa, Emerson

¹ <https://www.iea.org/reports/ccus-in-clean-energy-transitions/a-new-era-for-ccus#growing-ccus-momentum>

² <https://www.worldbank.org/en/programs/pricing-carbon>

³ sustainability-10-02688.pdf

Chapter 5: AI for Good

How to foster responsible innovation with AI within the energy sector?

- Daniel Jeavons, VP – Digital Innovation and Computer Science, Shell
- Trygve Randen, President – Software Integrated Solutions, Schlumberger
- Uma Sandilya, General Manager, Oil & Gas, BHC3
- Darryl Willis, Vice President of Energy, Microsoft

Moderator: Sean Evers, Managing Partner, Gulf Intelligence

INSIGHTS

AI holds some of the greatest potential in the tech world to help reshape the energy system. It is defined as: the ability of a digital computer or computer-controlled robot to perform tasks commonly associated with intelligent beings. The term is frequently applied to developing systems endowed with the intellectual processes characteristic of humans, such as the ability to reason, discover meaning, generalize, or learn from experience.¹ But its potential in the world of energy to bolster output, efficiency, and profit, while dramatically reducing CO₂ emissions has

“AI is one of the most promising technologies that allows us to reduce the footprint of existing operations while also shaping the future energy system.”

Daniel Jeavons, VP, Digital Innovation and Computer Science, Shell

barely been explored. Its applications are far-reaching, with some perhaps beyond comprehension.

At a more fundamental level, AI can support the growth of liquified natural

gas (LNG), the ‘greenest fossil fuel’. It can help scale up CCUS, establish a carbon price, put a carbon footprint on every fossil fuel product, and more. It can also play an indispensable role in the budding renewable energy market, including solar, wind, and hydrogen. Here, stakeholders can apply all the best practices that have only recently been learned, making these not only the greenest markets, but maybe the most modern too. In 2021, corporates must carefully craft responsible roadmaps so that AI can positively and sustainably help spur the energy transition while protecting balance sheets.

“A pressing question when it comes to AI is: how do we attract the talent we need in order for us to take advantage of AI capabilities? There are not infinite human resources emerging from universities with these skills.”

Trygve Randen, President, Software Integrated Solutions, Schlumberger



\$8.06bn

growth is anticipated in the AI market in the energy industry between 2020-2024, marking a CAGR of 48%, according to ResearchAndMarkets.²

87%

of 1,919 survey respondents said digitalization is part of their company's strategy, detailed DNV GL.³

\$26.34bn

was the valuation of the oil and gas security market in 2019. As the focus on security intensifies, including for AI, it is expected to reach \$34.59bn by 2025, said Mordor Intelligence.⁴

TAKEAWAYS

PROMOTE AN ECOSYSTEM

Integrating AI into the energy ecosystem must be a holistic effort. Each stakeholder has a responsibility to help carefully plan and correctly install AI – and its subsequent data harvesting – across the energy market. Without this cohesiveness, balancing the goals of corporates' balance sheets with the pressures of the energy transition will not be viable. In this vein, expect more partnerships between big energy and big tech, such as 'a Microsoft and a Shell'.

GAIN TRUST

There is a non-negotiable component to AI's success which is tricky to quantify – trust. Trust takes a long time to build and it is very easy to lose. AI tools must be deployed sensibly to sustain trust across the spectrum, from energy stakeholders to the general population. What is industry's ethical guidebook for implementing AI across energy markets? How can industry avoid bias in the AI system to ensure clean and transparent data and insights? How can accountability for sound AI standards be upheld worldwide, across nearly 200 nations that are home to nearly 8bn people? How to mitigate the risk of cyber-attacks on AI systems, and what safety nets are in place if the worst occurs? Being able to answer such pressing questions will lie at the heart of a trusted,

“AI can be an extraordinarily powerful tool. The way you apply it matters as much as the choice of projects you decide to take on.”

Uma Sandilya, General Manager, Oil & Gas, BHC3

sustainable, and scalable AI ecosystem in energy. Highlighting success stories can help minimize the concerns held by some in industry, government, academia, and wider society.

BOLSTER INDUSTRY'S TRANSPARENCY

Greater stewardship of AI is needed from industry. Many key players are involved, but there are still some who prefer to hoard their potentially game-changing intel on AI. As the industry seeks to tackle challenges to protect economies and the environment – especially amid the strains of the Covid-19 pandemic – responsible collaboration is a must. Rewriting the boundaries on what intel constitutes competitive intellectual property (IP) and non-exclusive royalty fees, for example, is a must-have conversation for corporates in 2021.

ACCESSIBILITY IS KEY

Democratizing access to intel on AI and technology has a meaningful impact when it comes to building trust and making projects scalable, especially for cross-

border projects. Part of this equation is being smart about the sort of projects that AI is used for. AI is an extraordinarily powerful tool and there are enough meaningful projects for all stakeholders to explore. But there are equally some projects that must be avoided, such as those with bias baked in or those with questionable ethics. Selectivity avoids expensive backtracking and reputational damage.

CROSS-INDUSTRY VALUE

Energy markets still have much to learn from other industries that have successfully integrated AI into their day-to-day operations. One speaker raised the example of healthcare, where AI is used to interpret scans and x-rays in seconds, rather than waiting weeks for the results. Energy markets are still relatively early on in their AI journey, but harvesting intel from other industries' successes – and failures – can save precious time as stakeholders solidify their digital footing in 2021.

“The global population is going to rise to nearly 10bn by 2050 and all those people need access to energy. So, we see AI as an essential assistant to everything that is being done to make things safer, more efficient, and more environmentally friendly.”

Darryl Willis, Vice President of Energy, Microsoft

¹ <https://www.britannica.com/technology/artificial-intelligence>

² <https://www.businesswire.com/news/home/20201104005556/en/Global-Artificial-Intelligence-in-Energy-Market-2020-to-2024---Players-Featured-Include-ABB-Alphabet-and-Flex-Ltd-Among-Others---ResearchAndMarkets.com>

³ <https://www.dnvgl.com/power-renewables/themes/digitalization/index.html>

⁴ <https://www.mordorintelligence.com/industry-reports/oil-and-gas-security-market>

Chapter 6: Compliance & Legal Best Practices

SNAPSHOT: How to close the data divide and ensure that the industry can benefit from AI and the data economy?

- Frederic Gimenez, Chief Digital Officer & Digital Factory Managing Director, Total
- Craig Hayman, Chief Executive Officer, AVEVA
- Sergio Zazzera, Business Partner, Technical Computing for Geosciences and Subsurface Operations and ICT, Eni

Topic Advisor: Dr. Saleh Shoaib, Corporate Affairs Lead, Microsoft

INSIGHTS

Agile and forward-thinking companies are disrupting legacy methods and approaches by embracing digital innovation. But despite encouraging levels of awareness and signs of adaptability, a Deloitte survey revealed that more progress is needed before legal and compliance functions within industry can fully embrace digital opportunities. Successfully making this transition means that companies will be able to efficiently revamp their approach to risk management and compliance, thus becoming more agile, integrated, and value driven. It is a win-win for those who can achieve it.

WHAT IS NEXT?

Begin by building a 'Culture of Compliance' and focus on every level of the organization in order to pin down better processes in the management of safety risks, incidents, and the onslaught of

"When discussing our Analytics Program, one question always arises: what amount of data is consumed in the program? And normally we say a lot. But in reality, it ingests more than 80 terabytes of data – this is equivalent to 73bn pages of text and data links. This applies to more than 90 quantitative models to identity, predict, and monitor risk in more than ten compliance and business scenarios. The program has helped the company identify and prioritize compliance risk, allocate resources to manage those risks, and operationalize risk management. It has also helped build those lessons into its business process – a major step."

Dr. Saleh Shoaib, Corporate Affairs Lead, Microsoft

regulatory requirements. Documentation, reporting standardization, and technological efficiencies – all facilitated by the 4IR – are critical for creating a compliance culture. It will also dramatically reduce organizational costs. A modernized compliance program which combines new technologies and new approaches – both aligned with corporates' goals – is the best

route. This can generate a measurable value proposition for the compliance function and turn the Chief Compliance Officer (CCO) into a strategic partner in top-level decision-making, which also boosts accountability. Overall, this turns compliance from a reactive, close-the-barn-door stance into a predictable and safer system.

4 PRINCIPLES

Microsoft's Compliance Analytics Program

1. Prioritization of risk
2. Data science
3. Managerial buy-in and accountability
4. Collaboration with the broader compliance community

1 <https://www2.deloitte.com/content/dam/Deloitte/dl/Documents/legal/DeloitteLegal-Legal-functions-embracing-digital.pdf>

2 <https://www.energydigital.com/utilities/7-top-trends-energy-and-utility-compliance>

3 <https://www2.deloitte.com/content/dam/Deloitte/us/Documents/regulatory/us-compliance-modernization.pdf>

4 <https://www2.deloitte.com/content/dam/Deloitte/us/Documents/regulatory/us-compliance-modernization.pdf>

5 <https://deloitte.wsj.com/riskandcompliance/2020/10/27/how-energy-companies-can-map-a-digital-future/>



CREATIVITY COUNTS

Overseeing the business risks associated with new technologies, such as AI, advanced automation, and cognitive technologies – as well as potential personnel challenges – may require new skills and fresh ways of looking at these projects. It is also important to determine who owns the management of risk associated with transformation efforts. Stakeholders must remember: it is a marathon, not a sprint.

Chapter 7: Integration

SNAPSHOT: How to streamline the quality of raw data inputs to maximize the value of AI?

- Khaled Al Blooshi, Vice President, Digital Projects & Innovation, ADNOC
- Rainer Ludwig, Global Director of Business Development Digital Solutions, Sensia
- James Wimbury, Resources (Oil, Gas, Petrochemicals) Lead – Saudi Arabia, Accenture
- Babur Ozden, Founder & CEO, MAANA
- Norm Gilsdorf, President, High Growth Regions, Middle East, Russia, Turkey, Central Asia & Customs Union, Honeywell

INSIGHTS

The energy industry is still in the process of digitalization. But what is clear is that large amounts of data are deeply influential when it comes to machine learning. And, that a lack of quality and accessible historical data is detrimental to energy companies' machine learning and AI projects. Data can only be collected once, so proactivity is integral to making progress. The curation of large and interesting datasets is one of the few defensible advantages that an energy company can build. These datasets are valuable not only because of how we can use them today, but because of the insights that can be generated tomorrow.²

BREAKING DOWN THE BRICK WALL

Outdated infrastructure is the largest stumbling block to the modernization of the energy sector. Currently, many companies may find themselves buried in a pile of data that they collect but they have

The lack of skilled resources for data management remains a top concern for energy stakeholders. That is no surprise, given that there are only 1-2mn data scientists compared to 5-10mn business intelligence power users.



no idea how to manage it.³ Essentially they are overwhelmed by a tsunami of numbers. Industry suffers great opportunity costs due to the vulnerabilities of outdated systems. Defining good quality data is complex and multidimensional. Typically, aspects of data quality include accuracy, completeness, timeliness, relevance, and accessibility. These are tall orders – especially as the industry grapples with the impact of the Covid-19 pandemic – but investing in such efforts today will support balance sheets later. This is especially true as competing firms are just as likely to start focusing more on their digital awareness and management.

“The digital skyscraper starts with the data, then models, and then algorithms.”

Babur Ozden, Founder & CEO, MAANA

YOU GET OUT WHAT YOU PUT IN

Inadequate data, or perhaps issues related to integration across various data sets, may negatively affect the value of the resulting data analysis. When insights are underwhelming, the tendency may be to undervalue the analytics process, leading companies to prematurely abandon or underinvest in the overall analytics effort.⁵ Instead, identifying risks early on means resources can be quickly directed to fix any mistakes and then data analytics and AI can be effectively deployed. Stay the course, as effective application will undoubtedly pay off.



¹ <https://adagefficiency.com/machine-learning-in-energy/>

² <https://adagefficiency.com/machine-learning-in-energy/>

³ <https://www.intellias.com/opportunities-and-challenges-of-artificial-intelligence-in-the-energy-sector/>

⁴ <https://www.intellias.com/opportunities-and-challenges-of-artificial-intelligence-in-the-energy-sector/>

⁵ <https://deloitte.wsj.com/riskandcompliance/2020/10/27/how-energy-companies-can-map-a-digital-future/>

Microsoft Energy Core’s Board Members

Energy Operators

Ahmed Hashmi, Chief Digital Officer and Technology Officer – Upstream, BP
Brad Davis, Innovation and Commercialization Manager, Chevron
Daniel Jeavons, General Manager, Data Science, Shell
Hamad Ahmad Al-Zaabi, Manager Innovation & Technology Group-KOC, Kuwait Petroleum Khaled Al
Blooshi, Vice President, Digital Projects & Innovation, ADNOC
Khalid S. Al-Ghamdi, Head of Digital Strategy and Growth, Saudi Aramco
Michael Deal, Chief Digital Officer, ExxonMobil
Sergio Zazzera, Business Partner, Technical Computing for Geosciences and Subsurface Operations and ICT, Eni
Torbjørn Folgerø, SVP & Chief Digital Officer, Equinor
Valero Joaquin Marin Sastron, Chief Digital Officer, Repsol
Nicolas Simone, Global Executive Director- Digital Transformation and Innovation, Petrobras

Universities

Adel Fadhl Noor Ahmed, Dean, College of Computer Science and Engineering, KFUPM
Ling Shao, CEO and Chief Scientist at Inception Institute of Artificial Intelligence, MBZUAI
Sebastian Geiger, Energi Simulation Chair and Director of Research, Herriot Watt
Steve Griffiths, Senior Vice President, Research and Development, Khalifa University

Industry Bodies

Mark Rubin, CEO and Executive Vice President, SPE

Technology Partners

Allan Rentcome, Chief Executive Officer, Sensia
Babur Ozden, Founder & CEO, MAANA
Craig Hayman, Chief Executive Officer, AVEVA
Norm Gilsdorf, President, Honeywell, High Growth Regions, Middle East, Russia, Turkey, Central Asia & Customs Union, Honeywell
Pattabhiraman Ganesh, Vice President, Digital Transformation & Lifecycle Services, Middle East & Africa, Emerson
James Wimbury, Resources (Oil, Gas & Petrochemicals) Lead – Saudi Arabia, Accenture
Ronan OSullivan, Vice President – Energy Industries, India, Middle East, and Africa, ABB
Susana Gonzalez, President Europe, Middle East & Africa, Rockwell Automation
Trygve Randen, President, Software Integrated Solutions, Schlumberger
Uma Sandilya, General Manager, Oil & Gas, BHC3

Microsoft

Ali Faramawy, Corporate Vice President, Digital Transformation & Partnerships Darryl Willis, Vice President, Energy
Dave Wisenteiner, Managing Director of Energy, Microsoft Azure
Vanessa Miler, Director, Energy Innovation & Impact

Energy Core Board Meeting (Q4, 2020)

Speakers

*(*Alphabetical order)*

Ahmad El Dandachi, Industry Lead - Energy & Manufacturing – Middle East & Africa, Microsoft
Ahmed Hashmi, Chief Digital Officer and Technology Officer – Upstream, BP
Ali Faramawy, Corporate Vice President, Digital Transformation & Partnerships
Babur Ozden, Founder & CEO, MAANA
Brad Davis, Innovation and Commercialization Manager, Chevron
Craig Hayman, Chief Executive Officer, AVEVA
Daniel Jeavons, VP – Digital Innovation and Computer Science, Shell
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Frédéric Gimenez, Chief Digital Officer & Digital Factory Managing Director, Total
James Wimbury, Resources (Oil, Gas & Petrochemicals) Lead – Saudi Arabia, Accenture
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Ronan OSullivan, Vice President – Energy Industries, India, Middle East, and Africa, ABB
Dr. Saleh Shoaib, Corporate Affairs Lead, Microsoft
Sean Evers, Managing Partner, Gulf Intelligence
Dr. Sebastian Geiger, Energi Simulation Chair and Director of Research, Heriot-Watt University
Sebastien Grau, Regional Director, Middle East Turkey & Africa, Rockwell Automation
Dr. Steve Griffiths, Senior Vice President – Research and Development, Khalifa University
Trygve Randen, President – Software Integrated Solutions, Schlumberger
Uma Sandilya, General Manager, Oil & Gas, BHC3
Uwa Airhiavbere, Managing Director of Worldwide Energy Industry Practice, Microsoft

